315. Pharmacological and non-pharmacological management of COPD

P2894

Effect of inhalation of tobramycin on reduction of hospitalisation rate in severe COPD

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Introduction: Exacerbation in severe COPD often requires hospital treatment and has a negative impact on patients prognosis. An important cause of frequent exacerbations is lower airway bacterial colonization in stable disease. In addition moderate bronchiectasis are present in up to 50% in severe COPD. The study investigated the effect of daily inhalation of tobramycin on hospitalisation rate in severe COPD.
Methods: At six centers we randomly assigned 44 patients (30 males) with severe COPD (FEV 1 of predicted value 42.8±7.1 Tobra and 33.5±10.3 placebo) and a minimum of two hospitalisations in the year before inclusion. Patients inhaled twice daily for 12 months 80 mg tobramycin (GERNEBCIN®) or isotonic saline (placebo) with a jet nebulizer (Pari Boy SX). Primary endpoint was hospitalisation rate in the period of study, secondary endpoints time to first hospitalisation and 6 MWD.
Results:

Table 1

	Tobra	Placebo
n	20	24
n (ITT 1)	11	21
n (PP)	6	14
Age (yrs)	65.5±10.1	63.9±8.8
Hospitalisations in the period of study (n)	4.3±2.6	2.5±1.9
Time to first hospitalisation (days)	104±38	173±26
6 MWD (m) study entry	398	380
6 MWD (m) end of study	272	328

ITT1 = number of patients which took study medication for at least 28 days.

Conclusion: Inhalation with 160 mg tobramycin by means of a nebulizer over a 12 month period didn't reduce the hospitalisation rate for patients with severe COPD and a minimum of two hospitalisations compared to placebo. The statistical relevance is reduced by a high drop-out rate specifically in the tobramycin-group unrelated to side effects during inhalation of tobramycin. However, the underlying reason remains unexplained.

P2895

Discharge coordinator intervention prevents hospitalisations in patients with COPD: A randomized controlled trial

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Background: Discharge planning is key element in the healthcare continuum that seeks to bridge the gap between hospital and patient home environment. As limited data is available for COPD, we conceived this study to determine the effectiveness of discharge coordinator intervention in reducing the risk for COPD hospitalisation.
Methods: This was a randomized, controlled trial that compared discharge coordinator intervention with usual care. Patients were enrolled within 48 hours following admission due to COPD exacerbation. Discharge coordinator intervention included educational and self-management sessions with patients and caregivers and liaison with health and social care providers in patient home environment. Patients in control group received standard management.
Results: Of the 253 eligible patients (71±9 years, 72% men, 87% GOLD III/IV), 118 were assigned to intervention and 135 to usual care group. During follow-up of 180 days, fewer patients receiving intervention were hospitalized due to COPD (14% vs 31%, p=0.002). In time to event analysis, intervention was associated with lower rates of COPD hospitalisations (p=0.001). Cox model of proportional hazards adjusted for sex, age, GOLD stage, heart failure, cancer, and long term oxygen treatment demonstrated that intervention reduced risk of COPD hospitalisation (hazard ratio 0.43, 95% confidence interval 0.24-0.77, p=0.002).
Conclusions: Among patients hospitalized for COPD exacerbation, discharge coordinator intervention reduced COPD hospitalisations. Hospital management programs should consider discharge planning to improve outcome in patients with COPD.

P2896

QVA149 administered once daily provides significant improvements in lung function over 1 year in patients with COPD: The ENLIGHTEN study

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Background: QVA149 is a once-daily, fixed-dose combination of the long-acting β_2-agonist indacaterol and the long-acting muscarinic antagonist NVA237 (glycopyrronium bromide) in development for the treatment of COPD. This study evaluated the long-term effect of QVA149 on lung function in patients with COPD.
Methods: In a multicenter, double-blind, placebo-controlled study, patients with moderate-to-severe COPD were randomized (2:1) to receive QVA149 (110/50 µg) or placebo (PBO) via a single-dose dry powder inhaler (Breezhaler®) for 52 weeks. Treatment was taken in the morning at the same time of day. Lung function was measured as forced expiratory volume in 1 second (FEV_1) and forced vital capacity (FVC) at 30 and 60 min post-dose at clinic visits over 52 weeks. Missing values were not imputed.
Results: 338 pts (77% male, mean age 63 years; mean post-salbutamol FEV_1 57% predicted, FEV_1/FVC 54%) were randomized to receive QVA149 (n=225) or PBO (n=113); 86% and 79% of patients respectively completed treatment. QVA149 significantly increased FEV_1 and FVC vs PBO at all assessment points (Table). QVA149 vs PBO differences in FEV_1 and FVC (mL) (all p<0.001):

