

387. Challenges in chronic disease management: helping individuals with chronic lung disease remain stable

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Late-breaking abstract: Comparison of respiratory symptoms in chronic pulmonary obstructive disease and restrictive ventilatory impairment according to disease stage: The PLATINO study in Latin America

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Introduction: Obstructive pulmonary disease presents defined symptoms such as cough, dyspnea, sputum and wheezing. Symptoms of restrictive ventilatory impairment are less well defined.

Objective: Compare the occurrence of respiratory symptoms in chronic obstructive pulmonary disease with the ones presented by individuals with restrictive impairment in the different stages of the disease.

Methods: Between 2002 and 2004, individuals over 40 years of age from five cities in Latin America were analyzed and had a pre post-bronchodilator spirometry done and reported their respiratory symptoms.

Results: N= 5315: 260 (4.9%) - restriction impairment and 759 (14.4%) - COPD diagnoses. Patients with COPD coughed more (31.4% vs 23.5%; OR 1.36: 1.05, 1.74) and had more sputum (28.3% vs 21.9%; OR 1.30: 1.0, 1.68). No difference was seen in dyspnea (OR:0.86 (0.69,1.06) between the two groups. Comparing the different stages of disease, at moderate stage: COPD patients presented more cough than those with restrictive impairment (40.5% vs 27.3%; OR 1.53: 1.07-2.20) and more sputum (36.6% vs 23.6%; OR 1.57: 1.07- 2.30); moderate, severe and very severe stages: COPD had more wheezing episodes than those with restrictive disease. Regarding dyspnea, it was more intense in patients with mild restriction than in those with mild COPD (43% vs 56%; OR 1.11: 1.02,1.21).

Conclusions: Cough and sputum are more frequent in patients with COPD than those with restrictive ventilatory impairment. Dyspnea is a symptom more pronounced in patients with restrictive impairment compared with individuals with COPD in early stages of the disease.

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Mobile device usability to support chronic obstructive pulmonary disease management

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COPD generates a serious burden on healthcare system. Telemedicine contribute to an efficient use of healthcare resources reducing number of non-scheduled visits. Are lacking studies assessing patients and healthcare provider's satisfaction on those new approaches. The aim of the study was determine the usability & satisfaction of COPD patients and professionals with a mobile device to support COPD management. A mobile system was offered during two weeks to 17COPD patients (FEV1 47±19% pred; age 65±8). Patients answered the EuroQoL questionnaire every day and used pulse oximetry during any exercise session at home setting. Data was collected & checked in a technological platform. Patients and professionals accomplished a usability & satisfaction questionnaire at the end of the study.

18% of patients refused and 65% finished the program. 83% felt safer during exercise and more controlled by professionals. 61% indicated that the device makes them do more physical activity. Lack of acceptance to undergo the study and drop-outs were associated with personality disorders (p<0,05). All patients evaluated positively the usability of the device and as a motivator to perform exercise. All professionals evaluated it as a useful tool to enhance life-style and to support their remote management.

Transfer of data between a mobile device and a digital platform is feasible for COPD patients. Remote monitoring of physical activity can enhance motivation to perform sustainable exercise and seems to show high grade of adherence. Long-term follow-up of a large number of patients will be needed to define effective home-based services to enhance management of COPD patients.

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Access and use of communication technologies in patients with chronic obstructive pulmonary disease

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Information and Communication Technologies (ICT) have proven useful to enhance

citizens' active involvement in several domains, including healthcare. Despite access to ICT is widespread across Europe, usability of ICT by elderly patients with chronic conditions remains controversial. The research was conducted within the frame of NEXES, an EU project designed to assess extensive deployment of integrated care services supported by an ICT platform (Linkcare®). The study explores current habits/attitudes of COPD patients concerning the use of mobile phones and Internet.

Prior to the initiation of the wellness and rehabilitation program in NEXES, we conducted a phone interview to 68 COPD patients (FEV1 P5-P95: 21-74%pred; age P5-P95: 54-78 years) to investigate their attitude towards technology.

