The impact of respiratory disease and treatment compliance to Canadian employers has not been fully quantified. Using an Excel cost-calculator tool, the objective of this study was to estimate the burden of asthma and chronic obstructive pulmonary disease (COPD) and the impact of improved treatment compliance on the Canadian workplace.

Methods

The number of asthma and COPD patients in a selected workforce were estimated based on Canadian prevalence.8,9 smoking10 and labour force participation rates,11 assuming a workforce of 10,000 full-time employees. (Table 1)

Asthma severity was based on published rates of symptom control (uncontrolled vs. controlled),6 COPD severity (mild, moderate, and severe) were based on the American Thoracic Society criteria.11

Published treatment compliance rates6,12 were linked to asthma symptom control, COPD exacerbation, drug costs, absenteeism and presenteeism.

Patients were considered to be compliant if the medication possession ratio was 80% or greater.13

Costs were measured in 2015 Canadian dollars. Pre-intervention medication and short-term disability costs (Table 2) were adjusted by compliance rates (42.7% for asthma and 61.1% for COPD). The cost offset of improved treatment compliance was explored by setting the post-intervention compliance to 80% for both asthma and COPD.

Disease severity levels are described below.

Asthma

- Medication costs were stratified by symptom control.6,9 (Table 2)
- Short-term disability costs were estimated based on average hourly wage14 and hours lost due to asthma symptoms.

Patients with controlled and uncontrolled symptoms were estimated to lose 5.1 and 8.2 hours from work per week, respectively.6,12

- Employers were assumed to call all the costs for absenteeism and 32% of the costs for presenteeism, as employees are present at work but not functioning at 100% capacity.6,11

- Using asthma exacerbations as a proxy measurement for symptom control, a 1% increase in compliance leads to a 0.44% increase in controlled asthma.16

COPD

- Medication costs were assumed to be 71% of maintenance costs and were stratified by disease severity.8,9,10 (Table 2)
- The rate of exacerbations by level of compliance was applied in the analysis.14 Improvement in compliance had a direct effect (improvement) on the frequency of exacerbations.

- The rate of work due to moderate exacerbations (short-term disability) was estimated to be 5 days (time taken to resume normal activities).15 For severe exacerbations, an average length of stay of 10 days was applied.6,11 This is likely an underestimate since patients are assumed to return to work immediately after discharge. However, this conservative approach was taken due to a lack of published data. The rate of exacerbations requiring hospitalization was estimated from the literature.16

- Long-term disability was estimated to be $246 per patient, regardless of severity or compliance.17 Data was not available by level of severity or compliance, thus the same input was assumed for all severity levels.

Results

- Assuming a workforce of 10,000 employees, there were an estimated 754 and 227 patients with diagnosed asthma and COPD, respectively.

- In the pre-intervention scenario, the total annual costs to the employer were estimated to be $3,887,334 for asthma and $785,331 for COPD (Figure 1). The costs per employee were estimated to be $5,153 for asthma and $3,464 for COPD. Indirect costs to the employer accounted for 56.5% of total expenditures for asthma patients and 50.6% for COPD patients.

- When treatment compliance was increased to 80%, 603 asthma patients were compliant and 151 were non-compliant (compared to 332 and 423 pre-intervention). Among COPD patients, 181 patients were compliant and 46 were non-compliant (compared to 139 and 88 pre-intervention).

- In the post-intervention scenario, medication and indirect costs related to symptom control or exacerbations decreased by $144,197 in asthma ($1,911 per employee) and $43,278 in COPD ($917 per employee), for a total annual savings of $187,476 (Figure 1).
References:


3. Canadian tobacco use monitoring survey (CTUMS), Summary of annual results for 2012. Health Canada


