87. The latest insights in integrated care

P620
Acute effects of light-emitting diodes on muscle fatigue during isometric exercise in patients with COPD: A pilot study
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Background: Patients with chronic obstructive pulmonary disease (COPD) are susceptible to early muscle fatigue. Light-emitting diodes (LEDs) have been used to minimize muscle fatigue in athletes and healthy subjects.

Aim: To investigate the acute effects of LEDs on muscle fatigue and perception of effort in patients with COPD during isometric endurance test of the quadriceps femoris (QF)

Methods: Ten patients (VEF1 50±13% of predicted) underwent a single LED and placebo (PL) application, 48 h apart, in a randomized, cross-over design. The LED and PL were applied in three localized areas of the QF (rectus femoris, vastus lateralis, and vastus medialis). Before and after exposure to LED and PL, patients performed an isometric endurance test (80% of the maximum voluntary isometric contraction) until the limit of tolerance concomitant to surface electromyography recording (median frequency as mean outcome). The slope obtained from linear regression analysis of the median frequency (MF) over endurance time was also used as an endurance index.

Results: Endurance time increased significantly after exposure to LED (from 26±2 s to 53 ±5 s) as compared to PL (from 23±3 s to 30±4 s) (F = 64, P = 0.0001). A greater decline in MF was observed during isometric endurance test after placebo, compared to LED (F = 14.6, P = 0.004). The slope of the MF over time was lower post-LED compared to post-placebo (-0.7 ±0.3 vs. -1.3±0.8; P = 0.004). The dyspnea score corrected for endurance time was lower post-LED (P = 0.008), but similar for fatigue both post-LED and post-PL.

Conclusion: A single application of LED minimizes muscle fatigue and increases isometric endurance time.

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Acu-TENS reduces breathlessness during exercise in people with COPD
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The aim was to evaluate the effect of the application of transcutaneous electrical nerve stimulation at acupoints (Acu-TENS) on breathlessness during exercise.

Methods: Individuals diagnosed with COPD were recruited in this randomized crossover study. Participants performed two incremental shuttle walk tests (ESWT) to determine an appropriate speed for the endurance shuttle walk test (ESWT).

After a session for practice of the ESWT, participants attended twice, one week apart, and performed two ESWTs per visit. On each visit, the second ESWT was performed an isometric endurance test (80% of the maximum voluntary isometric contraction) until the limit of tolerance concomitant to surface electromyography recording (median frequency as mean outcome). The slope obtained from linear regression analysis of the median frequency (MF) over endurance time was also used as an endurance index.

Results: Endurance time increased significantly after exposure to LED (from 26±2 s to 53 ±5 s) as compared to PL (from 23±3 s to 30±4 s) (F = 64, P = 0.0001). A greater decline in MF was observed during isometric endurance test after placebo, compared to LED (F = 14.6, P = 0.004). The slope of the MF over time was lower post-LED compared to post-placebo (-0.7 ±0.3 vs. -1.3±0.8; P = 0.004). The dysp notia score corrected for endurance time was lower post-LED (P = 0.008), but similar for fatigue both post-LED and post-PL.

Conclusion: A single application of LED minimizes muscle fatigue and increases isometric endurance time.

P622
Functional and metabolic consequences of increasing levels of neuromuscular electrical stimulation in non-depleted patients with COPD and healthy controls
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Rationale: Neuromuscular electrical stimulation (NMES) has been progressively used to improve skeletal muscle performance in patients with COPD. It is presently

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unknown, however, whether NMES is able to induce similar physiological and metabolic responses in COPD patients and healthy subjects.

**Objective:** To compare functional (torque) and metabolic (deoxyxygenation) effects of NMES at increasing levels of stimulation in patients with COPD and age- and gender-matched controls.

**Methods:** Fifteen males with moderate-to-severe COPD (FEV1 < 60% predicted) and 10 controls underwent high-frequency (50 Hz) NMES at 20 to 50 mA. Torque was measured by isokinetic dynamometry, muscle deoxygenation (HHb) by near infrared spectroscopy, and muscle mass by DEXA.

**Results:** Maximal voluntary contraction (MVC) was significantly lower in patients than controls; these differences, however, disappeared after muscle mass correction (p < 0.05). There were progressive increases in torque and HHb with amplitudes of stimulation in both groups. Although absolute torque at given level of stimulation was systematically lower in patients, MVC-corrected values were similar (20 mA ± 3.7% and 24.4 ± 4.8% in patients and 6.4 ± 2.2% and 22.4 ± 10.0% in controls, respectively). Moreover, there were no between-group differences in HHb (% cuff-induced maximal) across the stimulation intensities (p > 0.05).

