496. The best posters on physical inactivity, muscle dysfunction and exercise intolerance

P4758

Estimated steps from motion detectors worn at the wrist, waist and ankle in COPD patients

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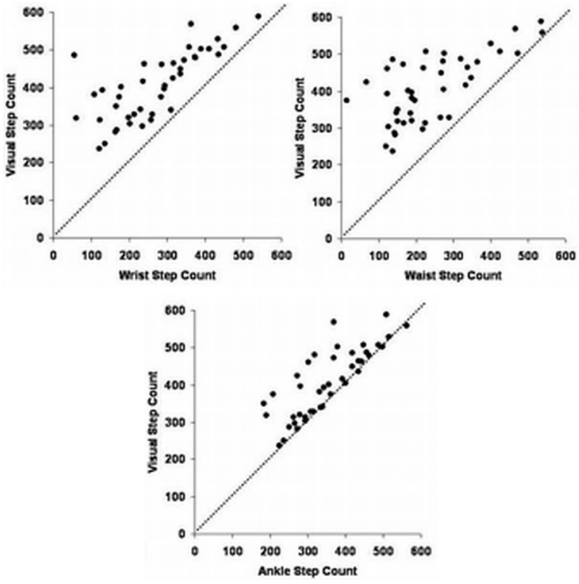
Increased walking activity is desirable in COPD patients, but its direct measurement presents a problem in slow-moving individuals. Accordingly, we tested the effectiveness of a tri-axial accelerometer in estimating steps in patients with COPD. Devices were simultaneously worn on the dominant side on the wrist, waist, and ankle. Estimated steps were compared to visually-counted steps in 14 patients (FEV1 52±22%). Step counting was performed at three walk speeds during endurance shuttle testing: 1) at the lowest shuttle walk speed [1.78 km/hr], 2) at 85% of maximal [3.18±0.53 km/hr], and 3) at mid-way between these extremes [2.50±0.33 km/hr]. The graphs (3 observations per patient) demonstrate the relationships between estimated steps from the 3 locations and visually counted steps. The diagonal line is the line of identity.



The devices significantly predicted counted steps (r^2= 0.57, 0.46 and 0.65 for wrist, waist and ankle locations, respectively, $p < 0.0001$ for all). However, the wrist and waist devices underestimated visually-counted steps at all walk speeds (-137±76 and -167±90 steps, respectively) although less-so at higher speeds, while the device on the ankle came closer: -55±57 steps (all, $p < 0.0001$). In summary, the accelerometer on the ankle appeared to be more accurate and precise as a step-counter in COPD patients.

P4759

Validity of activity monitors for physical activity assessment in patients with chronic obstructive pulmonary disease

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Rationale: Physical inactivity (PA) and symptoms during PA are hallmarks of