41% of the patients use Internet and 91% use mobile phones. 58% of all subjects have internet access at home. The main reason for not using Internet is a poor knowledge on how to use it (76% of non-users). But, 55% of the non-Internet users are interested in learning how to use it. Among the Internet users, 89% have access to e-mail and 46% of them participate in social networks. 62% of patients send SMS's and 15% send files by mobile phones. The use of mobile phones correlates with age (p=0.04) whereas Internet use correlates with educational level (p<0.001), but not with disease severity or aerobic capacity.

The percentage of COPD patients using Internet and mobile phone is similar to the general population of the area for the same range of age. Disease severity does not seem to be a factor limiting accessibility and use of ICT tools in COPD patients.

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Evaluation of a web based home training program for COPD patients: A controlled trial

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Introduction: An important aim of rehabilitation of patients with COPD is to support them in acquiring and maintaining an active lifestyle. Dependent on their ability to train, patients visit the rehabilitation center 2 or 3 times a week. It is hypothesized that a web based home training program, with exercise videos and a videoconference module can increase the efficiency and effectiveness of this rehabilitation program.

Aim and objective: To evaluate a web based home training program for COPD patients in terms of user experience (satisfaction and usability) and clinical benefits (changes in subjective perceived and objective measured health status: dyspnea and fatigue (VAS), CRQ and Six Minute Walk Test).

Methods: COPD patients were divided into a control and an intervention group. Patients of the control group followed the traditional rehabilitation program. Patients of the intervention group followed the same program but a web based home training program was provided as addition (for those visiting rehabilitation center 2 times a week) or as partly replacement (for those visiting rehabilitation center 3 times a week). At baseline and after intervention measurements were obtained.

Results: Preliminary data analysis (n=23) shows that patients are satisfied with the web based home training program and rated its usability as good. The degree of clinical benefit of the intervention group (n=23) is similar to the progression made by the patients of the control group (n=20) after rehabilitation.

Conclusions: Based on preliminary results, a web based home training program seems to have potential to treat patients in their own environment under professional supervision.

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Fit for flight? An investigation into awareness of air travel recommendations among patients with respiratory disease

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Objective: To investigate awareness of air-travel guidelines among patients with respiratory disease.

Background: While the population has aged and prevalence of respiratory disease has risen, air travel has increased dramatically in the UK. A significant proportion of flight-related emergencies may be of respiratory origin.

Method: 64 respiratory patients completed questionnaires based on British Thoracic Society (BTS) guidelines, screening for awareness and experience of air travel. Pulse oximetry readings were performed and, where possible, spirometry. Frequency data was analysed in StatsDirect, using Exact (Clopper-Pearson) 95% Confidence Intervals. Enquiries about in-flight oxygen were made to 8 airlines.

Results: 72% of patients were not aware of air travel guidelines. Of patients who deemed themselves fit to fly, 4% would require in-flight oxygen and 37.5% would be likely to require oxygen on flights lasting over 2 hours. Among patients planning to fly, most considered themselves fit to fly, although 79% were unaware of the guidelines and 42% would be eligible for hypoxic challenge testing. Of patients with experience of air travel, 87.5% had never been offered pre-flight respiratory tests and 25% had suffered in-flight respiratory problems.

Conclusion: Awareness of air travel guidelines among respiratory patients is low and poses a significant health risk. Patients are inadequately offered pre-flight

respiratory tests and availability of in-flight oxygen varies widely between airlines and is, when offered, an expensive service.

This study calls for greater recognition of air travel with respiratory disease among patients, physicians and airlines alike.

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Air travel and COPD: Exercise SpO₂ and walking distance as predictors for in-flight desaturation

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Background: Supplemental oxygen during air travel is recommended when in-flight PaO₂ is expected to fall below 6.6 kPa in patients with lung disease. Sea level oxygen saturation by pulse oximetry (SpO₂) alone has proven inadequate as a predictor of in-flight hypoxemia, and it has been suggested that exertional desaturation and walking capacity may provide useful additional information in the initial pre-flight assessment.

Aim: The study aimed to evaluate if exertional desaturation and walking distance during a 6-min walk test (6MWT) might help predicting in-flight hypoxemia and thereby the need for in-flight oxygen in patients with COPD.