		Day 1	Week 3	Week 6	Week 12	Week 26	Week 39	Week 52
FEV_1	30 min post-dose	156	246	268	235	271	231	248
	60 min post-dose	201	267	276	256	275	277	257
FVC	30 min post-dose	221	333	340	268	353	290	291
	60 min post-dose	254	328	340	286	338	334	319

Conclusion: QVA149 once daily provided rapid and clinically meaningful bronchodilation compared with PBO. No tachyphylaxis was observed and the bronchodilator effect was sustained over the 52-week treatment period.

P2897

Pneumonia in COPD patients treated with fixed ICS/LABA combinations

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Background: Inhaled corticosteroids (ICS) in combination with long-acting β_2-agonists (LABA) improve quality of life and reduce exacerbations in chronic obstructive pulmonary disease (COPD). Increased prevalence of pneumonia has been indicated during treatment with fluticasone but not with budesonide, but no direct comparisons have been performed.
Objectives: To investigate occurrence of pneumonia in a COPD population treated with fixed ICS/LABA combination; budesonide/formoterol (B/F) or fluticasone/salmeterol (F/S) (NCT01146392).
Methods: Medical records' data from primary care patients ≥ 18 years was linked to Swedish hospital and drug register data for 1999 – 2009. Index date was first prescription of a fixed ICS/LABA combination post COPD diagnosis. Propensity score matching was done at index date.
Results: The total sample covered 9,893 patients. Matching gave two equivalent populations (2,734 patients/group) using either B/F or F/S at index. Mean prescribed daily steroid dose was 562 µg budesonide and 786 µg fluticasone.
In all, 15,353 pneumonia diagnoses were seen. 44% of all patients had experienced

pneumonia within 8 years post COPD diagnosis. Yearly rate of pneumonia for B/F was significantly lower, 0.062 compared to 0.11 for F/S; 44% difference ($p<0.0001$). Yearly rate of hospitalisations due to pneumonia was 0.041 vs 0.074 (-45%); days at hospital/year 0.34 vs 0.63 (-46%) for B/F vs F/S, respectively. Time to first diagnosis of pneumonia showed a hazard ratio of 0.794 (95% CI 0.706, 0.892) in favor of B/F.
Conclusion: In this observational register study, COPD patients treated with budesonide/formoterol experienced fewer pneumonias than patients treated with fluticasone/salmeterol.
Study sponsor; AstraZeneca.

P2898
Estimates of demand and use for home oxygen for COPD in England and Wales
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Introduction: There are an estimated 60080 patients (40% of GOLD IV) who require home oxygen in England and Wales. It is unknown whether this need is met, or whether assessment and/or review of all home oxygen users would be beneficial.
Methods and results: To estimate the prevalence of COPD among home oxygen users, a survey of 2845 patients was undertaken with patients asked about the single condition for which they were prescribed oxygen. 58% replied that they received it for COPD and 15% gave a reply of "Not Known" or "Not Stated" or ticked two conditions. Thus 68%, from 58%/(1-0.15), of all home oxygen were estimated as having COPD. This equates to 58225 patients. It suggests that either supply is matching demand, or that some COPD users may be being inappropriately prescribed home oxygen, and that there are others with an unmet need.
Further data was obtained on oxygen concentrator electricity consumption and cylinder deliveries to 71078 patients (with varied diagnoses) over a 6 month period from three oxygen providers. A total of 16567 or 24% patients with a home oxygen prescription used no oxygen, 16524 used less than 20% prescribed and 5142 between 20% - 40% prescribed. In addition, 22644 patients were prescribed Short-Burst Oxygen Therapy (SBOT) without clinical trial evidence that SBOT is effective and for many patients, in addition to their oxygen concentrator.
Discussion: These data suggest the importance of the changes to the home oxygen service in England and Wales and inclusion of clinical assessment and review (HOS_AR) schemes to improve the accuracy of prescription, patient adherence and by withdrawing unnecessary home oxygen, particularly SBOT, ensure that supply matches demand.