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COPD. Adequate assessment of PA is a challenging objective in COPD. Various activity monitors are available but the validity of these monitors is poorly established. We aim to evaluate the validity of six activity monitors in patients with COPD against active energy expenditure (AEE) measured with doubly labelled water (DLW).
Methods: Eighty patients with COPD (age 68±6 years, FEV_1 57±19% predicted) recruited in four centres each wore simultaneously four out of six available monitors validated in chronic conditions (Lifecorder Plus, ActiWatch Spectrum, RT3, Actigraph GT3X, DynaPort MoveMonitor and SenseWear Armband) during wakefulness for 14 consecutive days. AEE was calculated (0.9xTotal Energy Expenditure (TEE) [DLW]-resting metabolic rate) and the validity of the monitors was evaluated by correlations between AEE and monitors outputs and through multiple regression analysis using TEE as the dependent variable with total body water (TBW) plus several PA monitors outputs as independent variables.
Results: Except for the Lifecorder Plus and the RT3, the remaining four monitors met the validation criteria. Actigraph GT3X and DynaPort MoveMonitor explained the majority of the TEE variance not explained by TBW (53% and 70% respectively) and showed significant correlations with AEE (r=0.63 p<0.0001, r=0.55 p<0.0001, respectively).
Conclusions: The present findings should guide users in choosing valid activity monitors for research or for clinical use in patients with chronic diseases such as COPD.
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P4760
Performance of activities of daily living as a predictor of rehospitalization for patients following an exacerbation of COPD
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Purpose: To evaluate the rehospitalization rates for patients with COPD using performance of activities of daily living (ADLs) as a metric marker.
Method: The Discharge, Assessment, and Summary @ Home (D.A.S.H., Klingensmith HealthCare, Ford City, Pennsylvania) program is a respiratory therapist driven home care based program for patients with COPD who are using supplemental oxygen following discharge from the hospital following a COPD exacerbation. The program includes the performance of four patient selected ADLs (e.g walking the four points of the home, loading the dishwasher) on days #1, #7, and #30 post-hospitalization. Oxygen saturation is maintained above 90% using a SmartDose Oxygen delivery system. Each ADL is measured as either fully completed or not.
Results: A total of 229 patients were entered into the study and had four ADLs performed at each of the three visits. 9% (23/229) of the patients were readmitted to the hospital within a 30 day period. Of those, 8 (3.5%) were readmitted with a COPD exacerbation and 15 (6.6%) were readmitted for other reasons. For those patients who performed 1 or less of 4 ADLs (n=42) to completion by day #7 of the program, 8 (19%) were readmitted while for those patients who could perform 2 or more ADLs (n=187) to completion, 15 (8%) readmitted.
Conclusions: Those patients with COPD who were oxygen dependent following hospital discharge for an exacerbation of COPD who could perform one or less ADLs to completion by 7 days following discharge have a higher 30 day readmission rate to the hospital than those who could perform 2 or more ADLs to completion.

P4761
Effects of a 3-week inpatient pulmonary rehabilitation (PR) on activity parameter in patients with COPD
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Rationale: Physical activity (PA) level in patients with COPD is markedly reduced in comparison to elderly healthy people. The aim of this study was to investigate the effect of a 3-week inpatient rehabilitation program (PR) on activity parameter measured by SenseWear®.
Methods: Forty patients with COPD, stage III-IV (age: 62*m*5y; BMI: 26*m*5kg/m^2; FEV_1: 36±9%pred.) were included in this prospective trial. PA was measured by SenseWear® Armband in all patients for 3 days at the beginning and at the end of inpatient PR. Additionally, quality of life was requested by SF36 questionnaire and each patient performed a 6-minute walking test (6MWT) (after pretest) pre and post PR.
Results: 6MWD improved significantly following PR (+39.1 [95% CI, +69 to +8] p=0.01). We observed an increase in mental score of SF36 (+5.10 [95%CI, +9.8 to +0.4] p=0.03). No significant differences between PA parameter pre and post PR were found: total energy expenditure (+35.27±319kcal, p=0.49), steps per day (+293±1419, p=0.20), metabolic rate (-0.01±0.28, p=0.78), duration of PA more than 3fold basic metabolic rate (-4.9±74, p=0.63) were seen. There was no significant difference in PA data between 24 hours calculated as the mean of 3 days compared to the PA data of the first 24 hours of the 3 day measurement.
Conclusions: These data show that there are no relevant changes in PA following inpatient PR, although exercise capacity and quality of life are improved. We hypothesize that an inpatient setting predefines the daily amount of PA that is not similar to the activity chosen in daily life at home. We conclude that PA measurement may not be appropriate as an outcome parameter for an inpatient PR.

