**494. Pulmonary rehabilitation: looking at alternative approaches and alternative populations beyond COPD**

P4797

**Pulmonary rehabilitation: First line treatment for respiratory disease**

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**Introduction:** Breathing Space is a multi-disciplinary primary care centre for the management of respiratory conditions in Rotherham, England. Breathing Space has an emphasis on Pulmonary Rehabilitation (PR) incorporating outpatient pulmonary rehabilitation and an inpatient facility.

**Aims:** The aim of the research was to establish the effect of PR on Patient Recorded Outcome Measures.

**Methods:** Data was examined retrospectively between June 2007 and December 2010. All patients underwent field walking tests (Incremental Shuttle Walk Test (ISWT), Endurance Walking Test (EWT) or 6 Minute Walk Test (6MWT)) and CRQ (self report) and HAD questionnaires. PR was provided over 12 sessions in a 6 week period.

**Results:** 94 patients with Bronchiectasis or Pulmonary Fibrosis were referred for PR. Of these 95% (n=78) agreed to attend PR after assessment. Refer to tables 1 & 2 for results.

**Results for walking tests**

<table>
<thead>
<tr>
<th></th>
<th>Bronchiectasis</th>
<th>Pulmonary Fibrosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invited</td>
<td>74% (n=60)</td>
<td>26% (n=22)</td>
</tr>
<tr>
<td>Female</td>
<td>57% (n=34)</td>
<td>41% (n=9)</td>
</tr>
<tr>
<td>Completion rate</td>
<td>97%</td>
<td>91%</td>
</tr>
<tr>
<td>Median ISWT pre</td>
<td>215M</td>
<td>207M</td>
</tr>
<tr>
<td>Median ISWT post</td>
<td>288M*</td>
<td>136M*</td>
</tr>
<tr>
<td>Median 6MWT pre</td>
<td>100M</td>
<td>75M</td>
</tr>
<tr>
<td>Median 6MWT post</td>
<td>138M</td>
<td>95M</td>
</tr>
<tr>
<td>Median EWT pre</td>
<td>6mins 39</td>
<td>4mins 52</td>
</tr>
<tr>
<td>Median EWT post</td>
<td>16mins 33</td>
<td>13 mins 37</td>
</tr>
</tbody>
</table>

*Denotes clinically significant result.

**Results of Health Status Measures**

<table>
<thead>
<tr>
<th></th>
<th>Bronchiectasis</th>
<th>Pulmonary Fibrosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyspnoea</td>
<td>3.13</td>
<td>2.55</td>
</tr>
<tr>
<td>Fatigue</td>
<td>3.07</td>
<td>2.42</td>
</tr>
<tr>
<td>Emotion</td>
<td>4.10</td>
<td>3.64</td>
</tr>
<tr>
<td>Mastery</td>
<td>4.11</td>
<td>3.70</td>
</tr>
<tr>
<td>Dyspnoea</td>
<td>3.76*</td>
<td>3.08*</td>
</tr>
<tr>
<td>Fatigue</td>
<td>3.90*</td>
<td>3.67*</td>
</tr>
<tr>
<td>Emotion</td>
<td>4.78*</td>
<td>4.83*</td>
</tr>
<tr>
<td>Mastery</td>
<td>4.20</td>
<td>4.84*</td>
</tr>
<tr>
<td>HAD anxiety pre</td>
<td>8.3</td>
<td>8.47</td>
</tr>
<tr>
<td>post</td>
<td>6.0*</td>
<td>6.46*</td>
</tr>
<tr>
<td>HAD depression pre</td>
<td>7.3</td>
<td>7.9</td>
</tr>
<tr>
<td>post</td>
<td>6.05*</td>
<td>6.31*</td>
</tr>
</tbody>
</table>

*Denotes clinically significant result.
Conclusion: Our data suggests that PR for patients diagnosed with Bronchiectasis or Pulmonary Fibrosis should be the treatment of choice.

