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389. Respiratory mechanics, muscles and breathing; functional status measures and coping styles

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Respiratory muscle evaluation in neuromuscular diseases

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Neuromuscular diseases (NMD) significantly impair respiratory muscles, thus causing important respiratory complications.

Objective: To evaluate respiratory muscle functions in clinically stable neuromuscular patients.

Method: During a 6 month period, NMD patients (excluding ALS patients) were evaluated at an outpatient branch of a tertiary hospital. Measurements included arterial blood gases, spirometry, cough capacity, MIC, PIM, and PEM. Patients were questioned about ongoing physical and respiratory therapy treatments; results were descriptively analyzed (mean±SD) and diagnosis groups compared using ANOVA.

Results: 89 patients were included (43.5% women), mean age 43±14 y. and 71% were users of home mechanical ventilation. Mean values observed in whole group were PF:223±93; PCF:233±96; PIM:38±20; PEM:39±19. Sixty nine percent of patients had values of PCF<250 l/min. Duchenne and post-poliomyelitis patients presented the lowest values.

Respiratory muscle evaluation

	Duchenne (8%)	Steinert (45%)	Post Polio (12%)	Others Myopathies (29%)	Becker (6%)	p
PEF (L/min)	105	259	171	232	180	0.001
PCF (L/min)	108	267	185	241	197	0.003
MIC (ml)	1008	1745	1284	1742	1653	ns
PIM (cmH ₂ O)	15	34	41	43	48	0.02
PEM (cmH ₂ O)	16	34	50	43	51	0.001
FVC (ml)	840	2050	1180	2347	1115	0.01

ANOVA.

Only 5% of patients received functional physical therapy while only 3% underwent respiratory physical therapy.

Conclusions: A high proportion of these NMD patients showed respiratory muscle force values at risk of respiratory complications, so regular assessments are mandatory to select candidates for preventive chest physiotherapy techniques.

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Morning to afternoon change in respiratory muscle strength and functional capacity in multiple sclerosis

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Aim: The purpose of this study was to investigate the changes in morning and afternoon respiratory muscle strength and functional capacity in patients with multiple sclerosis.

Subjects and Methods: Eighteen patients with multiple sclerosis (36.28±7.78 years, 11 F, 7 M, EDSS 3.08±1.72) participated in this study. Pulmonary function test was performed. Inspiratory and expiratory muscle strength (MIP and MEP, respectively) were measured. Functional capacity was determined using six-minute walk test. Heart rate, oxygen saturation, dyspnea and fatigue perception using modified Borg Scale was recorded before and after the walk test. Procedures were performed twice, in the morning and in the afternoon, on the same day.

Results: Both MIP and %MIP increased significantly from morning to afternoon (p<0.05). Change in MIP (9.6±10.0 cmH₂O) and %MIP (10.7±11.6%) were significantly correlated with gender, body weight, and smoking history (p<0.05). No significant changes were found in MEP, %MEP, six-minute walk test distance, exercise heart rate, percentage of predicted maximal heart rate, fatigue and dyspnea perception (p>0.05).

Conclusion: Inspiratory muscle strength shows diurnal variation whereas functional capacity, fatigue, and dyspnea are repeatable in patients with multiple sclerosis.

P4082

Assessment of different normalization methods for sternocleidomastoid muscle electromyography activity

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Normalising electromyography (EMG) activity of the sternocleidomastoid muscle (SCM) has long been recognized by researchers and clinicians and has been carried out through maximal voluntary isometric contraction (MVIC), maximal inspiratory pressure (MIP) manoeuvre or at rest. The aim of this study was to compare the surface EMG of SCM activity (EMG System) normalized by these three different methods. Forty-six healthy subjects (25 M, 21 F, 23±3 years old), with normal lung function assessed by spirometry and body mass index values (22±3kg/m²) were studied. SCM activity was analysed in five measurements of MVIC; three of MIP and five at rest. The Root Mean Square (RMS) technique was used to process the signal. Statistical analysis was performed using ANOVA-repeated measures and Intraclass Coefficient Correlation-ICC. This study was approved by Ethical Committee.

Results: RMS data are presented as mean±SD.