P4762
The usefulness of pedometry in patients with chronic obstructive pulmonary disease
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Introduction: Effort tolerance and daily physical activity (DPA) is predictive of quality of life and survival in COPD patients, but still remains difficult to assess them on their real life.
Aim: How to relate pedometry with other classical parameters commonly used in pulmonary rehabilitation (PR).
Methods: DPA has been evaluated by pedometry to 74 patients with COPD, age 63.55±8.73 (12 stage II, FEV1=60.16±7.78%; 29 stage III, FEV1=39.07±6.30%; 33 stage IV, FEV1=23.1±7.18%). Monitoring for a period of 7 days has been done before and 6 months after a PR of 3 weeks.
Results: Values have been widely dispersed with a maximum of 17420 and minimum of 964 steps/24hrs. Average values acquired: lowest in COPD stageIV, still with the highest increase over 6 months of PR +636 steps/24hrs (2476.32±2104.12→3112.63±2088.46 steps/24hrs, p < 0.02); in COPD stageIII the increase of DPA was +597 steps/24hrs over 6 months (5627.44±2152.95→6224.42±2105.19, p <0.04), in COPD stageII was the lowest increase +540 steps/24hrs (8724.33±2908.34→9264.16±2405.18, p <0.13), probably because the subjects belonging to this stage had the best preserved DPA. A low correlation was found with the 6-minute-walk distance and with the total score Saint George Respiratory Questionnaire (r=0.2). However it demonstrated the positive effects of PR even after 6 months on DPA.
Conclusions: DPA decreased opposite COPD stage, it is fluctuant with every subject, dependant of clinical status, weather and daily schedule. Wearing pedometers is very easy and motivational, provided that patients realize that they are being "watched".

P4763
Self-reported determinants of physical activity in COPD patients
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Introduction: COPD patients demonstrate reduced levels of daily physical activity compared with healthy controls1.This results in a higher risk of hospital admission and shorter survival2. Performing regular physical activity, reduces the risk of both COPD-related hospital admissions and mortality.
Aim: There is a lack of knowledge in the personal factors that determine whether a person is motivated to be physically active. Which factors cause patients to stay at home and which factors motivate them to be active?
Methods: We developed an online survey using www.surveymonkey.com which was posted on the patient forum of the Dutch Asthma Foundation and on COPD group sites of Hyves, a Dutch friend based site. The questionnaire was online from Oct. 23rd '09 till Jan. 12th '10.
Results: In total 192 COPD patients started the survey and 116 completed (60%). 66% were women and average age was 59±11 years. GOLD grades 1-4 were distributed as 18%, 31%, 32% and 19%, respectively. The top 3 of factors mentioned that stimulate physical activity was: 1. improvement of physical health, 2. the type of physical activity and 3. weather conditions. Demotivating factors were: 1. weather conditions, 2. tiredness and 3. dyspnea.
Conclusion: Most respondents are aware that physical activity influences their physical health. Awareness of the reasons for taking on an action is important in motivating oneself to conduct it. Knowing which factors influence patients to be physically active could be used as predictors for, or to influence physical activity in COPD patients.
References:
[1] Vorrink et al. Resp. Res. 2011, 12:33.
[2] Pitta et al. Eur Respir J. 2006 May;27(5):1040-55.

P4764
Physiological phenotype and daily physical activity in COPD patients. A pilot study in Greece
Eleni Kortianou[1,2], Zafeiris Louvaris[1], Vasileios Andrianopoulos[1], Stavroula Spetsioti[1], Maroula Vasilopoulou[1], Marianneta Roumpani[1], Ioannis Vogiatzis[1]. *[1]Thorax Foundation, Research Center of Intensive and Emergency Thoracic Medicine, Athens, Greece; [2]Department of Physiotherapy, Technological Educational Institute, Lamia, Greece*

Background: Although impaired lung function and skeletal muscle dysfunction impact on exercise intolerance and reduced physical activity in patients with