**P4798**
Effect of pulmonary rehabilitation on gas exchange, muscle cross sectional area and functional parameters in interstitial lung disease

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Introduction: Pulmonary rehabilitation has an important role in the management of interstitial lung diseases (ILD). This study evaluates effect of pulmonary rehabilitation on gas exchange, muscle cross sectional area and functional parameters in patients of ILD.

Aims and objectives: To evaluate 6 minute walk distance (6MWD), Mid Thigh Cross Sectional Area on CT (MTCSACT) and Carbon Monoxide Diffusion Capacity (DLCO) before and after pulmonary rehabilitation in patients of ILD.

Methods: Twenty eight patients of ILD were randomly allocated to Control and Test groups. The control group received standard medications for 8 weeks while the test group was given supervised pulmonary rehabilitation along with standard medications for 8 weeks.

Results: Mean values of 6MWD changed from 476.50±61.97 m to 482.64±58.33 m in control group [p=0.399] and from 455.64±63.55 m to 509.78±69.03 m in test group [p=0.015]. Levels of DLCO changed from 11.8±4.38 ml/min/mmHg to 11.6±4.00 ml/min/mmHg in control group [p=0.390] and from 10.80±3.73 ml/min/mmHg to 13.08±3.87 ml/min/mmHg in test group [p=0.004] in test group.

Conclusion: The difference of means between control and test groups after pulmonary rehabilitation was significant for DLCO, MTCSACT and 6MWD. Positive correlation was obtained between MTCSACT and 6MWD in test group [p=0.07, p=0.006].

**P4799**
Pulmonary rehabilitation (PR) outcomes in chronic obstructive pulmonary disease (COPD) compared with interstitial lung disease (ILD)

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Background: PR is effective in improving exercise capacity, dyspnoea and quality of life in patients with COPD. The benefits in patients with ILD are less well described.

Methods: The records of 24 patients (15 male) with ILD who had completed PR were compared with age (within 2 years) and MRC score (same score) matched COPD patients (19 male) who had also completed PR within the same setting. Incremental shuttle walk distance (ISWT), endurance shuttle walk time (ESWT), level of exercise induced desaturation, chronic respiratory disease questionnaire (CRDQ) scores and hospital anxiety and depression (HAD) scores were measured at baseline and on completion of the 8 week programme. The mean changes in each group were compared using a paired t-test.

Results: The mean average age of each group was 68 years, with a mean average MRC score of 3.3. The baseline oxygen saturations in both groups was similar. Differences in outcomes between COPD and ILD groups

<table>
<thead>
<tr>
<th>COPD</th>
<th>ILD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔISWT (m)</td>
<td>36.2</td>
</tr>
<tr>
<td>ΔESWT (seconds)</td>
<td>506.1</td>
</tr>
<tr>
<td>ΔDyspnoea (CRDQ)</td>
<td>3.5</td>
</tr>
<tr>
<td>ΔFatigue (CRDQ)</td>
<td>1.2</td>
</tr>
<tr>
<td>ΔEmotional function (CRDQ)</td>
<td>4.1</td>
</tr>
<tr>
<td>ΔHAD Anxiety</td>
<td>-1.1</td>
</tr>
<tr>
<td>ΔHAD Depression</td>
<td>-1.8</td>
</tr>
</tbody>
</table>

Both groups showed improvements in all measured outcomes-most of which were clinically important. There was no statistically significant difference between the groups in any of the outcomes. In addition, the level of exercise desaturation after PR was greater in the ILD group (7.7%) compared with the COPD group (3.0%).

Conclusions: This study shows that PR in patients with ILD produces similar outcomes in those seen in COPD. The exercise induced oxygen desaturation seen in patients with ILD is greater.

**WEDNESDAY, SEPTEMBER 28TH 2011**

**P4800**
Exercise tolerance and symptoms after standard rehabilitation in emphysema-like COPD patients

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In this retrospective analysis on a cohort of 823 COPD patients (age 71±8 yrs, FEV1: 56±18% pr.) admitted in 3 centres, we aimed at describing the effect of standard rehabilitation on exercise tolerance and symptoms in the subgroup of emphysema-like individuals, as defined by lung function parameters.