**Conclusions:** Our results indicate preserved functional and metabolic responses to NMES in non-depleted patients with moderate to severe COPD. These data suggest that they might derive full physiological benefit from this intervention.

**P625**

**Current COPD care in the UK – Data from 16000 patients in the POINTS database**

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**Background:** COPD is a major UK healthcare cost. Differing standards of care exist e.g. those qualifying for payment; Quality & Outcomes Framework (QOF) vs. the patient-centred incentivised NICe guidelines.

**Aims:** To define a large UK wide COPD cohort and describe their primary care management compared to these standards.

**Methods:** We interrogated the Patients’ Outcomes and Information Service (POINTs) database of participating practices in the UK. POINTs provided by GlaxoSmithKline UK Ltd as a service to medicine is delivered by Quintiles Data was collected between 2007-08 and 2009-10.

**Results:** 1265 GP practices had a list size of 7mlion with 160000 COPD patients. 911 practices returned total list sizes (1.7% prevalence of COPD) 51,000 (32%) had a COPD review recorded yet 85000 (53%) had spirometry recorded within 15 months. 124600 had flu and/or pneumococcal vaccination status recorded (82%) but only 15% had exacerbation frequency recorded. Increases in MRC dyspnoea score (MRCD) recording occurred from 2007 at 28% to 44% in 2009 (p < 0.001). The most common prescription was short acting β agonist SABA in 67%. 41% of patients had an ICS-LABA combi- inhaler in 47% with only 16% of patients taking LABA alone (15% were prescribed an ICS inhaler). 19000 patients with mild airflow limitation were on ICS-LABA beyond licence (FEV1 66-80%). We found 10,000 potentially misdiagnosed patients with FEV1 > 80%; of these 38% were on ICS-LABA and 20% were on ICS alone.

**Conclusions:** Overtreatment of mild COPD with ICS-LABA or LAMA is frequent. Exacerbations rates were poorly recorded suggesting incomplete COPD reviews that may lead to failure of appropriate management. Exacerbation frequency recording should be incorporated into QOF pay.

**P626**

**The need for the integrated care for advanced COPD patients in the northern Poland (Pomerania)**

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**Background:** COPD is one of the most prevalent chronic disease, significantly increasing morbidity and mortality in developed countries. Symptom control and preventing risk of exacerbations is the main goal in the management of COPD. Poor compliance and insufficient self-management, especially in the more advanced patients are recognized causes of increased exacerbation rate. Currently, in the Northern Poland the model of integrated care for advanced COPD patients is to be introduced. However little is known about the need and acceptance for such a care among patients and their relatives. Thus, the aim of this initial study was to assess the QoL (using SGRQ) in 30 consecutive advanced COPD patients living one of the small towns in Pomerania and their acceptance for continuing support (two times a week during one month) delivered in their homes (assessed by specially constructed questionnaire). Home intervention included two-hours meeting (structured as follows: 30 min of education including assessment of the proper use of inhalators and medications intake, 30 min of physical activity, 30 min of small-talk focused on the subject proposed by patient, and 30 min of the assessment of symptoms, palsoxymetry and PEF measurement) with medical caregiver. Results demonstrated poor QoL in the study group during the stable period of the disease (total score of SGRQ – mean: 71; range: from 24 to 91) and the full acceptance for the home support (28 patients were very satisfied, 2 were satisfied). These findings confirmed the need for integrated care in Pomerania and chance for realization of the program.
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Family care in advanced COPD: Perceived difficulties and expectations of support from services
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Chronic Obstructive Pulmonary Disease (COPD) is an incapacitating, highly prevalent disease which often requires intensive support from patient’s family members. However, knowledge about the difficulties experienced by family members in their caregiving role remains scarce. This study aimed to explore the difficulties experienced by family carers, and their expectations towards social and health support services.

A qualitative, cross-sectional study was conducted with 21 family carers of COPD outpatients at advanced grades (GOLD 3 and 4). Semi-structured interviews were performed to collect data. Participants were mostly female (n=20), with a mean age of 60.90±12.35 years old, spouses (n=12) and caring for more than 4 years (n=18). All interviews were audio-recorded, transcribed and submitted to content analysis by 2 independent judges. The major difficulties reported are related to: i) provide support in basic (washing (n=6), dressing (n=2)), and in instrumental activities of daily living [preparing meals (n=4)]; ii) communication with patient (n=2); and iii) restrictions in social activities (n=2). Six carers did not identify any difficulty. Most of participants (n=12) could not identify how formal support services could help them. Only 3 participants reported the need of help to provide support in activities of daily living.