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COPD, there is limited available information on those phenotypic factors that determine real-life daily physical activity.
Aim: The objective of this pilot study was to examine the impact of baseline lung dysfunction, exercise capacity and quadriceps muscle strength on daily walking movement intensity (WalkMI), walking energy expenditure (WalkEE) and average energy expenditure (AvgEE) in patients with COPD.
Methods: 20 COPD patients (age: 66±10; FEV_1: 48±15%predicted; FFMI: 18±3) were assessed using an incremental work-rate test, the 6MWT and quadriceps muscle force (QuadsMF). Physical activity was measured over 14 consecutive days using the DynaPort MoveMonitor triaxial accelerometer.
Results: WalkMI was related to 6MWT (r=0.44, p=0.05) and inversely related to dyspnea sensations during the 6MWT (r=-0.56, p=0.009). WalkEE was positively related to peak oxygen uptake (r=0.57, p=0.009), peak work rate (r=0.59, p=0.006) and FEV_1 %predicted (r=0.52, p=0.017) and inversely related to dyspnea sensations during the 6MWT (r=-0.47, p=0.03). AvgEE expressed in Mets was related to QuadsMF adjusted by body weight (r=0.42, p=0.046) and inversely related to dyspnea sensations during the 6MWT (r=-0.53 p=0.017).
Conclusions: Strategies to enhance whole body endurance capacity and locomotor muscle strength would ameliorate daily physical activities along with dyspnea sensations in patients with COPD.
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P4765
Reasons to be physically active differ from reasons to be sedentary in COPD: A qualitative analysis
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The daily physical activity (DPA) level in COPD patients is low, notwithstanding its beneficial effects. For the development of successful prevention and management programs it would be helpful to gain insight in the reasons why COPD patients are physically active or sedentary. The aim of the study is to assess this in a qualitative way.
115 COPD patients (68% male, FEV_1%pred 58±28, age 65±9 years) were interviewed in-depth. Furthermore, DPA (tri-axial accelerometer), lung function and dyspnea (MRC-scale) were determined. Answers were categorized according to the Grounded Theory. Afterwards descriptive analysis using k-means cluster analysis was performed.
The cluster analysis shows 2 clusters, one cluster with a high DPA level (n=52) and the second with a low DPA level (n=60) (figure1). A high DPA level was related to being physically active because of fun, because of having a continuous active lifestyle in the past, the number of reasons mentioned to be physically active and self-efficacy. A low DPA level was related to being sedentary because of bad weather influencing health, financial constraints, bad health and shame to be physically active.

Variable	**Cluster I (n=52)** High DPA level	**Cluster II (n=60)** Low DPA level
Patient characteristics		
Mean steps per day, steps	**8807.4**	**3331.5**
Gender, (0=male)	0.27	0.37
Age, years	65.6	64.4
FEV_1, % predicted	**71.6**	**45.8**
MRC dyspnea, score (1-5)	**1.8**	**2.9**
Answers on the interview		
Self efficacy (0-1: 0=good self efficacy)	**0.06**	**0.20**
Reasons to be physically active (0-1)		
Fun	**0.44**	**0.68**
Having a continuous active lifestyle in the past	**0.63**	**0.80**
Number of reasons mentioned (1-4)	**1.90**	**1.62**
Reasons to be sedentary (0-1)		
Weather, health specific	**0.62**	**0.35**
Financial constraints	**0.88**	**0.52**
Health	**0.48**	**0.20**
Shame	**1.00**	**0.92**

Figure 1: k-means clusteranalysis
The clusteranalysis shows the variables that were significantly different between the clusters. *Gender and age did not significantly differ between groups. Reasons to be physically active or sedentary were coded as 0=present, 1= not present. Therefore, a lower score indicates that the specific reason was more present in that cluster. DPA= daily physical activity.*

This study shows that reasons to be physically active or sedentary are related to the level of daily physical activity in COPD patients. These factors could be useful for developing physical activity enhancement programs.

P4766
Muscle phenotypes in COPD patients: An exploratory cluster analysis
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Peripheral muscle dysfunction is a key outcome in chronic obstructive pulmonary disease (COPD) and has been well characterized by reductions in fiber cross-sectional area (CSA) and type I fiber proportion. However, it is currently unknown if these two features are linked and consequence of common factors (like the oxidative stress), because of a great heterogeneity in the patients muscle histomorphology, which overlaps with sedentary healthy subjects (SHS). We therefore tested whether the clustering of COPD patients and SHS would reveal reductions in fiber CSA and type I proportions in distinct or same sub-groups. Then, we aimed to model the occurrence of fiber atrophy and/or reduced type I fiber proportion in a decision tree.
Principal component analysis of functional and histo-morphological muscle parameters revealed two clusters of COPD patients. As compared with the two clusters of SHS, both clusters had a reduction in the type I fiber proportion ($p<0.05$). Reduced fiber CSA and increased protein carbonylation were found only in the most severe cluster of patients ($p<0.05$). Yet, clusters of patients had the same age (60.4±8.8 yrs vs. 60.8±9.0 yrs; p=0.87). Last, an algorithm including 6-minute walking distance, ventilatory threshold, and body mass index accurately classified 57% of the individuals according to fiber atrophy and/or type I fiber regression. These clusters may indicate distinct COPD phenotypes, as they are related to clinical outcome (muscle/fiber atrophy). Moreover, patho-biological mechanism and time course may have differed in the two clusters of COPD patients. Decision trees may improve the identification of COPD patients with distinct muscle features.