Pre-to-post changes (D) in exercise tolerance (6MWT), Borg dyspnea (D), fatigue (F) and SatO2 (N) on effort, perceived breathlessness (MRC), and quality-of-life (SGRQ) were reported. Propotion of patients reaching the minimally clinical important difference (MCID) in 6MWT, D. F, MRC and SGRQ were also recorded.

Conclusions: None of the outcomes were significantly different from baseline.

**P4801**
Does better endurance capacity increase physical performance and work participation for patients with obstructive pulmonary disease?

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Background: Patients with chronic lung disease have increased risk of unemployment and disability pensioning caused by exacerbations and the complexity of this disease. Multidisciplinary pulmonary rehabilitation could be expected to improve physical performance, work stability and participation.

Aim: The aim of this study was to evaluate if a 4 weeks’ multidisciplinary vocational pulmonary rehabilitation had an effect on endurance capacity, and whether a change was correlated with degree of physical activity and work participation 1, 6 and 12 months post-rehabilitation.

Method: 128 consecutive patients were included in this intervention prospective cohort study. Endurance capacity was measured as time to exhaustion during constant work load treadmill walk before and after rehabilitation. Data on post-rehabilitation work relations and physical performance was collected by telephone interview.

Results: The endurance capacity increased from 360 sec to 840 sec (median), p=0.001 during the 4 weeks of rehabilitation. Increase in treadmill endurance time was correlated with physical activity 6 months after rehabilitation (r=0.22, p=0.023), but not 12 months post-rehabilitation (r<0.05, p>0.7). There was no correlation between increase in treadmill endurance and work participation 6 or 12 months after rehabilitation.

Conclusion: Patients experiencing the largest improvement in physical performance after participation in the current rehabilitation model were most likely to continue their physical activity 6 months after rehabilitation, but the effect was lost after 12 months. The degree of improvement in physical condition did not influence work participation.

**P4802**
Exercise physiologic response during three different video games in cystic fibrosis patients

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Cystic fibrosis (CF) is a multisystemic disease characterized by an abnormal ventilation response that limits the exercise tolerance. Physical training increases exercise capacity, decreases dyspnoea and improves quality of life. Adherence to respiratory rehabilitation programs is a key factor to guarantee optimal benefits. To determine the efficiency of three Wii video games as training systems by analysing the physiologic response in CF.

Methods: We included 24 CF patients: age 12±3.7 years; BMI: 18.3±2; FVC: 97±20%; FEV1: 93±20%, followed 4 different exercise types in randomized order

878s
Obesity in COPD and the response to pulmonary rehabilitation

Conclusions: Individual programs of RG reduced asthma symptoms and the use of outpatient PR program, we identified 64 NW and 67 OB patients. Baseline and quality of life compared with normal weight (NW) COPD patients, and would referred to pulmonary rehabilitation (PR) would have reduced exercise capacity and dyspnea. We hypothesized that OB COPD patients may have better survival than the non-OB, yet obesity may impair lung function, leading to ameliorated lung function. Obese in COPD was associated with less impairment in respiratory function, but MRC, HAD and FFM between the 2 groups.

Background: 50% of asthma patients experiences limitations in physical activity and usual lifestyle. Gymnastics can provide significant health benefits and improve quality of life.

Objective: To investigate effects of gymnastics on asthma patients, specifically leading to ameliorated lung function.

Methods: A prospective, randomized, controlled trial was performed to evaluate the effect of respiratory gymnastics (RG). 85 patients with moderate/severe asthma were randomly assigned to control (CG - 16 persons, standard therapy) or RG (RTGG - 69 persons, standard therapy & RG) group; with no significant difference in demographics. Patients were instructed how to practice exercises and examined in 3, 6, 9-12 months for pulmonary function, cardiopulmonary exercise and control of asthma.