Table 1

Measure	MVIC	MIP	Rest
1	424.95±26.00	162.02±12.44	5.14±0.31
2	416.53±26.83	169.37±13.31	5.08±0.34
3	398.14±23.41	164.42±12.71	5.18±0.33
4	396.52±22.38		5.06±0.32
5	391.49±22.26		5.21±0.35

Of the three methods investigated the MIP manoeuvre showed no significant differences among the three measurements (p<0.05). The ICC observed on the three methods was: MVIC=0.877; MIP=0.953 and at rest=0.960; considered excellent. In conclusion, our data suggest that MIP is the most appropriated method for EMG activity normalization of the sternocleidomastoid muscle due to the low variability and the high ICC score presented. In addition, it is a simple and quick method to apply and probably a method that better reflects muscle activity during breathing.

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Adaptation of the threshold IMT with double spring load

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Background: The IMT Threshold device is used for inspiratory muscle training and to assess respiratory muscle endurance. Although the large utility, load could not be increased beyond 41cm H₂O. The objective of this study was to evaluate the adaptation of Threshold IMT with double spring load.

Methods: In an experimental setting, the IMT Threshold was adapted with two spring load and coupled in a respiratory system that assesses pressure and flow. An air pump was used to simulate inspiratory flow. Air pump flow was adjustable to the threshold pressure to open the valve in 35 load levels (6 to 41 cmH₂O). Each setting was repeated ten times and the mean of each setting was used to statistical analysis. Linear regression was performed to predict the load value of IMT Threshold with double spring based on fixed load given by IMT Threshold device Manufactory Company.

Results: We found range load with double spring from 12.8±0.42 to 85.6±0.69 cmH₂O that correspond a range of 7 to 41 cmH₂O in IMT Threshold device Manufactory Company. The linear regression analysis found a relation IMT Threshold with double spring load predict by fixed load of IMT Threshold device with $y = -1.275 + 2.089 * X$, $r^2 = 0.99$ and $p = 0.0001$. The loads impose by device in all levels in approximately two times of fixed load by Manufactory Company.

Conclusions: Adaptation of IMT Threshold device with a double spring load seems to be able to achieve a load between 12.8 to 85.6 cmH₂O. The IMT Threshold with double spring load can be considered as a valid alternative to use the IMT Threshold device upper 41 cmH₂O.

This study is partial supported by CNPq/Brazil.

P4084

Inspiratory muscle fatigue and back muscle fatigability in persons with and without low back pain

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Increased back muscle fatigability as indicated by reduced lower back muscle endurance has been observed in persons with low back pain (LBP) and may be a risk for sustained LBP. LBP has a high prevalence in respiratory disease. Currently no study investigated respiratory muscle function and the impact of respiratory muscle fatigue on back muscle fatigability in patients with LBP.

We investigated respiratory muscle function (P_{lmax}) in LBP (22±4yrs) and controls (Ctr:23±3yrs). In addition we studied back muscle fatigability by investigating

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the endurance time (Tlim) and surface EMG (sEMG) median power frequency of the multifidus muscle during a modified Biering-Sörensen test. This was done with and without a prior inspiratory muscle loading at 80% of P_{Imax} until exhaustion (IML), aiming at eliciting isolated inspiratory muscle fatigue.

Lung function and respiratory muscle force were normal (P_{Imax} 107±38 in LBP vs 117±22%pred in Ctr). Tlim was significantly lower in LBP compared to controls (129±37s vs 181±51s; p<0.005). Tlim was reduced after IML in both groups (114±39s in LBP; 160±35s in Ctr, both p<0.01). sEMG showed more rapid signs of fatigue after the IML in both groups (all p<0.05). No between-group differences were observed.

We conclude that lower back muscle endurance is impaired in LBP and selective fatiguing inspiratory muscle endurance loading further reduces Tlim both in LBP and controls. This study underscores the role of the inspiratory muscles in the spinal stability and potentially in the aetiology of LBP. This is of interest, particularly in patients with respiratory disease who frequently suffer from lower back morbidity. TT is a post-doctoral fellow of FWO-Vlaanderen

P4085

Effects of pursed-lip breathing on dynamic hyperinflation and respiratory pattern at rest and during high intensity exercise in chronic obstructive pulmonary disease

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Background: although pursed-lip-breathing (PLB) is a strategy that potentially reduces expiratory flow limitation in patients with chronic obstructive pulmonary disease (COPD), there are only few studies addressing its effects during moderate and high intensity exercise.