P2899
Target lobar volume reduction and COPD outcome measures after endobronchial one-way valve therapy
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Introduction: Clinical effectiveness of endobronchial one-way valve therapy in patients with emphysema appears to be related to the extent of lobar volume reduction.
Methods: Data derived from a multicentre study from 416 patients with severe emphysema (62% male, age 63±7yrs, FEV1 30±8%), who were randomized to valve therapy (n = 284) or conservative treatment (n = 132), were analyzed. Pulmonary function, exercise capacity, dyspnea scores, and CT analysis of target lobar volume reduction (TLVR) were assessed before and 6 months after valve therapy.
Results: Of patients randomized to the treatment group, 49 (17%) showed > 50% target lobar volume reduction, 57 (20%) demonstrated TLVR between 20% and 50%, and 178 patients (63%) < 20% TLVR at 6 months post intervention ($p < 0.01$). Patients with TLVR > 50% demonstrated greater improvements in lung function parameters, exercise capacity (6-MWT), quality of life (SGRQ) and dyspnea score (mMRC) compared with the other groups. Consequently, BODE index was significantly improved by 1.4±1.8, 0.2±1.3, and 0.1±1.3 points in patients with TLVR > 50%, < 50% TLVR > 20%, and TLVR < 20%, respectively, whereas it worsened by 0.3±1.2 points in controls after 6 months ($p<0.01$ for inter-group differences). Logistic regression analysis identified target lobar volume reduction as the strongest independent predictor of improved BODE index scores from baseline to 6 months.
Conclusions: The extent of lobar volume reduction predicts improvement in BODE index and health outcomes associated with bronchoscopic lung volume reduction using one-way valves.

P2900
Sustaining a chronic obstructive pulmonary disease (COPD) discharge care bundle on the respiratory ward in an acute district general hospital
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A COPD discharge care bundle was previously piloted on the respiratory ward at our hospital in May 2010. At 1 year there were significant improvements in patient care and a reduction in 28 day COPD readmission rate from 25% to 18.4% ($p=0.06$).
Objective: To look at the current level of sustainability of the bundle, and to assess patient and staff experience. In addition, we implemented the bundle on our medical day unit (MAU).
Methods: To maintain sustainability, a programme of regular education and training was provided. Patient experience was assessed by the response of 40 patients to a telephone call post discharge, and ward staff (n=21) completed a questionnaire.
Results: Compliance with the bundle on the respiratory ward from May 2010 to January 2012 (21 months) has remained high at 99%. Compliance with all 4 elements of the bundle was 93%. Improvement in patient care continues to remain significantly higher than baseline. The 28 day COPD readmission rate is currently 18%.
85% of patients found the bundle useful or very useful. In the staff survey, 81% of staff thought that the bundle improved patient care and 71% found it easy to complete. 67% said that it improved their knowledge and skills about COPD, while 24% were unsure. 95% felt it should be carried out on other wards.
Compliance on the MAU was disappointing at 24% over the last 6 months. Reasons for poor compliance included a change in the MAU bed model, low nursing numbers and high patient turnover.
Conclusion: The improvement in patient care using the COPD bundle is sustainable on a specialist ward. Patient and staff experience was positive. Roll out on the MAU remains a challenge.

P2901
The six-minute walking test in patients with severe COPD: What conditions are matters?
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The distance walked during a Six-Minute Walk Test (6 MWD) is used for following the natural history of COPD, for assessing the response to therapeutic interventions, to estimate the prognosis in BODE index, in cardiology it is used to estimation of the chronic heart failure. Normally patients with COPD III and IV stage are patients with polypatology.
Aim: To investigate the pathologic conditions which influence on the 6 MWD in severe COPD patents with and without exacerbation.
Methods: 120 patients were clinically and functionally investigated in the study during and after hospitalization in the pulmonology department. Additionally for 16 patients was performed gated blood pool single photon emission computer tomography (gbSPECT) and proBNP measurement.
Results:

	6 MWD during exacerbation (R)	p	6 MWD without exacerbation (R)	p
GOLD stage	–0.21	0.27	–0.128	0.177
VC	0.37	0.000021	0.31	0.00062
FVC	0.38	0.000009	0.33	0.00022
FEV1	0.31	0.000366	0.38	0.045
SaO2	0.36	0.000032	0.39	0.00001
Coronary heart disease	–0.136	0.16	–0.25	0.008
Any heart failure (clinically)	–0.09	0.38	–0.25	0.0097
Muscle dysfunction index	0.33	0.00044	0.48	0.000000
Lean body mass	0.011	0.904	0.036	0.69
Stroke index of LV			0.55	0.027
End-systolic volume of RV			0.61	0.0077
End-diastolic index (RV)			0.58	0.013
End-systolic index (RV)			0.62	0.008
Right atrium frontal size			0.65	0.003
proBNP			0.088	0.78

LV, Left Ventricle; RV, Right Ventricle.