Methods: COPD-patients referred to hypoxia-altitude simulation test (HAST) were consecutively included. Lung function tests, blood gas measurement, 6MWT, and HAST were performed.

Results: 100 COPD patients (42% men) were included, mean (SD) age 65 (8) years, FEV₁ 41 (13)% predicted. SpO₂ baseline was 93 (3)%, PaO₂ HAST 6.3 (0.6) kPa, and nadir SpO₂ 6MWT 83 (6)%. Nadir SpO₂ 6MWT and walking distance correlated with in-flight PaO₂ (r=0.49, p<0.001 and r=0.27, p=0.007, respectively). ROC analysis with nadir SpO₂ 6MWT against PaO₂ HAST < 6.6 kPa gave an area under the curve of 0.786 and suggested that the cut-off yielding greatest accuracy for an in-flight PaO₂ < 6.6 kPa was a SpO₂ 6MWT below 85% (sensitivity 85%, specificity 69%). Walking distance had no prognostic value for in-flight PaO₂ in the ROC analysis.

Conclusions: In patients with COPD, exercise desaturation below 85% suggests that in-flight oxygen might be needed. As a supplement to sea level SpO₂, exercise desaturation might be useful in the initial pre-flight screening.

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Deployment of integrated care services for patients with long-term oxygen therapy (LTOT): Role of frailty

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Patients receiving LTOT are frequent users of healthcare services. Pilot studies have shown that Integrated Care Services (IC) reduce hospitalizations in these patients and have also identified that deployment of ICS requires an operational definition of frailty that allows risk stratification of patients.

Objective: To characterize the risk profile of LTOT patients in an urban area of 540.000 inh in order to allow the design of a one-year follow-up RCT to assess deployment of IC tailored by patient's frailty.

Methods: Observational study examining 751 patient's records. We planned three home visits for health examination survey, assessment of determinants of frailty, measurement of arterial blood gases and perceived needs. Up to 423 (56%) patients with active LTOT were studied. Preliminary data from an unbiased sample of 282 patients are reported.

Results: Eighty six patients (31%) had a P0₂ ≤ 55 mmHg and only 62 of them (22%) used LTOT ≥ 16 h/day. Most patients had never received an educational program (94%) or home care support (74%). Among several frailty indicators, the Canadian scale (CS) showed an association with the adequacy and hours of administration of LTOT. Patients with career but without other dependent persons at home [OR 3.56 (1.29–9.78)], higher CS of frailty [2.88 (1.09–7.60)] and high treatment score (5 to 9 drugs) [3.78 (1.05–13.6)] showed better LTOT adherence. Factors related with organization of healthcare services had impact on LTOT adherence [0.45 (0.22–0.91)].

Conclusions: The study provides the rationale for future actions on modifiable factors aiming at enhancing quality of LTOT.

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Development of a comorbidity index that reflects health-related quality of life in patients with COPD

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Background: In COPD research little consideration is currently given to the impact of co-existing comorbidities, which is partly due to the absence of an index that would quantify their impact. We developed a COPD comorbidity index that quantifies the impact on health-related quality of life (HRQL).

Methods: Using data from 411 Swiss and Dutch COPD patients with GOLD stages ≥2 we used the non-COPD specific Feeling Thermometer (FT, scores 0-100) as a valid and reliable instrument to measure HRQL. We ascertained the presence of comorbidities that may impact on HRQL through self-report and chart review. In the analysis, we used specific comorbidities if their prevalence was ≥5% and summarized rarer comorbidities by disease groups (e.g. psychiatric disease). We included these diseases in multivariate linear regression models if their association with the FT was ≥3 points (=0.5 minimal important difference) in univariate analysis adjusted for FEV₁.

Results: Coronary heart disease (p=0.018), diabetes (p=0.009), psychiatric disease (p=0.017) and urogenital disease (p=0.018) were most strongly associated with HRQL in the final multivariate model, which was then transformed into an index ranging from 0-4 where each disease counted equally. An increase of one disease count was associated with a decrease in HRQL of -4.54 on the FT (95% CI -6.34 to -2.74, p<0.001).