Objective: investigate the effects of PLB on dynamic hyperinflation (DH) and respiratory pattern at rest and during high intensity exercise in COPD patients.

Methods: in a randomized cross-over study, ten patients (8 males) with stable moderate-to-severe COPD performed PLB and normal breathing (NB) at rest and during exercise at 75% of their maximum exercise workload in a cycleergometer. Tidal volume (V_T), respiratory rate (RR), and the percentage of abdomen (%AB) and rib cage (%RC) contribution to V_T were accessed by respiratory inductance plethysmography. DH was evaluated by inspiratory capacity (IC) before and immediately after the end of exercise. Statistical analysis used two way ANOVA and the differences were considered significant when p < 0.05.

Results: IC decreased at the end of exercise both in NB (1.63±0.15 to 1.12±0.11 L; p<0.001) and PLB (1.70±0.15 to 1.19±0.12 L; p<0.001), without differences between them. Only at rest, the patients presented an increase in V_T (478.3±45.8 to 600.2±79.3 mL; p<0.05) and reduction in RR (19.1±1.5 to 15.7±2.1 bpm; p<0.05) during PBL, but no differences were observed in %AB and %RC.

Conclusion: in moderate-to-severe COPD patients, pursed-lip breathing improves ventilatory pattern at rest. During high intensity exercise PBL does not reduce DH. Financial Support: PRONEX-MCT, CNPq, FINEP and FAPERJ.

P4086

Thoracoabdominal asynchrony analysis in subjects with COPD during exercise

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Patients with chronic obstructive pulmonary disease (COPD) have pathophysiologic alterations that may contribute to the thoracoabdominal asynchrony (TAA). The airway obstruction, respiratory muscles overload and disadvantage of these muscles secondary to hyperinflation may produce TAA. The aim of this study was to evaluate the relation between TAA, minute ventilation (MV), muscle activity of the sternocleidomastoides (SCM) and maximal load were reached during exercise in subjects with COPD. Twenty subjects with COPD (FEV₁ 39.08±12.9% predicted; FEV₁/CFV 0.39±0.08; age 67.95±7 years) were investigated at rest and during exercise on a cycleergometer. Correlations were carried out between the variables of TAA (Phase relation in inspiration - PhRIB, Phase relation in expiration - PhREB and Phase relation in total breath- PhRTB), electromyographic activity of the SCM, maximal load and MV at rest and during three progressive intensity exercise considering p<0.05. Significant correlations were not found between PhRIB, PhREB, PhRTB and activation of the SCM. Significant correlations were found between PhRIB, PhREB, PhRTB and load (r=0.456; r=0.298; r=0.387) and MV (r=0.423; r=0.239; r=0.328). The findings demonstrated that subjects with COPD show electromyographic SCM overload during exercise in cycleergometer, although this increase is not related to the TAA indices. We suggest that TAA increase during exercise is influenced especially by ventilatory demands, what is modified by the increase of load during exercise (support by CNPQ and FAPEMIG).

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Comparison of controlled breathing and free breathing submaximal inspiratory endurance test in health individuals

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Objective: Compare controlled breathing and free breathing inspiratory endurance test in health individuals.

Methods: Ten health young (3M, 7F) 21±8 years, BMI 21±3 kg.m⁻², VEF₁ 99±4% pred, P_{Imax} 85.3±15.6% pred, underwent a two randomized inspiratory endurance test in different days. Previous breathing pattern was assessing Vt, Ti, Te, Ttot, f. After ten minutes device familiarisation, maximal time (tlim) sustained at 60% of P_{Imax} threshold load was measured in two conditions: free breathing pattern and with controlled breathing pattern (Ti/Ttot=0.5, basal Vt,f was imposed with visual and auditory control). Endurance was measured with inspiratory side of IMT Threshold valve coupled at the end part of respiratory signal system. The endurance test was continued while the subject could maintain the target volume for three consecutive breaths. If the subject could not tolerate the mouthpiece, he (she) would stop the test. Sensations of dyspnea and fatigue were recorded at the end of each trial with Borg scale.