Conclusion: In patients with COPD during disease exacerbation the main 6MWD limiting factors are respiratory function failure, hypoxia and muscle dysfunction. In stable state left and right heart dysfunction even without clinically significant heart failure contribute to 6MWD limitation.

P2902

Hospital admitted COPD patients treated at home using telemedicine technology – A randomized, multi-centre trial

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Background: COPD Patients with acute exacerbations are frequently admitted to emergency wards causing the patients to feel anxiety, loss of control and stress, and also causing considerable healthcare costs for the society.
Aim: We investigated whether patients with COPD exacerbations admitted to a hospital could avoid further admittance and safely be treated at home by means of telemedicine technology (TT).
Methods: Fifty-seven patients with severe COPD, who fulfilled the inclusion criteria and consented to participate within 24 hours of a hospital admission, were randomised to receive either standard treatment at the hospital or standard treatment at home using TT. The equipment consisted of a video conference system and a webcam, measuring equipment (spirometer, thermometer, and pulsoximeter), 24 hour online web-service, access to oxygen, nebulizer and medical therapy. Two university hospitals participated. Readmission within 30 days after discharge was selected as primary outcome.
Results: Twenty-nine patients were allocated to the TT group and 28 patients received usual care in the hospital. There were 10 readmissions in each group involving eight patients in the TT group and six patients in the control group. Readmission rate was 27, 6% (95% CI 11, 3 to 43, 9) in the TT group and 21,4% (95% CI 6,2 to 36,6) in the conventional group. No statistically significant differences between groups in readmission rate, use of antibiotics or systemic steroids were seen. No deaths occurred during the study period.
Conclusion: We propose that a considerable segment of patients with COPD exacerbations admitted to hospital can be safely treated at home using the TT solution.

P2903

COPD self management: The impact of implementing self management plans & rescue medications across 3 hospitals

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Introduction: Guidelines for COPD suggests that patients should be given self-management advice and rescue medication.
Aims & Objectives: Assess if a unified self management strategy, consisting of a self management plans, education and rescue medications, reduces hospital readmissions at 30 and 90 days.
Methods: A six months project, across three acute hospitals was carried out. All patients admitted with a COPD exacerbation, unless contra-indicated were given:
·Self management plan.
·Rescue medication: course of prednisolone & antibiotic.
Results: 491 patients were recruited. 53.3%, 54.6% and 25.2% of patients received a self management plan and rescue medication across the three hospitals respectively, with a mean of 36.3%. Common reasons for not receiving these were language barriers and concordance issues.

30 & 90 Day Exacerbation Rates Across 3 Hospitals

Hospital	COPD Readmission Rate, % 30 day readmission for patients given and not given self management plan & rescue medication		COPD Readmission Rate, % 90 day readmission for patients given and not given self management plan & rescue medication	
	Not Given (%)	Given Rescue Packs & Plan (%)	Not Given (%)	Given Rescue Packs & Plan (%)
1	16.3	12.2	23.3	10.2
2	20.5	14.0	31.8	26.0
3	33.3	21.3	32.2	30.0
Total	28.8	16.7	23.1	17.4

Conclusions: Unified self management plans and rescue medications in COPD reduces 30 and 90 readmission rates by 12.1% and 5.7% respectively.

P2904

Clinical phenotypes in patients with concomitant obstructive sleep apnea and chronic obstructive pulmonary disease