Results: 12 month physical rehabilitation (with pharmacotherapy) reduced: the frequency of complaints, clinical manifestations of asthma; symptoms: daytime (from 54.7% to 7.1%; p < 0.0001); the consumption of β2-agonists (from 3.2 to 2.1 puffs/week). RTGG group increased: FEV1 (from 1.3 to 1.7 L); PEF (from 103.6±19.5 to 140.5±15.8 L/s); exercise capacity (W/kg) from 0.85±0.1 to 1.4±0.1. The number of patients with limited physical activity decreased from 86.0±6.5 to 22.0±5.9; p = 0.001. Heart rate and blood pressure recovery time after exercise decreased from 10.4±0.7 to 9.1±0.6 min (p < 0.05). CG changes were much lower (difference between groups was significant, p < 0.001).

Conclusions: Individual programs of RG reduced asthma symptoms and the use of bronchodilator medication in patients with asthma, and can be effective as an adjuvant therapy and optimize asthma patients medical treatment.
Conventional pulmonary rehabilitation (PR) suggests minimal active exercise. Therefore, the ventilatory limitation, severe COPD patients are not always able to fully contribute. Electrostimulation (ESM) of the peripheral muscles helps to prevent total unfitness of the patients muscles and could aim to a complete PR program. The benefits of this intervention may be even more. The cardiovascular effects of ESM are not known in severe to very severe COPD patients.

We prospectively studied 9 COPD patients (3 females and 6 males, mean age of 65 y/o, mean FEV1 of 0.78 L (28%)) undergoing home-based peripheral muscles ESM. This latter consisted of 5 periods of 20 minutes, 5 times a week and for 3 weeks. Short and long-term benefits were measured according to 6MWT and 1RM leg press test. Cardiac frequency (F) and arterial pressure (AP) were registered each 5 minutes during periods 1, 7 and 15.

F and AP did not show any significant fluctuations from beginning to end of the ESM period, and there is no difference between periods 1 and 15. 6MWT showed a median change of +14% (p<0.0001). The median change of 1RM performance score from baseline to four weeks was 3.85 + 1.25 points in the experimental and control groups (p=0.001), and for satisfaction scores 4.70 and 1.85 points in the experimental and control groups (p=0.002). From baseline to three months, performance scores changed 1.25 ± 0.00 points in the experimental and control groups (p=0.001), and satisfaction score changed 3.15 and -0.40 points in the experimental and control groups (p<0.001).

Conclusions: The patients with COPD participating in a 5 hours ADL-training program evaluated their performance and satisfaction of doing ADL to be better than those participating in a 1 hour program, both at the time of discharge and three months after discharge.

Comparison of efficacy of respiratory rehabilitation in patients with COPD and interstitial lung disease

A comparison of interstitial lung disease (ILD) with COPD is challenging. ILD is generally considered as a chronic progressive disease with a poor prognosis. PR should be considered as an adjunct to exercise training in COPD patients with severe interstitial lung disease.

Our study aimed to compare the efficacy of PR in patients with COPD and ILD. We included patients with COPD and ILD who received PR at the same institution. The primary outcome was the improvement of 6-minute walking distance (6MWD) and Borg score at discharge.

Results: We found substantial decrease in SGRQ score from 42.1 to 33.9 (p=0.0409) in total patients. Patients with ILD responded well to the program with the improvement of 6-minute walking distance (318.4 m to 331.6 m) and Borg score (5.2 to 4.4). There was no difference between the level of improvement in patients with COPD and ILD.

Conclusions: Our results show that PR improves both functional status and dyspnea in patients with ILD to the same extent as with COPD. PR should be considered as a standard of care for ILD patients.

P4812

Pulmonary rehabilitation in patients with interstitial lung disease – An useful therapeutic option?

