315. Pharmacological and non-pharmacological management of COPD

P2894
Effect of inhalation of tobramycin on reduction of hospitalisation rate in severe COPD
Peter Hasli
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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 (FEV1 of predicted value ≤ 65% and FEV1/FVC < 55%) to receive tobramycin (120 mg daily) or placebo for 12 months. The study endpoints were time to first hospitalisation and in-hospital length of stay. The statistical analysis was performed using a chi-square test on an intention-to-treat (ITT) basis.

Results: Inhaled tobramycin reduced the hospitalisation rate in severe COPD compared to placebo (p=0.001). In the tobramycin group, 6 patients (14%) were hospitalised at least once, whereas 10 patients (23%) in the placebo group were hospitalised. The hospitalisation rate was significantly reduced in the tobramycin group compared to the placebo group (p=0.001).

Conclusion: Inhalation of tobramycin may reduce hospitalisation rates in severe COPD. Further studies are needed to confirm these results.

P2896
QVA149 administered once daily provides significant improvements in lung function over 1 year in patients with COPD: The ENLIGHTEN study
Ronald Dahl,1 Kenneth Chapman,2 Michael Rudolf,3 Rajendra Mehta,3 Pearl Kho,4 Vrijag Alagapan,2 Indrias Berhane,5 Hungta Chen,6 Donald Banecki,7 1Dept of Respiratory Diseases, Aarhus University Hospital, Aarhus, Denmark; 2Arthritis and Asthma Centre, University Health Network, Toronto Western Hospital, Toronto, Canada; 3Dept of Respiratory Medicine, Ealing Hospital NHS Trust and Imperial College, London, United Kingdom; 4Allergy and Asthma Care, Allergy and Asthma Care and Research Centre, Indore, India; 5Novartis Horsham Research Centre, Novartis, Horsham, United Kingdom; 6Novartis Pharmaceuticals Corporation, Novartis, East Hanover, NJ, United States

Background: QVA149 is a once-daily, fixed-dose combination of the long-acting β2-agonist indacaterol and the long-acting muscarinic antagonist GSK237 (glycopyrrolate bromide) 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 trial, 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 (FEV1) 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 FEV1 57% predicted; FEV1/FVC 54%) were randomized to receive QVA149 (n=225) or PBO (n=113); 86% and 79% of patients respectively completed treatment. QVA149 significantly increased FEV1 and FVC vs PBO at all assessment points (Table). QVA149 vs PBO differences in FEV1 and FVC (mL) (all p<0.001):

<table>
<thead>
<tr>
<th></th>
<th>Day 1</th>
<th>Week 3</th>
<th>Week 6</th>
<th>Week 12</th>
<th>Week 26</th>
<th>Week 39</th>
<th>Week 52</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV1</td>
<td>104±18</td>
<td>173±26</td>
<td>211±25</td>
<td>229±25</td>
<td>235±26</td>
<td>231±25</td>
<td>248±25</td>
</tr>
<tr>
<td>FVC</td>
<td>60±14</td>
<td>93±19</td>
<td>118±20</td>
<td>121±20</td>
<td>124±21</td>
<td>122±20</td>
<td>127±20</td>
</tr>
</tbody>
</table>

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 β2-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.

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 (2,735 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.

Conclusion: Pneumonia in COPD patients treated with fixed ICS/LABA combinations is significantly higher compared to PBO. No indication of increased pneumonia with either B/F or F/S at index was found.
pneumonia within 8 years post COPD diagnosis. Yearly rate of pneumonia for B/F vs F/S 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.

P2989
Estimates of demand and use for home oxygen for COPD in England and Wales
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Introduction: There are an estimated 600,800 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. 5% 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%/11/0.15, of all home oxygen was estimated as having COPD. This equates to 5825 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 5124 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 supply of home oxygen to patients 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.

P2990
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 73.7±8yrs, FVC 30±18%, 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 (69%) < 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, 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.

P2991
Sustaining a chronic obstructive pulmonary disease (COPD) discharge care bundle on the respiratory ward in an acute district general hospital
London, Isleworth, United Kingdom

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 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 low motivation.

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.