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Rationale: Concomitant obstructive sleep apnea syndrome (OSAS) and COPD (overlap syndrome, OLS) may result in the presentation of different clinical phenotypes of each disease.
Objectives: To examine the clinical phenotypes of COPD in OLS cases.
Methods: We conducted a prospective cohort study including 204 patients recruited in 8 years. All the subjects underwent the examinations: pulmonary function tests; polysomnography (PSG); blood chemistry tests, including a KL-6 test; nutritional assessments; computed tomography (HRCT) to assess emphysema (LAA%); and 6-minute walk tests (6MWT). Subjects with symptomatic airflow obstruction were classified as COPD patients, and the apnea-hypopnea index (AHI) was calculated for assessing OSAS. We analyzed the association between the variables recorded during the examinations.
Results: The overall cohort included 138 male subjects and 23 female subjects (mean age, 54.8 years). The mean FEV1:FVC ratio, mean body mass index (BMI), and mean AHI were 0.77, 25.3, and 30.3, respectively. The AHI values were as follows: 0–5 (n = 9), 5–15 (n = 36), 15–30 (n = 50), and >30 (n = 66). The subjects were divided into the OLS group (n = 34), OSAS alone group (n = 118), COPD alone group (n = 0), and neither group (n = 9). The mean age, BMI, and AHI in the OLS were 66.4, 24.5, and 34.7, respectively. AHI was significantly associated with BMI in the OSAS alone group. This association was not seen in the OLS group, in which there was a trend that low FEV1% predicted was associated with low AHI and AHI was significantly associated with KL-6 ($p < 0.0002$).
Conclusions: We concluded that OLS did not affect the clinical phenotypes of OSAS and COPD.

P2905

Costs and effectiveness of a disease management program for chronic obstructive pulmonary disease

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Introduction: The effect of disease management for COPD is not well established
Objectives: The effect of integrated care intervention (ICI) on hospital admission was examined and a cost analysis was performed
Methods: 208 COPD patients recruited by general practitioners in Massa-Carrara sanitary district from January 2009 were followed up prospectively. Interventions included individually tailored care plan following GOLD guidelines, educational program on self-management of the disease, treatment supervision during scheduled visits, home visits and phone contacts by specialised nurses.
Results: Data from the 2-year follow-up were compared with the year prior to its initiation.
ICI decreased the frequency of hospitalization and the mean number of hospitalization days in 1-year follow-up period; these results remained stable after 2 years (table 1). The best clinical results were detected in GOLD 2 and 3 stages. Mean daily cost of pulmonary drugs increased (€ 3.1/patient/year vs € 1.3 in the pre-enrolment year), while mean daily cost of hospitalization decreased from € 5.1/patient/year to € 2.2 ($p<0.001$).

Table 1

1-year Pre-enrolment		1-year Follow-up		2-year Follow-up	
Hospital admissions	Hospitalization days	Hospital admissions	Hspitalization days	Hospital admissions	Hospitalization days
0.59*	5.20**	0.20	3.20	0.26	2.92

Data are mean values. *$p<0.001$ vs 1 yr and 2 yr follow-up; **$p<0.01$ vs 2 yr follow-up.

Conclusions: The study shows that a standardised ICI based on share-care intervention between primary care and hospital team in COPD patients effectively decreases hospitalizations for exacerbation and total disease costs after 1 year follow-up; these positive results do not change after 2 years.

P2906

Cardioselective beta-blockers are not only safe in patients with COPD, but may also improve the responsibility of FEV1 to beta-agonist: A meta-analysis of randomized controlled double-blinded trials

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Objective: To assess the effect of cardioselective beta-blockers on respiratory function of patients with COPD

Methods: The EMBASE, MEDLINE, and the Cochrane Controlled Trials Register were searched comprehensively to identify all relevant clinical trials in humans published between 1966 and May 2011. Randomized, blinded, controlled trials that studied the effects of cardioselective beta-blockers on the forced expiratory volume in 1 s (FEV1) and responsibility of FEV1 to beta-agonist in patients with COPD were included in the analysis. Outcomes measured were the FEV1 and the change of FEV1 after the use of beta-agonist.
Results: Sample size for the cardio-selective beta-blockers was 85 cases, non-selective beta-blockers 46. The results showed that FEV1 declined 0.14L with the use of non-selective beta-blockers ($z = 6.78$, $p < 0.0001$), and with the use of cardiac-selective beta-blockers declined 0.03L ($z = 2.08$, $p = 0.04$). Non-selective beta-blockers decrease the response to beta-agonist of FEV1 by 13.42% ($z = 10.68$, $p < 0.0001$). Cardio-selective beta-blockers produced no significant change in response to beta-agnoist of FEV1 ($z = 0.46$, $p = 0.65$). A sensitivity analysis was performed to evaluate the effect of excluding a trial which had a great weight and the result showed an opposite result of the responsibility of FEV1 to beta-agonist, although not statistically significant.
Conclusion: Our meta-analysis suggests that cardioselective beta-blockers is not only safe in patients with COPD, but may also improve the responsibility of FEV1 to beta-agonist.