Results: Endurance time was higher in free breathing pattern than controlled breathing test (400±199 s vs. 299±134 s, p=0.008), no differences were found in sensation of dyspnea (1.2±2.3 vs. 1.7±1.9) and fatigue (4.1±1.5 vs. 4.4±2.2). All individuals were able to control their breathing pattern during endurance measurement.

Conclusion: These preliminary results suggest that breathing pattern may influence the performance of inspiratory muscle endurance in submaximal constant load test.

This study is partial supported by: CNPq/Brasil.

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A preliminary study into the reliability and responsiveness of recorded breathing parameters measured using an instrumented garment

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This study aimed to explore the feasibility of assessing 1) test-retest repeatability of respiratory parameters using an instrumented garment (LifeShirt[®]) during normal breathing, and 2) responsiveness of these parameters during slow breathing techniques. An uncontrolled test-retest design was used with participants acting as their own control. Nine healthy volunteers were recruited from a university student population. Four respiratory parameters (tidal volume, inspiratory/expiratory ratio, respiratory rate, phase angle) were recorded breath-by-breath during 30 minutes of normal resting breathing on two occasions. Parameters were also recorded during 30 minutes of slow breathing. The parameters studied showed variable degrees of reliability as assessed using the ICC. Expiratory tidal volume produced the highest ICC (0.93) and inspiratory/expiratory ratio the lowest (0.04). Bland and Altman plots showed no significant pattern of bias between sessions, but in some variables e.g. phase angle and expiratory tidal volume, there was a tendency to see larger differences as measures increased. During slow breathing there were measurable differences in all four parameters, reaching statistical significance (p<0.05) in three (not phase angle), and clinical significance in two (expiratory tidal volume and ventilation rate). No significant difference in minute ventilation was observed between normal breathing (9.92L/min) and slow breathing (9.01L/min). This preliminary study demonstrates it is feasible to produce objective measures while manipulating breathing patterns, but suggests that not all recorded parameters can be treated as equally reliable.

P4089

Effect of body position on respiratory pattern and thoracoabdominal motion in patients on waiting list for lung transplantation

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Objective: Our purpose was to examine the effect of body position on respiratory pattern and thoracoabdominal motion in severe pulmonary emphysema and bronchiectasis patients on the waiting list for lung transplantation.

Methods: We studied 13 emphysema patients (EN) and 11 bronchiectasis patients (BQ) by means of inductance plethysmography system in supine and sitting positions. In addition to respiratory variables (VT, respiratory times) and synchronic index of thoracoabdominal motion (MCA/VT), we analyzed the correlation between coordination movement and inspiratory muscle strength (MIP). ANOVA and Student's t test were used for p<0.05.

Results: The BQ group was younger (38±16 versus 53±11) and breath faster than EN group, which had a prolonged expiratory time (TE=3.26 versus 2.06). In both

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groups, the VT decreased in the sitting position with statistical significance only in the BQ group (383±143ml to 262±202ml). In the supine position the asynchronic thoracoabdominal motion was found in 6 emphysema (MCA/VT=1.16) and 3 BQ (MCA/VT=1.66). The number of patients with paradoxical motion was increased mainly in the BQ group when changing for the sitting position; 6 BQ with MCA/VT = 1.65 and 7 EN with MCA/VT=1.22. This alteration didn't show any correlation with the FEV₁ or MIP.

We conclude that severe respiratory dysfunction such as emphysema and bronchiectasis change the respiratory pattern. The sitting position, inversely to the normal behavior, worsened the tidal volume and the thoracoabdominal motion.

P4090**Study of breathing pattern and the thoracoabdominal motion during spontaneous breathing in patients with mitral valve disease**

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Introduction: Patients with Mitral Stenosis (MS) have hyperperfusion in the upper zone of the lung associated to abnormal breathing patterns. Rib cage dominant and paradoxical breathing patterns produce increase ventilation in the upper zone of the lung. It may represent a compensatory mechanism serving to match ventilation and perfusion. Mitral Regurgitation (MR) hasn't been studied yet.

Objective: To compare the breathing pattern and the thoracoabdominal motion between MS and MR patients during spontaneous breathing in the supine and sitting positions.