Conclusion: A simple index that counts the presence of four comorbidities can be used to quantify the impact of comorbidities in COPD patients in research and practice.

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Prevalence of dyspepsia in COPD patients: Experience in a large Canadian cohort

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It has been shown that dyspepsia can be associated with COPD and in some cases closely linked to COPD exacerbations. The association of dyspepsia with COPD severity (FEV₁, respiratory failure) and medications is not well described. The aim of this study is to evaluate the prevalence of dyspepsia in a large Canadian COPD cohort and to identify risk factors.

We retrospectively reviewed files of 1247 COPD patients. We classified patients as dyspepsia-positive (D+; 513 patients or 41%) or dyspepsia-negative (D-; 734 patients or 59%). Mean age was similar in D+ and D- (71.6 y/o versus 70.2) and we found no difference in FEV₁ (44.97% versus 45.07%, p>0.05). Dyspepsia was more frequent in female patients (54.4% versus 45.4%, p<0.02) and in patients receiving home oxygen therapy (35.1% versus 28.6%, p<0.02). Active smoking was inversely related to dyspepsia (31.8% in D+ versus 41.0% in D-, p<0.001). Frequent acute exacerbations (> 1/year) was also associated with dyspepsia (80.3% versus 71.7%, p<0.001). Finally, dyspepsia was positively related to cardio-vascular and osteoporotic comorbidities (86.7% versus 68.4%, p< 0.001). No relation was found with medications use, notably inhaled corticosteroids.

Conclusion: As reported by other publications, our retrospective study noted a high prevalence of dyspepsia in COPD patients and there was no relation with disease severity (expressed by the FEV₁). Female sex, frequent acute exacerbations and comorbidities appear to be associated with dyspepsia. Surprisingly, we found a negative association with smoking status. Dyspepsia treatment consequences should now be addressed closely (QOL, exacerbations, FEV₁ decline).

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Three-year follow-up study of inflammatory markers in chronic obstructive pulmonary disease

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Studies show that values of Interleukin-6 (IL-6) and C-reactive protein (CRP) do not change significantly in COPD patients over one-year period. However, long-term studies of these mediators are lacking. We aimed to evaluate the IL-6 and CRP over 3 years in 53 COPD patients (66% male, age = 63±9 years, FEV₁ = 56±21%). At baseline eight patients (15%) presented mild, 36% moderate, 21% severe and 28% very severe disease. There was no difference in the proportion of patients within each disease severity category, in the predicted FEV₁% and BMI over the period. However, tolerance exercise, dyspnea and BODE index worsened after three years. Plasma concentration of Interleukin-6 was measured by high sensitivity ELISA (BioSource International Inc, Ca, USA) and C-reactive

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protein were obtained by high sensitivity particle-enhanced immunonephelometry (CardioPhase, Dade Behring Marburg GmbH, Marburg, USA). Although, CRP did not change [5 (1.6-7.9) vs 4.7 (1.7-10) pg/L; $p > 0.05$], 11 patients (21%) presented changes > 3 mg/L in CRP after 3 years. IL6 increased significantly after 3 years compared to baseline measurements [0.8 (0.5-1.3) vs 2.4 (1.3-4.4) pg/ml; $p < 0.001$]. CRP was significantly correlated with IL-6 at baseline and after three-year period ($r = 0.54$, $p < 0.001$; $r = 0.53$, $p < 0.001$, respectively). In conclusion, the systemic inflammatory process, evaluated by CRP and IL-6, seems to be persistent and progressive in COPD patients. Research supported by FAPESP (2010/08527-0). R. Ferrari is the recipient of a fellowship from FAPESP (2010/08557-6).

P3482**A qualitative study of self-management in COPD: Attitudes and priorities of patients for making health behaviour changes**

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Pivotal to successful chronic disease self-management is achieving adoption and maintenance of health behaviours that influence disease progression and impact.

Aim: To evaluate patients' uptake and attitudes to health behaviour change in the SNAPPS framework consisting of the items: smoking, nutrition, alcohol consumption, physical activity, psychosocial wellbeing and symptom management.