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Introduction: Pulmonary rehabilitation (PR) is recommended for patients with chronic lung diseases by ATS or ERS independent of underlying disease. Data examining the role of PR in patients with interstitial lung disease (ILD) are limited,

Methods: We included 16 COPD patients with GOLD 3-4 who take part to a RRP during 12 weeks. The subjects were all unable to walk more than 350 meter at the 6-minute walking distance (6MWD) and were randomized in two groups:

- 8 patients performing the RRP (group R)
- 8 patients performing the RRP plus NMES (group R-ES)

We assessed the spirometry, the 6MWD, the VO2 max, the maximal work load developed on the cyclo-ergometer, the quality of life as well as the evaluation of the strength and the endurance of the quadriiceps at T0 and T12 weeks.

Results: We observed that the addition of NMES sessions as complementary technique to respiratory rehabilitation significantly increased the quadriiceps strength (± 19.4%), as well as in quality of life (SF-36), associated with a significant increase of the 6MWD (± 25%) in the group R-ES compared with the group R.

Conclusion: Further studies are needed to identify the physiologic mechanisms involved in the improvements after NMES as well as its place as adjunct therapy in respiratory rehabilitation.

P4808

Peripheral muscle electrostimulation: Cardiovascular response in COPD patients and long term effects

Bruno-Hugues Dallaire1, Mathieu Houle-Pilouin2, Poirier Claude3. 

The effect of BiPAP on maximum exercise capacity in patients with COPD

Patrick Huppmann1, Bernd Sczepanski2, Martina Boensch2, Sandra Winterkamp3, Ursula Schonheit-Kenn2, Klaus Neurohr1, Jürgen Behr1, Klaus Kenn1. Medical Clinic I, Division of Pulmonary Diseases, Klinikum Großhadern, Ludwig-Maximilians-University of Munich, Munich, Germany; 2Department of Pneumology, Schoeno-Klinik Berchtesgadener Land, Schoenau am Koenigsee, Germany; 3Department Internal Medicine III, BG University Hospital Bergmannsheil, Bochum, Germany

Aim: To investigate if COPD patients experienced differences in performance and satisfaction in performing ADL at inclusion (baseline), after four weeks (at discharge) and three months after discharge.

Methods: A prospective, randomized, single blinded, parallel group design. The control group received Glittreklinikken’s standard rehabilitation program, which included 1×60 min ADL-training. The experimental group received 4×60 min ADL-training in addition to the standard rehabilitation program. The Canadian Occupational Performance Measure assessed the performance and satisfaction of doing ADL at inclusion (baseline), after four weeks (at discharge) and three months after discharge.

Results: 24 COPD patients (59% women) were included; mean±SD age 69±8 years. FEV1% predicted change 43±14%TABLE 1. Changes in 6MWT and 1RM leg press test. It could precede a complete PR program in selected individuals with COPD and ILD. It could improve functional status in patients with ILD.

Conclusion: The optimal parameters of stimulation and its indication remain currently considered as an adjunct to exercise training in COPD patients with severe interstitial lung disease.
so far only a benefit of PR in patients with COPD is widely accepted. Aim of our study is to evaluate an in-patient PR in view of functional status and quality of life in ILD-patients.

Methods: 402 ILD-patients (IPF n=202, hypersensitivity pneumonitis n=59, sarcoidosis n=50, rheumatoid disease n=24, other n=67) with in-patient PR from 1999 to 2010 in a specialised centre were included. Mean duration of PR was 30±1 days. Pulmonary function, blood-gas analysis, 6-minute-walk test (6MWT), dyspnoea rating with visual-analogue-scale (VAS) and health-related quality of life (SF36-questionnaire) were evaluated on admission and discharge of PR-clinic. Results: 6MWT showed a significant improvement with 46±3m (admission 308±6m, discharge 354±6m, p<0.001). Dyspnoea rating before and after PR was indistinguishable. Lung function testing showed only a marginal improvement (vital capacity +1.3±0.4%, p=0.001). SF-36-questionnaire demonstrated an increase in all eight subscores as well as in physical and mental health summary scores (physical: +1.8±0.5 points, p<0.001; mental: +6.3±0.9 points, p<0.001). Underlying disease did not show any influence on improvement, but patients with signs of pulmonary hypertension had less improvement in 6MWD (36±5m vs. 49±3m, p<0.05).