Methods: We studied 55 patients. Group MS had 29 patients (valve area of 0.97±0.2cm², 46±10 years, 21 females) and group MR had 26 patients (44±13 years, 18 females), in pre-operative period. We evaluated breathing pattern (VT, f, VT/VI, TI/TTOT) and thoracoabdominal motion (%RC/VT, MCA/VT) using a respiratory inductive plethysmography system in supine and sitting positions. Our data were analysed by ANOVA Two Way for level of significance p<0.05.

Results: No differences were found between MS and MR. The change from supine to sitting position didn't affect the respiratory times. There was increase in the tidal volume (VT= 382ml versus 469ml), mean inspiratory flow (VT/VI=267.4 ml/s versus 329.5ml/s) and rib cage motion (%RC/VT=34% versus 49%). The thoracoabdominal movement synchronism (MCA/VT=1.04) was presented in both groups and positions.

Conclusions: MS and MR in pre-operative of cardiac surgery had the same behaviour in breathing pattern and thoracoabdominal motion.

P4091**Chronic effects of smoking on pulmonary mechanics in young male adults**

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Introduction: According to a recent report on global tobacco epidemic (WHO 2008), Greece has the 2nd highest rate of smoking in men and the 3rd highest in women among 52 European countries. Moreover, smoking prevalence among young Greeks ranges from 28%–50%. Therefore, studying the effects of smoking on pulmonary function in young adults is of critical importance for Greece. In addition, it is well documented that adult smokers have impaired pulmonary function; however, little is known for pulmonary function decline in young smokers.

Aim: The purpose of this single blind study was to examine the chronic effects of smoking on pulmonary mechanics in young, healthy male smokers.

Methods: 52 smokers and 56 non-smokers, aged 20-25, were selected from a population of 618 students based on their sex, BMI (20-25kg/m²), physical fitness (low), smoking habit and health status. Smokers had more than three pack-years. Non-smokers had never smoked. All measurements were obtained by the same examiner, according to the recommendations of ATS/ERS. The examiner was not aware of the subjects smoking status. All subjects abstained from coffee and smokers from smoking for 8 hours before the tests.

Results: Non smokers and smokers had no differences regarding their height, body weight and BMI. Non smokers had significantly higher FVC and FEV₁ compared to smokers (5.72l vs 5.50l and 5.00l vs 4.79l respectively, p<0.05). FEV₁% did not differ between groups (87.4% vs 87.1%). FEV maneuver over the first 5 seconds was conducted and indicated that smokers had significantly lower FEV through all time intervals.

Conclusions: Chronic smoking was found to impair young male smokers' pulmonary mechanics, decreasing their FVC and FEV₁.

P4092**A comparison of subjective fatigue in COPD patients with healthy older people**

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Introduction: Patients with Chronic Obstructive Pulmonary Disease (COPD) may report negative effects of fatigue, however few studies compare fatigue components with healthy older people.

Aims: This study compares components of fatigue using the Multidimensional Fatigue Inventory 20 (MFI 20) in COPD patients with healthy older people.

Methods: 57 stable COPD (39 male; aged 69.1(54 – 86) yrs); mean (SD) FEV₁ 1.22 (0.6) l, predicted FEV₁ 47.9 (20.8) % and 33 healthy subjects (11 male; aged 67 (57-84) yrs) were included in the study. Fatigue was assessed using MFI 20 questionnaire. Other variables included body mass index (BMI), fat free mass (FFMI), Quadriceps Torque (Tq%BW) and depression (HADS). Differences between groups were tested using t-test.

Results: Age, FFMI and BMI were all similar between groups (p>0.05). However, HADS depression was higher and Tq%BW lower in COPD (p<0.01). Fatigue was significantly higher in COPD.

Comparison of mean(SD) fatigue score (MFI 20) in COPD and healthy groups

MFI 20	COPD (n=57)	Healthy (n=33)	Difference
General Fatigue	12.8(3.5)	8.0(2.7)	4.1(0.7)**
Physical Fatigue	14.1(4.1)	8.2(3.1)	6.0(0.8)**
Reduced Activity	13.0(4.0)	7.6(2.6)	5.4(0.8)**
Reduced Motivation	9.7(4.0)	6.6(2.3)	3.1(0.8)**
Mental Fatigue	8.2(3.7)	6.9(2.4)	1.3(0.7) NS

**p<0.01, NS p>0.05

Conclusions: Level of fatigue in COPD is higher than in healthy people of a similar age. Fatigue in COPD may be an underestimated symptom and requires further evaluation.