Carers reported several difficulties in their caregiving role. However, they were unable to identify how social and health services could support them. The lack of information about community resources might explain these results. Strategies towards effective flow of information must be addressed in order to prevent caregivers’ burden.

P628
Rehospitalization rates for patients with pneumonia who require supplemental oxygen therapy following hospital discharge
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Objective: To compare the hospital readmission rates for patients with pneumonia who require supplemental oxygen therapy following an exacerbation who are entered into a home-care based, respiratory therapist centered transition of care program.

Method: Patients with a diagnosis of pneumonia who required supplemental oxygen therapy on hospital discharge were entered into a post hospitalization transition of care program [Discharge, Assessment and Summary @ Home (D.A.S.H.), Klingensmith Healthcare, Ford City, PA]. Patients with a diagnosis of COPD were excluded from this analysis. The program consists of face to face visits by a respiratory therapist with the patient on days 2, 7, and 30 following hospital discharge. Education, behavior modification, skills training, oxygen titration during performance of activities of daily living, clinical assessment, and adherence data collection are components of the program. The 30 day readmission rates following discharge for those patients entered into the program over a twenty four month period were evaluated.

Results: 22 consecutive patients with pneumonia from 23 different hospitals were enrolled into the program over the two year period. None (0%) of the patients were rehospitalized within the first thirty days following hospital discharge.

Conclusions: The use of a multiple visit respiratory therapist based patient centered management program resulted in a significant decrease in the 30 day readmission rates for those patients who were discharged following a hospitalization for pneumonia.

P629
Psychological distress in asthma and COPD
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Background: The effective control of asthma requires a treatment regimen that may be compromised by psychological factors, such as anxiety and depression. The aim of our study is to estimate the prevalence of anxiety and depression among adults with stable persistent asthma.

Methods: We analyzed the data from 50 adult patients with persistent asthma (group A). Fifty patients with COPD (GOLD II-IV) were the control group (group B). The pulmonary function test was performed by spirometry. Depression and anxiety scores were assessed by Hospital Anxiety and Depression Scale. The prevalence of anxiety and depression was calculated in both groups and the difference between groups was estimated. The correlation between pulmonary function parameters and psychological distress was calculated.

Results: The anxiety score in Group A was 6.2±2.3 and in Group B 7.87±0.45. The depression score in Group A was 4.9±2.4 and in Group B 7.97±0.04. The difference between groups was significant for both anxiety and depression (p<0.05). There was no correlation between psychological status and pulmonary function tests in group A (p>0.05) and in Group B (p<0.05).

Conclusion: This research suggests the importance of psychological distress screening for patients with persistent asthma, as COPD also. Further studies are needed to examine the correlations between the severity of the respiratory disease and mental status and to target the psychological factors that contribute worsening asthma and COPD.

P630
Influence of anthropometric characteristics in respiratory reserve volume of elderly
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Introduction: The reduction of the respiratory reserve volume (ERV) is considered the most consistent finding for changes in lung volume in morbid obesity.

The importance of decreased ERV in morbid obesity is attributed to the known association between these volumes with the closure of small airways, which causes hypoventilation.

Objective: Was to correlate ERV with anthropometric characteristics of morbid obese women.

Methods: Cross-sectional study with morbidly obese (BMI>=40kg/m2) and control groups (BMI between 18.5 and 24.9 kg/m2), both with normal lung function. The body mass index (BMI), waist circumference (WC), waist-biip ratio (WHR), and neck circumference (NC) were measured. Subsequently, pulmonary function test was performed.

Results: A total of 30 morbidly obese (BMI 44.7±14.11 kg/m2) and 30 lean women (BMI 22.1±1.18 kg/m2) were evaluated. ERV was significantly lower in obese [0.28 (0.14L-0.60L)] when compared to lean women [0.74 (0.51L-1.08L)]. The percentage of predicted values of forced expiratory volume in one second (FEV1) were significantly lower in morbidly obese (88.31±4.31L/min) when compared to lean women (102.75±11.2L/min). There were no differences in forced vital capacity (FVC), the ratio FEV1/FVC. We found negative correlation between body mass, BMI, waist circumference (WC), waist-biip ratio (WHR) and neck circumference (NC) with ERV, respectively (r= -0.3757, -0.4112, -0.4771, -0.3456, -0.1545).

Conclusions: The ERV is influened by body mass, BMI, WC, WHR and NC.

P631
Association between the mini nutritional assessment and the COPD assessment test
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Background: The Mini Nutritional Assessment® (MNA) has not been studied extensively in COPD patients.

Objectives: We evaluated whether COPD patients with impaired health status determined by the COPD Assessment Test (CAT) have poor nutritional status according to the MNA.