Methods: Community nurse mentors trained in a self-management approach, mentored 90 participants with COPD for up to 12 months by telephone. Participants' views were sought during semi-structured interviews with a purposive representative sample. Data analysis by two independent authors used an Iterative Thematic approach. Health status was measured using SGRQ, HADS and MRC scales.

Results: In 20 participants (50% male, 50% current smokers) with COPD (GOLD stage: moderate 15, severe 5), mean age 65.4 years, the SGRQ overall score was 45.0 (SD 23.8). We found three groups related to health behaviour change attitudes: 8 (40%) subjects were actively making changes; 9 (45%) subjects were open to making changes and 3 (15%) subjects were more resistant. Severity of COPD and current smoking status were not major influences on attitude. Mentoring increased awareness of COPD effects and helped develop and personalise behaviour change strategies, importantly even in those not actively making changes. Physical activity was most frequently targeted for changes. 50% of current smokers developed plans targeting smoking. Motivation to maintain changes was increased by mentor support.

Conclusions: Health behaviour change in COPD at all stages can be supported by regular telephone mentoring.

P3483**Assessment of self-management needs among patients with COPD**

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Introduction: While self-management is an essential part of chronic illness care, little is known about patients' perspectives of their self-management needs.

Objective: To address this gap we conducted a cross-sectional, self-management needs assessment among patients with COPD.

Methods: Patients were enrolled from clinics as part of a self-management intervention trial. Patient activation was categorized based on their confidence in self-management and on motivation to participate in their care. Behavioral intentions addressed readiness to quit smoking and to meet physical activity goals. Self-efficacy was assessed using a COPD-specific scale. Open-ended questions assessed self-care facilitators, barriers, and goals.

Results: Of 76 patients enrolled, mean age was 69.2 years with 49.1% female. For patient activation 29.0% are active, 31.6% high effort, 23.7% complacent, and 15.8% passive. Among current smokers the majority are interested in quitting with 35% contemplation, 30% preparation, and 20% action. While mean levels of reported self-efficacy were similar across domains, the proportion reporting low levels of confidence were greatest for physical activity and behavioral domains (56.6%). In a qualitative analysis of 34 interviews major themes relevant to self-management facilitators, barriers, and goals were fear (i.e., disease progression, suffocation/death), loss (i.e., functioning, independence, cherished activities), comorbid limitations, stigma/social isolation, and desire for change (i.e., improve functioning, better care, information, understanding).

Conclusions: The results from this cross-sectional analysis highlight the complexity of self-management support needs among patients with COPD.

P3484**The views and attitudes of patients, carers and healthcare professionals on nutrition in COPD**

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Introduction: Weight loss is a reversible prognostic factor in COPD but there is little evidence on effective community nutritional intervention for underweight COPD patients. This study is part of a feasibility study on designing and evaluating such nutritional intervention.

Aims: To find out the views and attitudes of patients, carers and healthcare professionals (HCPs) towards nutrition in COPD and to gain insight on:

1. Effect of weight loss
2. Factors influencing eating
3. Dietary counselling
4. Current COPD nutritional pathway

Methods: Six underweight COPD patients, 6 carers and 8 HCPs were recruited by purposive sampling and formed 3 semi-structured focus groups. Discussions were recorded and transcribed verbatim, sorted with NVivo software and analysed using framework qualitative analysis.

Results: Weight loss was important not only for health but also for cosmetic, psychological and financial reasons.

Patients chose food according to taste, cost, consistency, chewability and availability. They tolerated only small portions but valued variety and ate more when in company. Oral nutritional supplements (ONS) were disliked but some found it useful as energy source when ill.

Dietetic consultations were perceived as useful if individualised and regular. Negative views on underweight in COPD led to delayed dietetic referrals. Screening and referrals were not yet fully developed and follow-ups could be improved.

Conclusions: To increase adherence to the nutritional programme, varied high caloric food which are easily chewable, available and affordable should be considered.

The nutrition support intervention should involve food fortification, snack and/or ONS and incorporate individualised consultation.

