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The COPD assessment test (CAT) assists prediction of COPD exacerbations in high-risk patients☆

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KEYWORDS
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Summary
We evaluated the predictive value of the COPD assessment test (CAT™) for exacerbation in the following six months or time to first exacerbation among COPD patients with previous exacerbations.

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COPD assessment test;
Prediction

COPD outpatients with a history of exacerbation from 19 hospitals completed the CAT questionnaire and spirometry over six months. Exacerbation events were prospectively collected using a structured questionnaire.

The baseline CAT score categorised into four groups (0—9, 10—19, 20—29, and 30—40) showed strong prediction for time to first exacerbation and modest prediction for any exacerbation or moderate-severe exacerbation (AUC 0.83, 0.64, and 0.63 respectively). In multivariate analyses, the categorised CAT score independently predicted all three outcomes ($p = 0.001$ or $p < 0.001$). Compared with the lowest CAT score category, the higher categories were associated with significantly shorter time to first exacerbation and higher exacerbation risks. The corresponding adjusted median time was >24, 14, 9, and 5 weeks and the adjusted RR was 1.00, 1.30, 1.37, and 1.50 in the category of 0—9, 10—19, 20—29, and 30—40 respectively. Exacerbation history (≥2 vs. 1 event in the past year) was related to time to first exacerbation (adjusted HR 1.35; $p = 0.023$) and any exacerbation during the study period (adjusted RR 1.15; $p = 0.016$).

The results of this study support the use of the CAT as a simple tool to assist in the identification of patients at increased risk of exacerbations. This could facilitate timely and cost-effective implementation of preventive interventions, and improve health resource allocation.
Trial registration: Clinicaltrials.gov: NCT01254032.

Introduction

Exacerbations of chronic obstructive pulmonary disease (COPD) significantly impair health-related quality of life (QoL), are associated with poor prognosis [1,2] and place a huge economic burden on health services and society [3]. The Global initiative for chronic Obstructive Lung Disease (GOLD) strategy document recommends use of a multidimensional system based on post-bronchodilator forced expiratory volume in 1 s (FEV_1), exacerbation history and symptom scores to stratify COPD patients into GOLD A, B, C or D categories and guide the selection of pharmacological therapy [4]. A recent study showed that there is substantial heterogeneity in clinical characteristics among patients in group D and the highest exacerbation rates were recorded in this group [5]. This has led to the search for a tool to assist stratification of patients who are at high risk of exacerbations, particularly those placed in group D, according to their imminence or likelihood of exacerbations. This may facilitate initiation of prompt interventions and improve planning and distribution of health resources.

Few studies have evaluated the potential of exacerbation risk factors to stratify patients according to the imminence or likelihood of exacerbation [6,7]. The spirometric staging system defined by GOLD (GOLD stages 1—4) [4] was found to lack the potential for risk stratification [7] while the BMI/airflow obstruction/dyspnea/exercise capacity (BODE) index exhibits good prediction performance but was not practical to be used in clinical practice [6]. Therefore, there is a need for a simple and reliable tool to assist with the assessment of COPD exacerbation risk.

The recently developed CAT is a short self-administered QoL questionnaire [8]. It is readily available, easy to complete and interpret, suitable for routine clinical use [9,10]. The CAT has demonstrated good correlation with established QoL questionnaires and other relevant measures of disease severity [8,11—13]. Further, it provides a good sense of the health impact in COPD patients [14]. In an earlier study, the CAT score was significantly different between stable and exacerbated patients with COPD [8]. Moreover, longitudinal studies showed that the CAT score relates to exacerbation severity [15] and is responsive to changes in health status during and after exacerbations [13,15,16].

We hypothesised that health status could be a premonitory sign of exacerbation and the CAT could be a useful tool for predicting exacerbations. This study evaluates the predictive value of the CAT for exacerbations and moderate-severe exacerbations in the following six months, and time to first exacerbation in COPD outpatients who are at risk of exacerbations. It also examines the potential of the CAT to further stratify these patients according to the imminence or likelihood of exacerbations.

Methods

Study design and population

In this prospective observational 6-month study, we recruited 545 patients with COPD from outpatient clinics across 19 hospitals in Australia, China, Korea and Taiwan between August 2010 and April 2011. Patients were at least 40 years old, with smoking history of more than 10 pack-years, established diagnosis of COPD for at least six months, defined as FEV_1/forced vital capacity (FVC) ratio <0.7 [4], and with history of at least one COPD exacerbation, which required additional treatment in the previous 12 months. Patients with a current diagnosis of asthma were excluded.

All patients provided written informed consent and the study was approved by the local ethics committees or review boards prior to the initiation of any study-related activities. The study was conducted in accordance with Good Clinical Practice (GCP), all applicable patient privacy requirements, and the ethical principles that are outlined in the Declaration of Helsinki.

Study assessments

All patients attended the clinic every eight weeks and received a telephone call every eight weeks in between