P4093**The sensitivity of the COPM in comprehensive pulmonary rehabilitation**

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Introduction: The Canadian Occupational Performance Measure (COPM) seems a promising instrument to assess any change in ADL performances resulting from pulmonary rehabilitation. The reliability of the COPM has been documented in pulmonary patients but questions remain as to its sensitivity to change.

Aim: Aim of the present study was to evaluate the sensitivity of the COPM to track changes in functional performance in patients with COPD following an intensive, interdisciplinary pulmonary rehabilitation program.

Methods: In 141 patients with COPD, pre- and post rehabilitation COPM scores for performance and satisfaction were obtained. Patients participated between June 2006 and January 2008, in a 12-week intense, comprehensive rehabilitation program in a tertiary rehabilitation centre. The majority (80%) followed the programme on an inpatient basis.

Results: Population characteristics: age 63±9 yrs, FEV₁ 1.06±0.46 l. (40±16%pred.), FRC 4.92±1.39 l. (158±38%pred.), W_{MAX} 47±35 Watt (35±21%pred.), VO_{2PEAK} 1.07±0.38 l. (67±21%pred.), 6MWD 358±104 mtr (56±15%pred.)

Both the COPM performance and satisfaction score increased statistically significant as well as clinically relevant from 3.26±1.30 to 6.86±1.43 and from 2.86±1.44 to 6.98±1.56 (p< 0.001), respectively.

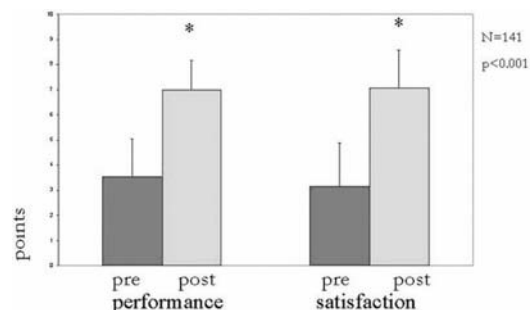


Figure 1. Canadian occupational performance measurement.

Conclusion: The COPM is a sensitive instrument to measure changes in functional performance in patient with COPD following a comprehensive pulmonary rehabilitation programme.

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P4094**Responsiveness of 3 subjective instruments for assessment of functional status in patients with COPD**

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Aim: The objective of the present study was to compare the responsiveness to change of 3 subjective instruments to assess functional status in patients with COPD: the Pulmonary Functional Status and Dyspnea questionnaire – modified version (PFSDQ-M), the London Chest Activity of Daily Living scale (LCADL) and the Medical Research Council scale (MRC).

Methods: Sixteen patients (9 female, 66 [62-71] years, FEV₁ 34 [32-58]%predicted) were submitted to a 3-month exercise program of high intensity endurance and strength training. Assessments at baseline and after completion of the program included application of the 3 instruments besides spirometry and assessment of muscle force, functional exercise capacity (6-minute walking test – 6MWT) and the SaintGeorge Respiratory Questionnaire (SGRQ).

Results: All SGRQ domains and its total score improved significantly after the program (all $p < 0.05$), as well as the 6MWT ($p < 0.01$) and quadriceps, biceps and triceps muscle force ($p < 0.0005$ for all). There was significant improvement after the program in the domains self-care, domestic, leisure and total score of the LCADL and dyspnea of the PFSDQ-M (all $p < 0.05$). No significant improvement occurred in the MRC ($p = 0.43$). Changes in the 6MWT were not correlated with changes in any of the instruments. Significant correlations occurred only between changes in the LCADL physical activity domain and in the SGRQ total score, as well as between changes in the PFSDQ-M dyspnea domain and in the quadriceps muscle force ($r = 0.57$; $p = 0.02$ in both cases).

Conclusion: Despite being responsive to exercise training, improvements in the LCADL and the PFSDQ-M correlate poorly with improvements in other outcome measures.