P3485**Muscle regrowth in COPD patients induced by anabolic steroids is amplified by systemic glucocorticoids (GC): A potentiating interaction between GC and IGF-1?**

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Muscle wasting is associated with poor prognosis in COPD. Anabolic steroids can induce muscle regrowth and stimulate muscle insulin growth factor 1 (IGF-1) signaling, while high dose systemic glucocorticoids (GC) can induce muscle atrophy. The current study aimed to gain insight into the combined effect of GC and anabolic stimulation on muscle. Post-hoc analysis of a previously published clinical trial (Creutzberg, et al. Chest 2003; 124:1733-1742) investigating nandrolone decanoate (ND) efficacy on male COPD patients revealed that gain in fat-free mass (assessed by deuterium dilution), was highest in ND/GC 2.27±0.42 kg (mean±SEM; $p < 0.05$) vs ND/no-GC 1.10±0.84kg (NS) compared to their respective controls placebo/GC and placebo/no-GC. Muscle function determined by peak workload similarly increased most in the ND/GC group 22.25±5.11W ($p < 0.05$) vs ND/no-GC 8.54±4.06W (NS) compared to their respective controls. During muscle regrowth activated satellite cells (myoblasts), differentiate and fuse with myofibers, which is stimulated by IGF-I. In cultured C2C12 myoblasts, GC strongly impaired (> 2 -fold) and IGF-I stimulated (> 2.5 -fold) multiple parameters of muscle differentiation, like Creatine Kinase activity, muscle contractile protein content and myoblast fusion. However when combined, a synergistic stimulation (> 3 -fold) of myogenic differentiation parameters was observed, which is in line with our clinical data. Unraveling the potentiating interaction between GC and IGF-I may provide new leads to enhance efficacy of intervention strategies to prevent/or restore muscle wasting in COPD.

P3486**The effects of nutritional support with omega-3 rich diets on respiratory functions, exercise capacity and quality of life in stable COPD**

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Objective: To determine the effects of nutritional support with omega-3 rich diets on respiratory functions, exercise capacity and quality of life in COPD

Methods: The study was planned on 21 stable COPD patients. A questionnaire

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was applied to patients including demographic and disease information, food-frequency, a three-d 24-h dietary record and Subjective Global Assessment, SF-36, 6 Minute Walking Test, BORG scale and spirometric tests were performed to the patients. Before the personal diets were planned, patients' personal needs were determined and an omega-3 rich diet was administered with an omega-3 dietary supplementation (180 mg EPA and 120 mg DHA).

Results: After dietary intervention, patients' mean BORG scale result was decreased ($p < 0.05$). After diet, physical component score and mental component score were increased and these differences between before and after intervention were statistically significant ($p < 0.05$). The mean walking distance of the patients was 395.9 ± 53.65 m before intervention and 420.8 ± 48.07 m after intervention ($p < 0.05$). Before dietary intervention, FEV1/FVC was $64.1 \pm 11.61\%$ and after the intervention this ratio increased to $67.8 \pm 9.37\%$ ($p > 0.05$). After diet, there was a significant negative correlation between dietary omega-3 and BORG scale ($r = -0.623$, $p = 0.003$), a significant positive correlation between dietary omega-3 and SF-36 Physical Health component ($r = 0.456$, $p = 9.038$).

Conclusion: While planning the COPD patients' diet it should be so important to provide adequate energy, low carbohydrate and high omega-3 content within diets for the quality of life and survival.

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Association of weight loss in COPD patients with low body mass index on outcomes

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The impact of COPD phenotypes based on body composition and its change was evaluated on longitudinal outcomes in COPD patients from the "Evaluation of COPD Longitudinally to Identify Predictive Surrogate Endpoints" (ECLIPSE) study.

We assessed the effect of low body mass index (BMI) (BMI < 21 kg/m²) at Study Year 1 for 364 COPD patients and assessed the impact of BMI and the change in BMI from baseline to year 1 on mortality during the subsequent two years of the study. During the follow-up, there were 31 deaths. Using logistic regression, each decrease from baseline to Year 1 of 1 kg/m² in BMI in this underweight group was associated with a 51% increased risk of death after controlling for FEV₁% predicted and BMI.