P2992
The six minute walking test in patients with severe COPD: What conditions are affecting 6 MWD?
Marja Sanzharovskaya1, Anna Fisenko1, Georgy Chemorgyuk2. 1Chair of Hospital Therapy, Siberian State Medical University, Tomsk, Russian Federation; 2Department of Nuclear Medicine of Cardiology, Siberian Branch of the Russian Academy of Medical Sciences, Tomsk, Russian Federation

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 programme intensity of BOSE therapy, in comparison with the estimation of the chronic heart failure. Normally patients with COPD III and IV stage are patients with polyopathy.

Aim: To investigate the pathologic conditions which influence on the 6 MWD in severe COPD patients 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 COPD patients were performed saturated blood pool single photon emission computer tomography (gbSPECT) and proBNP measurement.

Results:

<table>
<thead>
<tr>
<th>Conditions</th>
<th>6 MWD during exacerbation (R)</th>
<th>p</th>
<th>6 MWD without exacerbation (R)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOLD stage</td>
<td>-0.21</td>
<td>0.27</td>
<td>-0.128</td>
<td>0.177</td>
</tr>
<tr>
<td>Vc</td>
<td>0.37</td>
<td>0.000021</td>
<td>0.31</td>
<td>0.00062</td>
</tr>
<tr>
<td>FVC</td>
<td>0.38</td>
<td>0.000009</td>
<td>0.33</td>
<td>0.00022</td>
</tr>
<tr>
<td>FEV1</td>
<td>0.31</td>
<td>0.000366</td>
<td>0.38</td>
<td>0.045</td>
</tr>
<tr>
<td>6MWD</td>
<td>0.36</td>
<td>0.000132</td>
<td>0.39</td>
<td>0.00001</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>-0.136</td>
<td>0.16</td>
<td>-0.25</td>
<td>0.008</td>
</tr>
<tr>
<td>Any heart failure (clinically)</td>
<td>-0.09</td>
<td>0.38</td>
<td>-0.25</td>
<td>0.0097</td>
</tr>
<tr>
<td>Muscle dysfunction index</td>
<td>0.33</td>
<td>0.00044</td>
<td>0.46</td>
<td>0.00000</td>
</tr>
<tr>
<td>Lean body mass</td>
<td>0.111</td>
<td>0.904</td>
<td>0.036</td>
<td>0.69</td>
</tr>
<tr>
<td>Stroke index of LV</td>
<td>0.55</td>
<td>0.027</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End-systolic volume of RV</td>
<td>0.61</td>
<td>0.0877</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End-diastolic index (RV)</td>
<td>0.58</td>
<td>0.013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End-systolic index (RV)</td>
<td>0.62</td>
<td>0.008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right atrium frontal size</td>
<td>0.65</td>
<td>0.005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>proBNP</td>
<td>0.088</td>
<td>0.78</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LV, Left Venticle; RV, Right Venticle.

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.

530s

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**Introduction:**

Guidelines for COPD suggest that patients should be given self-management advice and rescue medication. However, the current level of self-management plan and rescue medications across 3 hospitals.

**Methods:**

Fifty-seven patients with severe COPD, who fulfilled the inclusion criteria and consented to participate within 24 hours of a hospital admission, were included in the study. They 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 pulse oximeter), 24-hour online well-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 26.7% (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.

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**P2902**

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

Anna Swanne Jakobson, Lars Christian Larsen, Birte Østergaard, Susan Rydahl-Hansen, Christina Emme, Lone Schou, Klaus Viengpheth Phanareth. Telemedicine Research Unit, Frederiksborg University Hospital, Frederiksborg, Denmark; Medical Department O, Herlev University Hospital, Herlev, Denmark Research Unit of Nursing, Institute of Clinical Research, University of Southern Denmark, Odense, Denmark; Research Unit at Climbing the steps, causing the patients to feel anxiety, loss of control and stress, also causing considerable healthcare costs for the society.