P4095**Portuguese version of the modified pulmonary functional status and dyspnea questionnaire (PFSDQ-M) and the Medical Research Council scale (MRC) in patients with chronic obstructive pulmonary disease: a validation study**

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Objective: To investigate the validity and reproducibility of the Portuguese version of two subjective instruments which assess limitations in the performance of activities of daily living (ADL) in patients with COPD: the Pulmonary Functional Status and Dyspnea Questionnaire-Modified version (PFSDQ-M) and the Medical Research Council scale (MRC).

Methods: 30 patients with COPD (17 men; 67±10 years; FEV₁ 42±13%predicted) filled in twice the Portuguese version of both instruments within a 1-week interval. The PFSDQ-M is composed by 3 domains: influence of dyspnea and fatigue in ADL, and changes in ADL in comparison to before the start of the disease. The MRC scale is simple, composed by only 5 items, amongst which the patient reports his/her level of limitation in daily life due to dyspnea. The traditional Saint George's Respiratory Questionnaire (SGRQ), previously validated in Portuguese language, was used as validation criteria.

Results: The intraclass correlation coefficient between test and retest of the PFSDQ-M was 0.93, 0.92 e 0.90 for dyspnea, fatigue and change in ADL, respectively, whereas for the MRC scale it was 0.83. The Bland & Altman plots showed good agreement between test and retest for the PFSDQ-M. The PFSDQ-M domains and the MRC scale were significantly correlated to all domains and the total score of the SGRQ ($0.49 < r < 0.80$; $p < 0.01$ for all).

Conclusions: The Portuguese versions of the PFSDQ-M and the MRC scale were shown to be reproducible and valid in patients with COPD.

P4096**Sensitivity of the clinical COPD questionnaire to measure disease control in COPD patients referred for pulmonary rehabilitation**

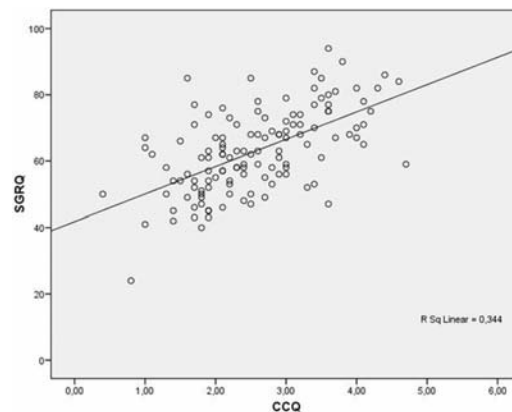
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Introduction: The clinical COPD questionnaire (CCQ) has been developed as a screening tool to measure disease control in COPD patients. However, due to the simplicity of the CCQ, its sensitivity to detect the overall impact of chronic lung disease on quality of life may be questioned.

Aim of the study: The purpose of this study was to compare results of the CCQ, the St. Georges Respiratory Questionnaire (SGRQ) and the Short-Form 36-item Questionnaire (SF-36) in patients referred for pulmonary rehabilitation.

Methods: In 121 patients with COPD referred to our centre for pulmonary reha-

bilitation we assessed the CCQ, SGRQ and SF-36. Population characteristics are: age 63±10 yrs, FEV₁ 43±17%pred., W_{MAX} 52±39 Watt, 6MWD 386±111 mtr. **Results:** The average scores for the CCQ total score, the SGRQ total score and the SF-36 physical component summary score and SF-36 mental component summary score were 2.60±0.89, 63±13, 33.2±6.6 and 42.4±11.6, respectively. Figure 1 represents a scatter plot of the CCQ and SGRQ total scores.



Significant correlation coefficients were observed between CCQ and SGRQ total score ($r = 0.58$; $p < 0.001$), the CCQ and the physical component of the SF-36 ($r = 0.37$; $p < 0.001$) but not between the CCQ and the mental component of the SF-36 ($r = -0.11$; $p = 0.22$).

Conclusion: These data suggest that the CCQ may underestimate the impact of COPD on quality of life, in particular on mental aspects.

P4097**Improving passive coping style increases quality of life in patients referred for pulmonary rehabilitation**

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Introduction: A passive coping style is characterized by rumination and depressive thoughts. It is measured via the UCL (Schreurs, 1984). In general, passive coping styles are negatively related to quality of life (McCarthy et al., 2002). We predict that improving the coping style in pulmonary patients will have a positive effect on quality of life.