Methods: We recruited clinically stable male COPD outpatients (age, ≥65 years) from a cross-sectional study. We conducted the following examinations: pulmonary function tests, nutritional assessment using the MNA questionnaire (high scores indicate good nutritional status), the CAT, and dyspnoea evaluation. The patients were divided into 2 groups: (A) those with CAT scores ≥10 and (B) those with CAT scores <10. We also calculated 4 scores exploring the domains of the nutritional status from the MNA questionnaire: anthropometric, general, dietary, and subjective scores.

Results: The study included 68 patients (mean age, 75.4 years). The total score was significantly correlated with FEV1% predicted, BMI, the Medical Research Council dyspnoea score, and the CAT score (Spearman’s rank correlation coefficient, ρ = 0.298, p = 0.013, ρ = 0.701, p < 0.0005, ρ = −0.373, p = 0.002, and ρ = −0.363, p = 0.002, respectively). Group A (n = 47) had significantly lower total, general, dietary, and subjective scores than group B (n = 21) (p = 0.003, p = 0.029, p = 0.045, and p = 0.014, respectively, Mann-Whitney U-test).

Conclusions: The nutritional status as determined by the MNA was associated with pulmonary function, dyspnoea, and the COPD-related health status. In addition, the nutritional status as determined by the MNA was significantly lower in COPD patients with CAT scores ≥10 than in those with CAT scores <10.

P632
Usability of digital media in patients with COPD: A pilot study
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Digital media can serve as the main interface between the patient and the care-
A home telehealth service for patients with severe COPD. The PROMETE study

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Goal: To establish the efficacy of a home telehealth service in patients with severe COPD, measured as the reduction in the number of hospitalisations, the length of hospital stay, A&E visits and deaths, due to COPD exacerbations.

Materials and methods: The PROMETE study is a randomised controlled trial including two groups, conventional healthcare and another telehealth, with 30 patients participating in each group. The trial was performed by the Pneumology Department from the Hospital Universitario La Princesa (Madrid, Spain) and coordinated with four local Primary Care Centers. Telehealth equipment, home service, technical assistance and specialized telehealth triage center was provided by Air Products Healthcare.

Patients included in the trial suffered severe COPD, GOLD stage IV, with at least one exacerbation episode that leaded to hospitalization in the year prior to inclusion in the trial.

Vital signs like blood pressure, heart rate, blood oxygen saturation and pick-flow where monitored in a daily bases.

Results: In the first three months of monitoring, 74 red alerts (clinical alerts) were detected. These alerts were evaluated upon severity and immediate clinical response was activated. The intervention group (home telehealth) experienced 10 A&E visits, 6 hospital admissions (with 44 cumulative days of stay), and 1 death due to a COPD exacerbation. While the control group experienced 30 A&E visits, 21 hospital admissions (with 239 cumulative days of stay) and 3 deaths.

Conclusions: Home Telehealth Services are effective in the follow-up of patients with severe COPD, and considerably reduce the number of hospital admissions and A&E visits, as compared with the control group.

Can controlled oxygen be safely given in the home environment?

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Introduction: Long term oxygen therapy is a widely used treatment in end stage COPD. Uncontrolled oxygen therapy can be dangerous due to CO2 retention. In hospital these patients would often receive controlled oxygen via Venturi mask systems (VMS). Historically VMS have not been used in the community as they may cause cyanosis to alarm and may not deliver an accurate FiO2. With newer concentrators and VMS available, we wanted to know if accurate FiO2 could now be practically delivered.

Aims: To compare the actual delivered oxygen concentration versus the manufacturers expected oxygen concentration through various combinations of VMS and oxygen concentrators.

Methods: We measured percentage oxygen output at manufacturers recommended flow rates via a concentrator. We tested three makes of VMS (Respironics, Salter Labs and AirSep), and seven types of concentrator, the AirSep New Life Elite, 0.5/8min and the AirSep VisionAir 0.3-3/min. We also tested the VMS with the hospital oxygen supply.

Results: The average differences from the stated percentage for the 3 makes of VMS via the concentrators were 2.2% (Respironics), 1.4% (Salter Labs) and 1.1% (Intersurgical). For walled oxygen it was 4.2%, 0.3% and 1.6%. Some combinations of oxygen source and VMS delivered oxygen that was higher than expected. This occurred in 45% of cases via the concentrator and 81.8% of cases via the walled oxygen. For all VMS the oxygen percentage delivered was lower or equal when using concentrators than from the wall oxygen source. The use of VMS with oxygen concentrators did not trigger the devices used to alarm.