**Aim:**

We investigated whether patients with COPD exacerbations admitted to a hospital were provided with adequate self-care and rescue medication 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 pulse oximeter), 24-hour online well-service, access to oxygen, nebulizer and medical therapy. Two universities 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 26.7% (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.
Methods: The EMBASE, MEDLINE, and the Cochrane Controlled Trials Register were searched comprehensively to identify all relevant clinical trials in humans published between 1986 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 = 0.78, p < 0.0001), and with the use of cardiac-selective beta-blockers declined 0.03L (z = 0.08, p = 0.04). Non-selective beta-blockers decrease the responsibility to beta-agonist of FEV1 by 13.4% (z = 10.68, p < 0.0001). Cardiac-selective beta-blockers produced no significant change in response to beta-agonist of FEV1 (z = 0.46, p = 0.05). 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
Yunici Kassem1,2, Ritsuko Wakabayashi, Kamiko Hattori1, Takeo Ishii1,2, Ryoji Kiyokawa1,2, Kozui Kida1,2, Kenichi Yashima1,2, Akihiko Gemma1

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 continuance were 51.4%, whereas in Group EP, these values were 73.8, 21.1, 48.4, and 407, respectively. The mean age, BMI, FEV1%, and continuance were 51.4%, whereas in Group EP, these values were 73.8, 21.1, 48.4, and 407, respectively. The mean age, BMI, FEV1%, and continuance were 51.4%, whereas in Group EP, these values were 73.8, 21.1, 48.4, and 407, respectively.

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 correlated with clinically diagnosed dissocial personality disorder (PD) (n=4, 20.9%), low NEO-FFI Agreeableness and Conscientiousness scores, 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). A high correlation was found between the degree of COPD and mental disturbance, with the variable of cooperation (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 recognize 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 (5.5) 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).

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 hypoxemia in COPD patients unqualified for long-term oxygen therapy
Yuja Yang, Liuming Tao, Guochao Shi, Huanying Wan, Xiaoting Cai, Haixing Zha, Pulmonary Medicine, Renji Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China

Objectives: To identify daytime variables that are predictive to nocturnal hypoxemia among COPD patients unqualified for long-term oxygen therapy (LTOT).

Methods: Forty-eight stable COPD patients with daytime SaO2≥90% were enrolled to this study and regarded as patients unqualified for LTOT. Patients were divided into 4 groups depending on daytime SaO2: SaO2=97%, group 1; SaO2=95%, group 2; SaO2=94%, group 3; 90%<SaO2<95%, group 4. All patients underwent lung function examination during daytime. Their nocturnal oxygen saturations were monitored with overnight pulse oximetry (PO). Results: Daytime oxygen saturation was positively correlated with nocturnal mean SaO2 (r=0.79, P<0.001), while negatively correlated with time spend with saturation below 90% (TB90) (<0.75, P<0.001). No significant relationship was found between lung function parameters and nocturnal SaO2. 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

<table>
<thead>
<tr>
<th>Variables</th>
<th>r</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nocturnal SaO2</td>
<td>0.79</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>TB90</td>
<td>-0.75</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>ODI</td>
<td>0.28</td>
<td>0.0552</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Variables</th>
<th>X^2</th>
<th>P value</th>
<th>Multiple comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nocturnal SaO2</td>
<td>7.5665</td>
<td>0.0059</td>
<td>group 1 vs group 4</td>
</tr>
<tr>
<td>TB90</td>
<td>9.8115</td>
<td>0.0202</td>
<td>group 1 vs group 4</td>
</tr>
<tr>
<td>ODI</td>
<td>3.6406</td>
<td>0.5030</td>
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</tbody>
</table>

Conclusions: Daytime oxygen saturation may effectively predict the occurrence of nocturnal hypoxemia in stable COPD patients unqualified for LTOT. To reduce COPD complications and improve prognosis, we suggest a relative indication of LTOT for patients with continuous oxygen saturation between 90% and 95% and associated with nocturnal hypoxemia.
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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, PaO2 and PaCO2 were analyzed with both univariate and multiple regression methods.

Results: All of PaO2, PaCO2, and MMRC associated significantly with age, various pulmonary function, and/or BMI. In addition, multiple regression analysis with stepwise manner revealed that PaO2 was able to be explained by %FEV1, %Kco, BMI and age (R²=0.20, p<0.0001). PaCO2 could be explained by %IC, %Kco,%RV/TLC and age (R²=0.15, p<0.0001). Then MMRC could be explained by %FEV1, %Kco, %VC, %IC, age and PaO2 (R²=0.14, p<0.0001).

Conclusion: We showed that %FEV1, %Kco and age were important to dyspnea and the estimation of blood gas analysis in COPD patients.