Conclusion: PR has a positive impact on functional status and quality of life in ILD-patients. Therefore PR should be considered as a standard of care for patients with ILD.

P4813
Stationary bicycle training at home in COPD patient on LTOT. Is it enough to improve quality of life and exercise capacity? A pilot study

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Pulmonary rehabilitation improves quality of life (QoL) and exercise capacity (EC) in COPD patients. LTOT with stationary source may reduce daily activities (DA). Aim of study was to assess if self administered training at home improves QoL, EC and overcomes restriction in DA.

Methods: Consecutive COPD pts qualified for LTOT with oxygen concentrator were assessed and randomly assigned to training (TG) or control (CG) groups. Assignment comprised of: cardiopulmonary exercise test (CPET) on cycle ergometer, 6 minute walk test (6MWT), dyspnoea (MRC scale), lung function tests, QoL (SGRQ), DA measured by actigraphy and questionnaire. Training consisted of 30 min. cycling every day for 3 months. In TG adherence to training and its performance was verified by memory card, pts were regularly visited and load was adjusted to patients ability. CG was monitored by phone and encouraged to sustain physical activity.

Results: We studied 33 pts (18M, 15F), mean age 70±9 yrs, mean FEV1 0.9±0.4 l (40±13%), mean PaO2 55±4 mmHg. Of 20 pts allocated to TG, 13 pts completed training program. Adherence was satisfactory, pts trained 73±23% of days. TG showed significant improvement in SGRQ (symptoms) and duration of CPET. There was tendency to improve VO2max (p=0.054) and total SGRQ score (p=0.07). Better adherence to training correlated with greater improvement in QoL, VO2max and 6MWT distance. Higher work load reached during training correlated with reduction in MRC scale and improvement in 6MWT and VO2max.

Conclusions: Self cycling at home may improve QoL and EC in COPD patients starting LTOT with stationary source, but has no effect on performance of DA.

P4814
Pilot study of effectiveness of home rehabilitation for homebound patients with severe COPD

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Introduction: While pulmonary rehabilitation is efficacious, available evidence is not generalizable to patients who are homebound with severe impairment.

Objective: To test the effectiveness of home-based rehabilitation for homebound patients with physician-diagnosed COPD and severe functional impairment.

Methods: Homebound patients, defined as not driving independently and requiring taxing effort to leave home, were enrolled from primary care and pulmonary clinics. Patients were randomly assigned to one of two interventions comprised of education and physical therapy emphasizing either aerobic activity (A) or strengthening (S). The interventions were delivered over 8 weeks with up to 20 sessions. Pre- and post-intervention outcome measures were collected at 8 and 16 weeks using the Chronic Respiratory Questionnaire (CRQ) and 2-minute walk distance (2MWD).

Results: Of 41 patients enrolled 24 completed the 8 week intervention period with mean age 74.4 (SD 10.7) years, 45.8% female, FEV1 0.75L [30% predicted]. CRQ showed significant improvement in SGRQ (symptoms) and duration of CPET. Of 1 patients enrolled 14 completed the 8 week intervention period with mean age 74.4 (SD 10.7) years, 45.8% female, FEV1 0.75L [30% predicted]. CRQ showed significant improvement in SGRQ (symptoms) and duration of CPET. Baseline 2MWDs (mean, SD) were 56±0m (23.5) and 69±3m (34.0) for groups A and S, respectively. After 16 weeks all CRQ domains improved in both groups with the largest improvements in CRQ-dyspnea (A=1.85 [p=0.02] and S=2.21 [p=0.003]). Overall, the proportion of patients reporting clinically significant improvements in CRQ-dyspnea was 80% in group A and 71% in group S. Moreover, 2MWD increased in Group A but declined in Group S.