P4767
Is quadriceps muscle endurance reduced in COPD? A systematic review and meta-analysis
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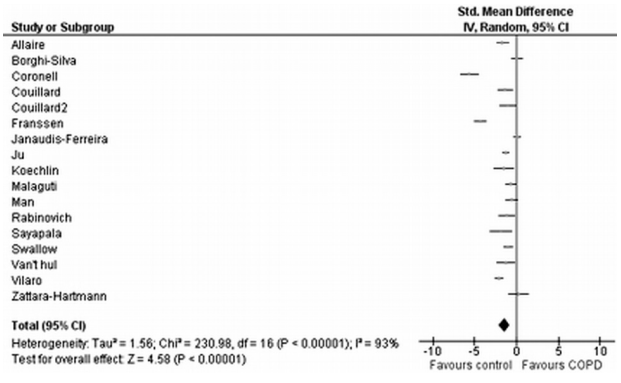
Background: Although quadriceps Type 1 muscle fibre proportion is reduced in patients with COPD, there is conflicting evidence as to whether quadriceps muscle endurance is impaired. We therefore performed a systematic review and meta-analysis of studies comparing quadriceps endurance in COPD to healthy controls.
Methods: Studies comparing quadriceps endurance between patients with COPD and healthy controls were identified using six databases (1946-2011) and grey literature. Full text articles were obtained after two researchers independently reviewed the abstracts. Weight standardised mean difference (WSMD) with 95% confidence intervals were calculated by a random effects model for measures of quadriceps endurance.
Results: Data were extracted from 17 studies involving 565 patients with COPD and 353 healthy controls. The outcome measurements involved a mixture of techniques. Quadriceps endurance was greater in the controls compared with COPD (WSMD -1.46 [-0.84 to -2.09]) $p<0.001$. This relationship was similar both when non-volitional versus volitional techniques (p=0.26) or when sustained versus dynamic contractions (p=0.43) were used to measure quadriceps endurance. There was significant heterogeneity between studies.



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Conclusions: Quadriceps endurance is reduced in patients with COPD compared to healthy controls. The results were independent of the type of muscle endurance test used.

P4768

Determinants of exercise capacity in patients with COPD

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Background: Patients with Chronic Obstructive Pulmonary Disease (COPD) suffer from a loss of lower-limb muscle strength and endurance (Franssen et al. MSSE 2005). To date, it remains unclear whether and to what extent decreased quadriceps muscle strength and/or decreased quadriceps muscle endurance contribute to different aspects of exercise capacity. Therefore, the aim was to study determinants of functional exercise capacity in patients with COPD.
Methods: In 66 patients (34 men, age: 64±8 yrs, BMI: 25±5 kg/m^2, FFMI: 17±2 kg/m^2, FEV_1: 34±14% pred, TLCO: 42±14% pred), 6-minute walk test (6MWD), constant work rate test (CWRT) on a bicycle ergometer at 75% of pre-determined peak work rate, quadriceps isokinetic peak torque (PT, Nm) and total work (TW, Joules; 30 repetitions at 90°/s) and PImax were measured.
Results: Patients had a poor functional exercise performance (6MWD: 317±104 m; CWRT: 192±113 s), quadriceps dysfunction (PT: 55±16% pred; TW: 1204±510 Joules) and respiratory muscle weakness (PImax: 70±23% pred). 6MWD correlated with TLCO (r=0.33) and TW (r=0.36; both $p<0.05$). CWRT correlated with PImax (r=-0.36), PT (r=0.44) and TW (r=0.49; all $p<0.05$). In stepwise multiple regression analysis, TLCO and TW explained 11% and 13% of the variance in 6MWD respectively, while TW explained 24% of the variance in CWRT.
Conclusion: Functional exercise performance is reduced in patients with COPD. Quadriceps muscle weakness and loss of muscle endurance partially but very weakly explain the exercise intolerance in patients with COPD.