Conclusion: Oxygen delivered by a VMS and a home concentrator appears safe compared to controlled oxygen in hospital.
Ventilatory responses during 6-min walk test in stable COPD patients

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Aim: The purpose of this study was to evaluate the ventilatory responses during the 6-minute walking test (6MWT) in stable COPD patients. Subjects and methods: 23 patients with stable COPD (23 male, age; 75.5 ± 6.4 years (mean ± SD), BMI; 22.5 ± 3.8, FEV1; 56 ± 21.2%pred) took part in this study. Throughout the 6MWT, oxygen uptake (V’O2), carbon dioxide production (V’CO2), minute ventilation (VE), and heart rate (HR) were measured using a portable cardiopulmonary exercise system (MetaMax 3B, Cortex, Germany). Dyspnea and oxygen saturation were recorded at each minute during the 6MWT. Dyspnea was measured using the Borg 0-10 dyspnea scale. The IC was measured at every two minute during the 6MWT. These data were compared with those of incremental cycle ergometer test (ICET).

Results: This study showed that the distance walked in the 6MWT was 505.7 ± 100.4 m, the peak V’O2 was 12.9 ± 2.5 ml/min/kg, the peak V’CO2 was 12.5 ± 3.2 ml/min/kg, the peak V’E was 28.2 ± 9.2 L/min, the Borg dyspnea scale at the end of the 6MWT was 4.6 ± 2.2, and the oxygen saturation showed 89.3 ± 2.9%. During the 6MWT, V’E/V’O2 and V’E/V’CO2 curve decreased for 2 minutes, and then showed a leveling off, while these curve inflected upward during the ICET.

Conclusions: These data suggested that the ventilatory equivalent at two minutes was most efficient and that respiratory metabolism was below anaerobic threshold during the 6MWT in stable COPD patients.

The effect of corticosteroid use on skeletal muscle function in patients with interstitial lung disease

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Background and objective: Many patients with interstitial lung diseases (ILDs) may have reduced skeletal muscle strength. Steroid therapy is often used in these patients and known to have many side effects including muscle weakness. However, the effect of corticosteroid on skeletal muscle strength is uncertain. The purpose of this study was to examine the effect of corticosteroid therapy on skeletal muscle strength in patients with stable ILDs.

Methods: Eighty-two ILDs patients were studied. Subjects were divided into with or without oral corticosteroid therapy, and skeletal muscle strength were evaluated.

Results: Handgrip and quadriceps forces were less in patients taking corticosteroid than without steroid. There were significant correlations between % predicted handgrip force and mean daily dose (r = 0.260, p = 0.019), duration (r = 0.276, p = 0.013), and total dosage (mean daily dose*duraction, r = 0.289, p = 0.009) of corticosteroids use.

Conclusions: Corticosteroid usage significantly affected skeletal muscle strength in patients with ILDs. Moreover, skeletal muscle weakness may be associated with increasing daily dose and duration of corticosteroids.

Validity of the visual simplified respiratory questionnaire (VSRQ) in pulmonary rehabilitation

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Introduction: Evaluating health-related quality of life (HRQL) in pulmonary rehabilitation (PR) is important. The St George’s Respiratory Questionnaire (SGRQ) is a disease-specific measure often used as a reference test in clinical trials. However, its length of completion limits its routine used. The Hospital Anxiety and Depression Scale (HAD) focused only on psychological distress. The VSRQ is a new tool designed to assess HRQL in patients with COPD (Perez T, et al. Int J Chron Obstruct Pulmon Dis. 2009). The aim of this study was to assess the clinical interest of this test in the evaluation of patients HRQL in PR.

Methods: We enrolled 138 consecutive patients with chronic lung diseases who underwent a PR in a monocenter, prospective study (CEPRO 2011-036). The global score of the VSRQ (scored from 0 to 80 with 8 questions), SGRQ (scored from 0 to 100 with 8 parts) and HAD (scored from 0 to 42 with 7 questions for anxiety evaluation and 7 for the depression) were measured at the beginning and the end of a six week outpatient PR. HRQL improvement was measured by the increase of the VSRQ score and the decrease of the SGRQ and HAD scores.

Results: The VSRQ correlated with the SGRQ (r=0.49, p=0.01) and the HAD (r=0.47, p=0.01). After PR, there was a significant improvement of the VSRQ (46 vs 39, p<0.001), SGRQ (38.3 vs 42.3, p=0.019) and HAD (14 vs 15.1, NS). The VSRQ increase correlated with the SGRQ decrease (r=0.39, p<0.01).

Conclusions: The VSRQ score correlates with the SGRQ and HAD scores. Our data demonstrate the clinical interest of this simplified test to evaluate the HRQL in PR.