Work productivity loss in mild to moderate COPD: lessons learned from the CanCOLD study

To the Editor:

Little attention has been given to the impact of chronic obstructive pulmonary disease (COPD) on work productivity loss. Individuals with COPD are at risk of reduced working hours, absenteeism, presenteeism and early retirement [1]. Studies have been focused mostly on patients attending outpatient clinics [2], which exclude individuals with undiagnosed COPD, thus limiting the external validity of the findings. There are very few population-based cohort studies [3–6], few reports on presenteeism [5], and a lack of objective measures to define COPD [6]. There would be value in knowing the extent of work productivity loss in individuals with mild COPD, or those who are yet undiagnosed. This could further translate into the allocation of health management programmes in the workplace.

We evaluated work productivity loss (measured as absenteeism and/or presenteeism) between individuals with mild to moderate COPD and those without COPD. We hypothesised that working individuals with COPD, having mild and moderate airflow obstruction with a high symptom burden would have greater work productivity loss than those with a low symptom burden.

Our study was embedded in the Canadian Cohort Obstructive Pulmonary Disease (CanCOLD) study, an ongoing multicentre study involving subjects with COPD, sampled from the general population (see Bourbeau *et al.* [7], for full details). For the purpose of the current study, inclusion criteria for employed COPD and non-COPD control subjects were as follows: ⩾40 years old, having paid employment at the time of study enrolment and a post-bronchodilator forced expiratory volume in 1 s/forced vital capacity (FEV_1/FVC) <0.70 for COPD *versus* FEV_1/FVC ⩾0.70 for non-COPD. All participants provided written informed consent and the study was approved by the respective institutional ethical review boards. Subjects with spirometrically defined COPD, who reported prior physician-diagnosed COPD, chronic bronchitis, or emphysema upon entering the CanCOLD study were identified as "diagnosed" subjects, and subjects with spirometrically defined COPD, who had not received a COPD diagnosis prior to enrolment in the study, were identified as having "undiagnosed" COPD. The overall work productivity loss, *i.e.* absenteeism and/or presenteeism, was measured by the health and labour questionnaire (HLQ) [8], a generic and validated instrument. Absenteeism refers to health-related absence from work, whereas presenteeism refers to the act of attending work while sick, *e.g.* decreased work quality or quantity. Symptom burden was measured using the COPD Assessment Test (CAT) [9]. Subjects with CAT scores <10 were classified as low symptom burden and those with CAT scores ⩾10 as high symptom burden [10]. Comparisons between groups for descriptive summaries were performed using ANOVA or the Kruskal–Wallis test for continuous variables, and the Chi-squared test for dichotomous variables. The level of significance was set at $p<0.05$. All analyses were carried out using the SAS version 9.1.3 software (SAS Institute Inc., Cary, NC, USA).

Of 1556 subjects recruited from the CanCOLD study, 1484 completed spirometry and the HLQ. The study population consisted of 207 employed COPD subjects and 271 non-COPD control subjects. Overall, subjects were on average 60 years old; 60% were female and more than 50% had >2 comorbidities. The COPD subjects, in comparison to the non-COPD controls, had a longer smoking history (21.8±25.1 *versus* 11.7±16.6 pack-years; $p<0.001$), greater airflow obstruction (FEV_1/FVC of 62.2±6.9 *versus* 77.6±5.1%; $p<0.001$ and FEV_1 % predicted of 82.1±17.0 *versus* 100.1±15.9; $p<0.001$), and both showed relatively good

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COPD patients with high symptom burden or CAT ⩾10 have an increased likelihood of experiencing work productivity loss http://ow.ly/FnG030e6uaY

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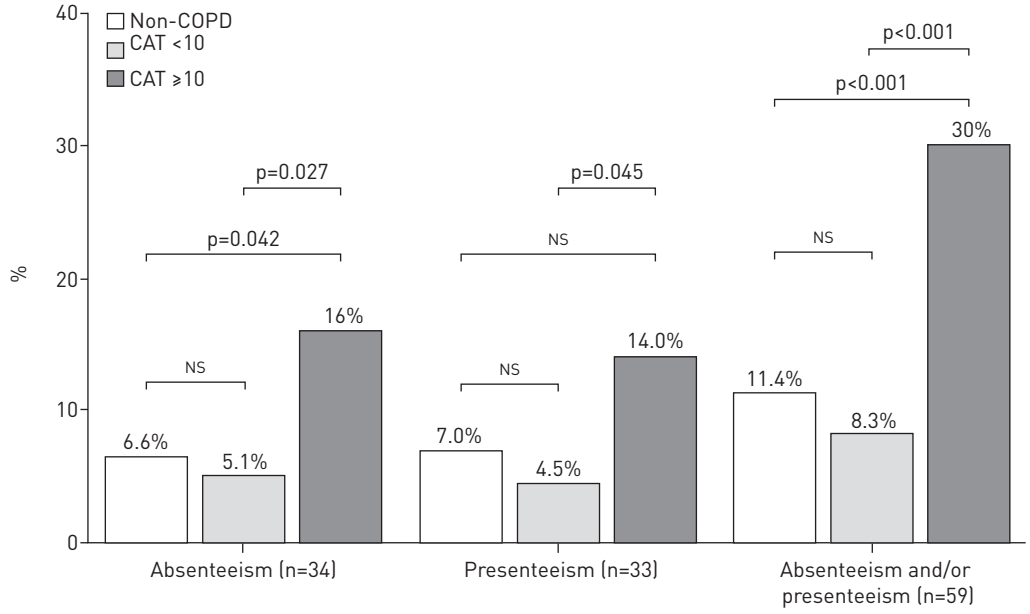