P4769

Peripheral muscle strength and exercise capacity in children with cystic fibrosis and non-cystic fibrosis

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Cystic fibrosis (CF) is a chronic disease associated with pulmonary involvement, malnutrition, increased respiratory muscle work and musculoskeletal manifestations. Bronchiectasis not caused by CF is often perceived to be rare in western societies, but remains an important cause of chronic suppurative lung disease in the developing world among children. Therefore the aim of this study is to document the differences in exercise response and the possible underlying mechanisms between CF and non-CF patient groups. 24 patients with non-CF bronchiectasis (mean age 13.2(3.4) years) and 24 patients with CF (mean age 11.6(3.3) years) participated in the study. Pulmonary function testing and 6 minute walk test (MWT) were performed and peripheral muscle strength was measured by a hand held digital manual muscle tester to selected muscles. There was no significant difference between the physical characteristics, pulmonary functions, peripheral muscle strength and the distance walked in the 6 MWT ($p>0.05$). Non-CF patient group reached higher heart rate and maximum heart rate percentage in the 6 MWT ($p<0.05$). Distance walked in 6 MWT was significantly correlated with lean body mass (r: 0.613, $p<0.001$), maximum voluntary ventilation (r: 0.497, $p<0.01$) and peripheral muscle strength (r: 0.510, $p<0.01$) in the CF group. There was no relation between the exercise responses and pulmonary and nutritional factors in non-CF patients ($p>0.05$). Our data suggests that the major limitation to exercise seems to be related to nutritional factors in CF patients.

P4770

Validity of the six-minute stepper test in pulmonary rehabilitation

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Introduction: The six-minute stepper test (6-MST) is an easy, sensitive and secure field test used to evaluate the exercise tolerance. In a previous study, we have demonstrated the reproducibility and sensitivity of this test in patients with COPD (Borel B, et al. Clin Rehabil. 2010). The aim of this new study was to compare the 6-MST to the six-minute walk distance (6-MWD) and the cardiopulmonary exercise testing (CPET) before and after pulmonary rehabilitation (PR).
Methods: We enrolled 138 consecutive patients with chronic lung diseases who underwent a PR in a monocenter, prospective study (CEPRO 2011-036). Number of steps per six minutes on a stepper GoSport®, 6-MWD, oxygen uptake (VO2 in ml/kg/min) and workload at peak exercise (peak) and ventilatory threshold (VT) were measured at the beginning and the end of a six week PR.
Results: 6-MST was correlated with the 6-MWD (r=0.51, p=0.01), the VT and peak workload (r=0.53, r=0.63 respectively, p=0.01). There was a weak correlation with the VT and peak VO2 (r=0.35, p=0.05). After PR, there was a significant increase of the 6-MST (500 vs 437 steps, $p<0.001$), the 6-MWD (417 vs 390m, p=0.02), the VT workload (55 vs 44W, $p<0.001$) and the peak workload (91 vs 79W, $p<0.001$) and the VT VO2 (10.8 vs 10.2, p=0.025). There was no change of the peak VO2.
Conclusions: The 6-MST is correlated with the 6-MWD and the CPET workload. Our data demonstrate the clinical interest of this field test to evaluate the exercise tolerance in PR.