Logistic Regression with mortality during Year 2 and Year 3 as dependent variable in underweight subjects

Parameter	Increment	OR	95%CI	p-value
BMI change, B/L to Y1	-1 kg/m ²	1.51	(1.11, 2.05)	0.008
FEV % predicted, Y1	-5% pred	1.08	(0.95, 1.24)	0.237
BMI at Y1	-1 kg/m ²	1.09	(0.91, 1.30)	0.370

These findings suggest that for a group of underweight COPD patients, the magnitude of weight change in the previous year is an independent predictor of poor outcome.

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Hypoxia altitude simulation test (HAST): Arterial blood gases or pulse oximetry?

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Background: Supplemental oxygen is recommended when PaO₂ is expected to fall below 6.6 kPa during air travel. Hypoxia altitude simulation test (HAST) with monitoring of arterial blood gases (ABG) is the most frequently used test to identify those at risk of developing in-flight hypoxemia. If pulse oximetry can be used as a substitute for ABG, HAST would be simpler to perform and thereby more available.

Aim: We hypothesised that pulse oximetry may replace ABG when using HAST in the pre-flight evaluation of COPD patients.

Methods: COPD-patients referred to HAST were consecutively included. HAST was performed with arterial blood gases taken from an arterial line in addition to continuous measurement of SpO₂ with a pulse oximeter. After 15 min with inhalation of a hypoxic gas (15.1% O₂, equivalent to 2348 m above sea level), PaO₂ and SpO₂ were simultaneously registered.

Results: 100 COPD patients (42% men) were included, mean (SD) age 65 (8) years, FEV₁ 41 (13)% predicted. SpO₂ baseline was 93 (3)%, PaO₂ HAST 6.3 (0.6) kPa, and SpO₂ HAST 83 (4)%. There was a strong correlation between PaO₂ HAST and SpO₂ HAST ($r = 0.81$, $p < 0.001$). A ROC analysis showed strong prognostic properties (area under curve 0.928) for use of pulse oximetry for detection of in-flight PaO₂ < 6.6 kPa. The suggested cut-off value for PaO₂ < 6.6 kPa was SpO₂ HAST $< 85\%$ (sensitivity 89%, specificity 81%).

Conclusions: Pulse oximetry may replace arterial blood gases during HAST. A SpO₂ $< 85\%$ can predict development of severe in-flight hypoxemia (PaO₂ < 6.6 kPa) with a sensitivity of 89% and a specificity of 81%. Use of SpO₂ during HAST will simplify the test considerably.

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Ambulatory care of patients with bronchial asthma participating in a German disease management program

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Background: In 2006 a disease management program for bronchial asthma was started in the North Rhine region, Germany, focussing on patient education and optimisation of quality of care.

Methods: By the end of 2009 data from 55,928 adults (A) and 13,021 children (C, aged 5 to 17 years) are analysed cross-sectionally. Between 2007 and 2009 continuously documented patients are analysed longitudinally. Standardised medical records provide information of symptom frequency, non-medical interventions and pharmacotherapy.

Results: In 2009 35% of the adults suffer at least from weekly symptoms (C 13%), in 38% symptoms are documented less than once per week (C 50%). Control of inhalation techniques is conducted for 72% of all adults (C 79%) and 63% are provided with a self-management plan (C 86%). Asthma education is advised to 47% of all patients (C 65%), but only 46% of these subsequently participate in such an education (C 48%). Most common pharmacotherapy in patients with at least weekly symptoms consists of short-acting beta-agonists (SABA) as reliever medication (A 70%, C 82%), inhaled corticosteroids (ICS) (A 71%, C 72%) or long-acting beta-agonists (LABA) as controller medication (A 63%, C 34%). SABA (2007-09 A: 69-68%, C: 91-92%), LABA (A: 56-60%, C: 26-22%) and ICS in adults (70-68%) are prescribed rather constantly over time, prescription rates of ICS in children decline (73-58%).

Conclusions: Prescription rates of SABA, LABA and ICS seem to be in accordance to recommendations by asthma guidelines. Control of inhalation devices is at a high level, but rate of participation in patient education needs further improvement. Limitations due to potential selection bias have to be considered.