Results: Pulmonary patients and a passive coping style have a lower quality of life (mental component of the SF36) pre-rehabilitation than patients with an average or low passive coping style (see Table 1).

The rehabilitation program lowers the passive coping responses for patients who score high on this passive coping style, from 15.4±2.8 pre-rehabilitation to 13.1±3.2 post-rehabilitation, $F(1, 65) = 39.0$, $p < 0.001$. Furthermore, the program improves the score on the mental component of quality of life from 43.3±11.9 pre-rehabilitation to 50.7±10.3 post-rehabilitation, $F(1, 177) = 67.7$, $p < 0.001$. The more passive the patients were before rehabilitation, the more the program improved their quality of life, $\beta = -0.23$, $p = 0.002$. Lowering the passive coping style was linked with an increase in quality of life, $\beta = -0.24$, $p = 0.001$.

Table 1

SF-36 mental component	Mean	SD	N
Low passive coping	52.9 a	10.3	25
Average passive coping	44.7 b	10.6	123
High passive coping	36.5 c	10.5	97
$F(2,242) = 30.8$, $p < 0.001$			

Note. a,b,c indicate differences between groups ($p < 0.05$).

Conclusion: The rehabilitation program succeeds in improving the coping style of COPD patients, which leads to an improvement in the quality of life of these patients. The more passive the coping style of patients had been, the greater the effect was on quality of life.

P4098**Impact of patient education and knowledge on emergency room visits in patients with obstructive pulmonary disease**

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Obstructive pulmonary diseases are major health problems and an extensive burden on the patient and the health care system. In guidelines, patient education is

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recommended, but the influence on patient knowledge and health outcomes is not fully examined. The aim was to describe knowledge and investigate what factors measured at baseline were associated with further emergency room (ER) visits over a 12 month period.

136 patients (60 years) with asthma (84) or COPD (52), who had performed an ER visit because of an exacerbation were included. They were interviewed (telephone) 4 to 6 weeks after the ER visit and followed for a year.

Most patients had received information but < 20% experienced that their knowledge was "good". Patients with "good" were younger, had asthma diagnose, had had respiratory symptoms for more years, and had a higher educational background ($p<0.05$). 52% performed at least one ER visit within the following year, and significantly more patients with COPD (67% vs 42%, $p<0.05$). Patients who had performed ER visits the year before inclusion had a higher risk of ER visits the following year, adjusted HRR was 3.83 (1.99-7.38). Regarding patient education and knowledge there were no significant differences between the group with further ER visits and the group with only one ER visit (inclusion criteria) after adjusting for sex, diagnose and age.

In conclusion, although most patients had been informed their knowledge was poor. Our results indicate that increased attention regarding patient education is needed to minimize the burden of disease.

P4099**What factors influence adherence to portable oxygen systems in patients with chronic obstructive pulmonary disease (COPD)? A qualitative study**

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COPD is a common respiratory disease in the UK, with 900,000 known cases and the likelihood of a further 3 million undiagnosed. Many of these patients receive long-term oxygen therapy (LTOT), which has been documented to reduce mortality if used for at least 15 hours per day. The change to UK oxygen prescription practices since February 2006 has produced an increased prescription of ambulatory oxygen (AO) systems. Proper use of AO can improve both quality of life and adherence to LTOT. The aim of this research was to discover from patients using AO, how and why they decided to use, or not use their system. Thirty COPD patients were interviewed in their own homes, of whom only 2 were using their AO systems on a regular basis. The most common reason for not using AO was that the patient was unable to carry the AO cylinder, and was reliant on a carer to do so, if the carer was physically able. Some patients felt embarrassed and stigmatised by wearing the AO system in public, often using it in the car but not for walking in public. Most had received little or no information or education on the AO system, which had been delivered with an LTOT concentrator, either on discharge from hospital or from their Primary Care physician. Those patients who had AO systems prescribed by their local Respiratory Centre recalled having more information given to them. These findings suggest that physical difficulties, feelings of stigma and lack of information may all contribute to a patient not using their AO system as prescribed. Further work is needed to see if intervention in any of these areas improves the use of AO systems in COPD patients.