P4771

The 6-minute walk distance cannot be accurately assessed at home in people with COPD

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Background: There is growing interest in home-based rehabilitation and self management programs for people with COPD. The 6-minute walk test is commonly used to assess the effects of these treatments on exercise capacity, however it is not known whether this assessment can be performed accurately in the home environment. The aim of this study was to determine whether exercise capacity can be accurately assessed in the home using the six minute walk test (6MWT).
Methods: 14 participants with stable COPD (10 males), mean age 73 (SD 7) years and FEV1 55(14) %predicted undertook the 6-minute walk test at home and at the hospital. Home and hospital tests were conducted in random order on separate days, within one week, with two tests performed on each testing occasion and the best distance recorded. Hospital tests were conducted on a 30-metre walking track whilst home tests were conducted using the longest available track, inside or outside the home. Agreement for 6-minute walk distance (6MWD) across testing locations was examined using the Bland and Altman method.
Results: Eight home tests were conducted outdoors and six were conducted inside the home, with track lengths ranging from 7 to 30 metres. The home 6MWD was shorter than the hospital 6MWD (mean 37 metres shorter, limits of agreement -192 to 118 metres). For the home tests, a shorter track length was associated with a greater reduction in 6MWD (rS=0.65, p=0.01).
Conclusion: The 6-minute walk distance cannot be accurately assessed at home in people with COPD. Alternative exercise tests that are suitable for the home environment should be developed if a comprehensive assessment of people with COPD is to be performed at home.

P4772

Do field walking tests produce similar cardiopulmonary demands as an incremental treadmill test in obesity?

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Cardio-respiratory fitness assessed by peak oxygen uptake (VO_2pk) is an independent predictor of mortality in obesity. We investigated whether VO_2pk measured during corridor walking tests was similar to that measured by an incremental treadmill (ITM) test in obesity.
Methods: Individuals with a BMI >30 were recruited from a sleep clinic. All patients had treated Obstructive Sleep Apnea. Patients with chronic lung or heart disease were excluded. Participants completed an ITM test; the gold standard to determine VO_2pk, two six-minute walk tests (6MWT) and two incremental shuttle walk tests (ISWT) on three separate days in a randomised order. Expired gas analysis was performed during all tests. The difference between the peak parameters for the two corridor tests compared to the ITM was assessed by Dunnett test.
Results: 16 patients completed the study: 8 male, mean [SD] age 58 [12] y, BMI 36.1 [7.6] kg/m^2. The results of the second walking test were used. Table 1 shows the peak parameters for the three tests.

Table 1

	ITM	ISWT	6MWT
VO_2 (ml/min)	2266 [478]	2017 [561]	1778 [360]*
VCO_2 (ml/min)	2636 [695]	2210 [714]	1676 [471]*
VE (L/min)	82 [25]	73 [26]	56 [13]*
RER	1.16 [0.09]	1.10 [0.10]	0.99 [0.09]*
Heart rate (beats/min)	143 [30]	142 [27]	127 (21)

*Significantly different to ITM ($p<0.01$); VCO_2 = carbon dioxide output, VE = minute ventilation, RER = respiratory exchange ratio.

The limits of agreement for VO_2 pk between the ISWT and the ITM was 730 ml/min.

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Conclusion: In obesity, the ISWT VO_2 pk more closely reflects ITM VO_2pk than the 6MWT VO_2pk, but is not predictive in an individual.

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Long-term adherence to exercise after pulmonary rehabilitation: What are the motivating factors and barriers?

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Introduction: Adherence to exercise after PR is known to be low, but motivation/barriers to exercise in this population are unclear. This study aimed to investigate motivation and barriers to exercise post PR.
Method: A postal survey was sent to 112 (58=M) participants who completed >50% of a PR program in the previous three years. Collating demographics, physical activity level, exercise information and participants' views of their motivation (21 items) and barriers (14 items) to exercise, quantified along a 5 point-likert scale.
Results: 51.8% (n=58) responded; mean age 71.72, MRC dyspnoea 2.86 and co-morbidities 1.09, COPD=87.9%. Individual's motivation and barrier mean were calculated, but did not correlate, mean barrier did correlated with; MRC (p=0.003), co-morbidities ($p<0.001$) and intent to exercise ($p<0.001$). The most frequent (always/often) motivating reasons were; I want to improve my fitness=82.7%; I want to be physically fit=80.4%; I exercise for health concerns=72.6%. Barriers were; shortness of breath=58.4% and lack of energy=52.2%. Significant differences in motivation/barriers were identified between exercisers (≥ once a week most weeks) and non-exercisers, but not time since completion of PR. Preferred options to motivate exercise were; weekly PR group 47.4% and repeat PR yearly 42.1%, those with a higher motivation (p=0.039) or lower barrier (p=0.011) opted for the weekly PR group significantly more.
Conclusion: This study quantified motivation/barriers to exercise post-PR identifying many items that significantly differed depending on exercise level; these do not change significantly over time and may predict long-term exercise preference.