P2907
Continuance and effects of self-training at home using a bicycle ergometer with long-term oxygen therapy
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Rationale: Regular exercise is an important therapeutic modality for advanced chronic obstructive pulmonary disease (COPD). However, daily mobility is severely restricted in patients with advanced COPD.
Aim: We evaluated whether self-training at home using a bicycle ergometer with oxygen therapy is an effective therapeutic modality for COPD.
Methods: We recruited 129 patients with advanced COPD. After an observation period, each patient was given a bicycle ergometer as per the advice of health care professionals. The patients were instructed to use the ergometer for 20 min each in the morning and afternoon, with oxygen therapy (2 L/min), and to maintain the maximum pulse rate at <110 beats/min. Before self-training was undertaken, each patient was examined to assess the effects of the training. We compared the data recorded after 6 months of self-training.
Results: The subjects were divided into 2 groups: those using a bicycle ergometer (Group E) and those performing usual exercise (Group U). Group E was further divided into 2 groups: those showing good adherence (Group EG) and those showing poor adherence (Group EP). In Group EG, the mean age, BMI, FEV1%, and walking distance covered in 6 minutes were 72.3, 21.0, 44.2, and 423, respectively, whereas in Group EP, these values were 73.8, 21.1, 48.4, and 407, respectively. The walking distance significantly improved in Group EG. Continuance was 51.4%, and the major reasons for discontinuance were lumbago and arthralgia.
Conclusions: Self-training using a bicycle ergometer with oxygen therapy might be useful in select subjects.

P2908
COPD: Disease coping styles
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It is generally known that desadaptive coping plays an important role in deterioration of medical patients' quality of life (QoL). However, rehabilitation of COPD patients in general is performed uniformly, while individual psychological features of the patient remain ignored.
Aim: To identify the basic styles of disease coping in COPD patients.
Methods: 43 COPD therapeutic inpatients (male n=36; mean age 65,6±10,4 yr.) were included into the study. All patients were examined by a pulmonologist and clinically interviewed by a psychiatrist. Psychometric scales Beck Depression Inventory (BDI), Temperament and Character Inventory (TCI-125) and NEO-Five Factor Inventory (NEO-FFI), SF-36, Index of Cooperation (IC - developed by Moscow Research Institute of Pulmonology) were also used.
Results: Three styles of disease coping were identified: maladaptive denial of physical illness (n=21, 48,8%), health anxiety (n=18, 41,8%), and depression (n=4, 9,3%). Maladaptive denial was comorbid with clinically diagnosed dissocial personality disorder (PD) (n=9, 20,9%), low NEO-FFI Agreeableness and Conscientiousness scores, and low TCI-125 Self-Directedness score. Health anxiety and depression were often comorbid with histrionic PD (n=7, 16,3%), or avoidant PD (n=2, 4,6%). QoL decrease was prominent in health anxiety and depression groups. Maladaptive denial patients showed relatively fair QoL scores (measured by SF-36), but had disturbances in treatment compliance (measured by IC).
Discussion: On the assumption of typology described, we propose developing patient-centered rehabilitation programs, according to the individual COPD patient's coping style: QoL-oriented program for health anxiety/depression patients, and compliance-oriented for maladaptive denial patients.

P2909
Disease management program for COPD patients with frequent exacerbations
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Objectives: To determine if a disease management program focused on early recognition and self-treatment of COPD exacerbations can reduce hospital admissions due to COPD exacerbation.
Methods: We included outpatients with stable COPD who had two or more COPD exacerbations in the previous year. Patients attended an individual education session conducted by a specialized respiratory nurse that included general information about COPD, direct observation of inhaler techniques, smoking cessation counselling and encouragement of regular exercise. Subjects were instructed to recognized signs and symptoms of an exacerbation and to begin action plan medications for symptoms that were substantially worse than usual. Each subject received an individualized written medical action plan and the telephone number to contact the case manager. The nurse made monthly phone calls to patients. Scheduled medical visits were made every three months and after exacerbation.
Results: 31 patients were included in the program (94% male; mean age 74 SD 7 years; post-bronchodilator FEV1% predicted 39 SD 11; 100% ex-smokers). The average duration of follow-up was 13.5 (3.5) months. During this period of time a mean of 8 DS 4 phone calls and 5 SD 2 medical visits were made. The frequency of hospitalizations and emergency visits for COPD were lower than the previous year before beginning the program (mean 0.26 SD 0.6 vs. 0.97 SD 1.1; p=0.000). The total COPD exacerbations were significantly lower than the previous year (mean 2.35 SD 1.8 vs. 3.61 SD 1.4; P=0.001)
Conclusions: A disease management program focused on early recognition and self-treatment of COPD exacerbations can reduce hospital admissions due to COPD exacerbation.