FIGURE 1 Proportion of work productivity loss in the past month for chronic obstructive pulmonary disease (COPD) and non-COPD subjects categorised according to high symptom burden (COPD Assessment Test (CAT) score ⩾10) and low symptom burden (CAT score <10).

health status with CAT scores of 6.5±5.5 *versus* 5.4±4.6. Only 23% of the COPD subjects had a physician diagnosis of COPD.

Figure 1 illustrates the work productivity loss (absenteeism, presenteeism and the two combined) in COPD and non-COPD subjects, according to high (CAT ⩾10) and low symptom burdens (CAT <10). Work productivity loss in subjects with a high symptom burden was about 3-fold higher than in COPD subjects with a low symptom burden and in non-COPD subjects. Among the COPD subjects reporting presenteeism, the most frequent type of impairment reported was difficulty in concentrating (64%) and a slower than usual pace at work (64%), followed by difficulties making decisions (57%), postponement of work (36%) and the need for assistance (21%). Absenteeism was higher in subjects with physician-diagnosed COPD compared to those with undiagnosed COPD (14.6% *versus* 5.7%, p=0.04). However, the difference was not significant for presenteeism (4.2% *versus* 7.5%, p=0.41) and overall work productivity loss (18.9% *versus* 11.9%, p=0.22).

The present study provides a comprehensive overview of work productivity loss (absenteeism and/or presenteeism) among a representative population-based sample of individuals with mild to moderate COPD. Despite having relatively mild to moderate airflow obstruction, and on average a health status comparable to healthy control subjects, we demonstrated that COPD subjects with a high symptom burden (CAT ⩾10), experience increased work productivity loss (*i.e.* combined absenteeism and presenteeism) compared to COPD subjects with a low symptom burden (CAT <10), and non-COPD subjects.

In keeping with our results, Foo *et al.* [11] reported that COPD subjects who experienced a greater degree of breathlessness and other symptoms showed high work productivity loss. Consistent with our findings, Jansson *et al.* [5] showed that absence from work owing to respiratory diseases was higher in subjects with diagnosed COPD compared to those with undiagnosed COPD. This could be explained by the fact that a physician diagnosis of COPD usually identifies those experiencing a greater number of respiratory symptoms and/or exacerbations that could result in increased absence from work [5]. Thus, strategies to reduce the societal burden of COPD should include those that prevent both hospitalisations and work-related outcomes by optimising medication use, self-management interventions and pulmonary rehabilitation.

One of the strengths of the present study is the selection of subjects with COPD from a random population sample, thus making it more representative of the COPD population at large. This provides information not only on individuals with physician diagnosed COPD, but those that are still undiagnosed, who represent 70% of the individuals with COPD. In addition, COPD diagnosis was based on an objective

assessment of post-bronchodilator spirometry, in contrast with previous studies that relied on self-reporting or screening of symptoms [12, 13]. Another strength of the present study is the inclusion of a comparison group of subjects with non-COPD. This allowed enhanced estimation of the magnitude of difference in work productivity loss in COPD subjects. Furthermore, both presenteeism and absenteeism were reported in the current study on COPD with mild to moderate airflow obstruction, thereby overcoming the limitations of previous studies on COPD that focused on absenteeism alone [4, 12].

There are also limitations that should be considered in the interpretation of our results. First, the sample size of employed subjects was relatively small and might have led to an underestimation of the true effects of COPD. Recall and social desirability biases cannot be excluded, considering the work productivity evaluation was done using questionnaires.

In conclusion, our study shows that the burden of COPD goes beyond its impact on the health care system. There is potential for a significant burden at the workplace, even among individuals with mild to moderate airflow obstruction. This study also emphasises the importance of assessing symptom burden, to identify those with a high symptom burden, or CAT $\geqslant$10, who have an increased likelihood of experiencing increased work productivity loss (*i.e.*, combined absenteeism and presenteeism). There is a need for further studies to evaluate the relevance of early COPD recognition by physicians, particularly in those patients who are still in the workforce, and consider whether optimal pharmacological and non-pharmacological management would reduce symptoms, improve work performance, and reduce societal cost.

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