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Effect of pulmonary rehabilitation on erythrocyte oxidative stress and antioxidants in COPD patients

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Background and objective: Recent studies suggest that pulmonary rehabilitation (PR) is essential in the management of COPD. However, the effect of PR on oxidants and antioxidants in erythrocytes is only partially understood. The aim of this study was to evaluate whether PR improves not only exercise capacity and health-related quality of life (HRQL), but also the oxidant/antioxidant imbalance in erythrocytes.
Methods: Twelve stable COPD patients participated in PR for 8 weeks. A pulmonary function test, 6-minute walking test (6MWT), shuttle walk test (SWT), and the St. George's Respiratory Questionnaire (SGRQ) were administered before and after PR. Blood was collected prior to and after PR for analysis of thiobarbituric acid-reactive substance (TBARS), superoxide dismutase (SOD), Cu-Zn-SOD, glutathione peroxidase (GPX), and total glutathione (TGSH).
Results: After PR, exercise capacity was improved (6MWT: 399.5±28.6 vs. 455.1±31.7 m, $P<0.01$, SWT: 335.6±45.9 vs. 373.3±47.1 m, $P<0.01$). There were reductions in the SGRQ total, symptoms and activity scores, indicating a clinical improvement, but no significant difference in TBARS pre- and post-PR. Erythrocyte CAT activity and TGSH were significantly increased after PR (CAT: 158.2±4.8 vs. 174.4±6.6 K/gHb, $P<0.05$, TGSH: 4.9±0.7 vs. 5.9±0.7 μM/gHb, $P<0.05$), but there were no differences in the erythrocyte SOD and GPX activities and the Cu-Zn-SOD concentration.
Conclusions: The current study suggested that PR improved exercise capacity and HRQL and upregulated antioxidant capacity, resulting in no further increase with exercise therapy.

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A randomised clinical trial to assess the effect of active muscle stimulation on hospitalised patients with COPD exacerbations

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Introduction: Physical exercise reduces the detrimental effects of acute exacerbations in patients with chronic obstructive pulmonary disease (COPD). The Galileo™ system (Novotec Medical, Pforzheim, Germany) is based on the principle of active muscle contraction via extension reflex triggers.
Aim: To assess the effect of active muscle stimulation in hospitalised COPD patients on exercise capacity, health-related quality of life (Qol), and inflammation.
Methods: 24 hospitalised COPD patients with an acute exacerbation were randomised to participate either in the standard physiotherapy programme (PT: physical and respiratory exercises) or in the standard programme with the addition of exercises on the Galileo device (PTG). On the days of admission and discharge we assessed: 6-minute walking test (6-MWT), COPD assessment test (CAT), and serum c-reactive protein (CRP).
Results: The baseline characteristics are shown in table 1.

Table 1

	PT	PTG
Gender [M/F]	9/4	5/6
Alter [years]	72,92±10,21	67±11,93
BMI [kg/m^2]	25,73±5,81	25,05±4,81
FEV1 [%pred.]	40,47±18,49	34,49±12,17

Mean ± SD.

While CRP decreased in both groups ($p<0.05$), we found a significant increase in the 6-MWT ($p<0.005$) and a significant decrease in the CAT ($p<0.05$) in the PTG group only (table 2).

Table 2

	PT		PTG	
	admission	discharge	admission	discharge
CRP [mg/l]	22.23±13.94	10.41±8.14	57.45±81.14	6.82±3.19
6-MWT [m]	186.22±128.23	157.92±106.61	154.72±117.8	264.82±122.38
CAT	21.69±9.49	22.21±7.34	30.91±7.59	26.09±5.38

Mean ± SD.

Conclusion: In patients hospitalised due to an exacerbation of COPD, the addition of active muscle contraction with the Galileo system results in beneficial effects on Qol and exercise capacity.

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