P2910
Daytime risk factors of nocturnal hyoxemia in COPD patients unqualified for long-term oxygen therapy
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Objective: To identity daytime variables that are predicative to nocturnal hyoxemia among COPD patients unqualified for long-term oxygen therapy (LTOT).
Methods: Forty-eight stable COPD patients with daytime $SaO_2 \geq 90\%$ were enrolled to this study and regarded as patients unqualified for LTOT. Patients were divided into 4 groups depending on daytime SaO_2 ($SaO_2 \geq 98\%$, group 1; $SaO_2 = 97\%$, group 2; $SaO_2 = 96\%$, group 3; $90\% \leq SaO_2 \leq 95\%$, group 4). All patients underwent lung function examination during daytime. Their nocturnal oxygen saturations were monitored with overnight pulse oximetry (OPO).
Results: Daytime oxygen saturation was positively correlated with nocturnal mean SaO_2 ($r = 0.79$, $P < 0.0001$), while negatively correlated with time spend with saturation below 90% (TB90) ($r = -0.75$, $P < 0.0001$). No significant relationship was found between lung function parameters and nocturnal SaO_2. Patients with daytime oxygen saturation between 90% and 95% were more likely to have lower nocturnal oxygen saturation and longer TB90 ($P < 0.05$).

Table 1. Spearman rank correlation coefficient between daytime SaO2

Variables	r	P value
Nocturnal MSaO2	0.79	<0.0001
Tb90	–0.75	<0.0001
ODI	0.28	0.0552

Table 2. K-W test and SNK test among different SaO2 levels of COPD patients

Variables	χ^2	P value	Multiple comparison
Nocturnal LSaO2	7.5685	0.0059	group 1:group 4
TB90	9.8115	0.0202	group 1:group 4
ODI	3.6406	0.3030	none

Conclusions: Daytime oxygen saturation may effectively predict the occurrence of nocturnal hyoxemia in stable COPD patients unqualified for LTOT. To reduce COPD complications and improve prognosis, we suggest a relative indication of LTOT for patients with daytime oxygen saturation between 90% and 95% and diagnosed with nocturnal hyoxemia.

P2911

Multiple dimensional analysis of arterial blood gas and pulmonary function in patients with COPD

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Introduction: Blood gas analysis is very important and often used to evaluate the hypoxemia and hypercapnea in chronic obstructive pulmonary disease (COPD) patients, but little attention has been given to the relationship among blood gas analysis, pulmonary function, body composition and symptoms.
Objectives: To identify the predictor of dyspnea, hypoxemia, hypercapnea in COPD patients, we investigated COPD patients cross-sectionally on multidimensional aspects.
Methods: A total of 369 Japanese COPD patients (334 male), age 71 (64-76), with a smoking history of at least 10 pack-years underwent comprehensive measurements, including medical examination, arterial blood gas analysis, pulmonary function tests, and modified Medical Research Council (MMRC) dyspnea scale. Patients with long term oxygen therapy or non-invasive ventilation were excluded. Possible predictors of MMRC, PaO_2 and $PaCO_2$ were analyzed with both univariate and multiple regression methods.
Results: All of PaO_2, $PaCO_2$, and MMRC associated significantly with age, various pulmonary function, and/or BMI. In addition, multiple regression analysis with stepwise manner revealed that PaO_2 was able to be explained by $\%FEV_1$, %Kco, BMI and age (R^2=0.20, $p<0.0001$). PaCO2 could be explained by %IC, %Kco,%RV/TLC and age (R^2=0.15, $p<0.0001$). Then MMRC could be explained by $\%FEV_1$, %Kco, %VC, %IC, age and PaO_2 (R^2)=0.14, $p<0.0001$).
Conclusion: We showed that $\%FEV_1$, %Kco and age were important to dyspnea and the estimation of blood gas analysis in COPD patients.