Trends in non-receipt of recommended COPD medication

To the Editor:

Long-acting inhaled medications reduce frequency and severity of exacerbations, decrease number of hospitalisations, and improve functional status and reduce mortality for people with chronic obstructive pulmonary disease (COPD) [1–3]. COPD guidelines, including the Global Initiative for Chronic Obstructive Lung Disease (GOLD) report, offer evidence-based recommendations on optimal medication use [4]. However, many COPD patients do not receive these medications [5–7]. Previous studies have described appropriate use of long-acting inhaled medications in the COPD population and others have trended medication use over time [8, 9]. However, none that we are aware of have described or quantified trends in guideline-recommended long-acting inhaled medications over time in a large, complete, real-world COPD population. This was the focus of the current descriptive study.

There are many ways that medication use can be suboptimal and it is helpful to study each because their causes may differ. While studying overuse and nonadherence to medications has value, we chose to measure receipt of sufficient COPD medications to uncover gaps in treatment.

We conducted a longitudinal, population-based retrospective cohort study using health administrative data from Ontario, the largest province of Canada, with a multicultural population >14 million, between 2004 and 2018. Ontario's publicly funded universal healthcare system covers all medically necessary services provided by physicians and hospitals as well as medications for residents aged ⩾65 years. In this setting, we were able to study medication without cost being a significant barrier. This study was approved by the Research Ethics Board of Sunnybrook Health Sciences Centre, Toronto, ON, Canada.

Nine Ontario provincial data sources, including those with information on drugs dispensed, physician services and hospitalisations, were linked using unique encoded identifiers and analysed at ICES, an independent, nonprofit research institute whose legal status under Ontario's health information privacy law allows it to collect and analyse healthcare and demographic data, without consent, for health system evaluation and improvement. The use of these various databases has been previously validated for respiratory disease health services research and can be found elsewhere [10].

A dynamic cohort of patients aged ⩾66 years who had physician-diagnosed COPD for ⩾1 year was studied. Age 66 years was used because the Ontario Drug Benefit programme universally covers medications for Ontario residents starting at age 65 years and we required a 1-year look-back period. Individuals were identified as having physician-diagnosed COPD if they had three or more ambulatory claims and/or one or more hospitalisations for COPD within 2 years, a case definition previously shown to have a sensitivity of 66% and specificity of 91% compared to a clinical reference standard [11]. Although use of a physician-diagnosed COPD cohort may not perfectly identify patients with COPD, it does indicate patients who physicians believe have COPD and should be considered for treatment.

Minimal optimal medication regimens for patients in a given year were based on exacerbation risk and national and international COPD guidelines in effect during that year [4]. Patients' exacerbation histories were used to determine those at lower and higher COPD exacerbation risk. COPD patients at low risk had no or one outpatient exacerbation (COPD emergency department visits or outpatient COPD physician visits for COPD accompanied by receipt of oral corticosteroids and/or respiratory antibiotics within 7 days [12]) in the previous year. COPD patients at high risk had two or more outpatient exacerbations or one COPD hospitalisation in the previous year.

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Receipt of sufficient COPD medication has improved over time; however, recommended therapy continues to be underused, especially in patients at lower risk of COPD exacerbation
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Since we did not know the previous medications that patients might have failed to respond to or been intolerant to, since we did not have full knowledge of medication contraindications and since we did not have access to spirometry results or symptoms to know how medications might have been picked, we accepted adequate treatment as being receipt of any of the alternative medication recommended by guidelines from filled prescriptions. Given the overlap of these regimens, we were able to identify minimal medications that, when present, covered several alternatives. Thus, long-acting muscarinic antagonists (LAMA) and/or long-acting β_2-agonists (LABA) were deemed sufficient long-term therapy for patients at lower risk of COPD exacerbation; LAMA or LABA/inhaled corticosteroids (ICS) for patient at higher risk of exacerbation [4]. Since all patients, including those at low risk, had at least three COPD physician visits within 2 years or one COPD hospitalisation, they likely had, at least, moderate disease, making not being on medication or receiving a short-acting bronchodilator alone insufficient.

To trend yearly proportions of patients receiving appropriate medication from the pharmacy, age–sex direct standardised rates were calculated using the 2018 Ontario COPD population as the reference population. Confidence intervals were calculated using the gamma distribution.
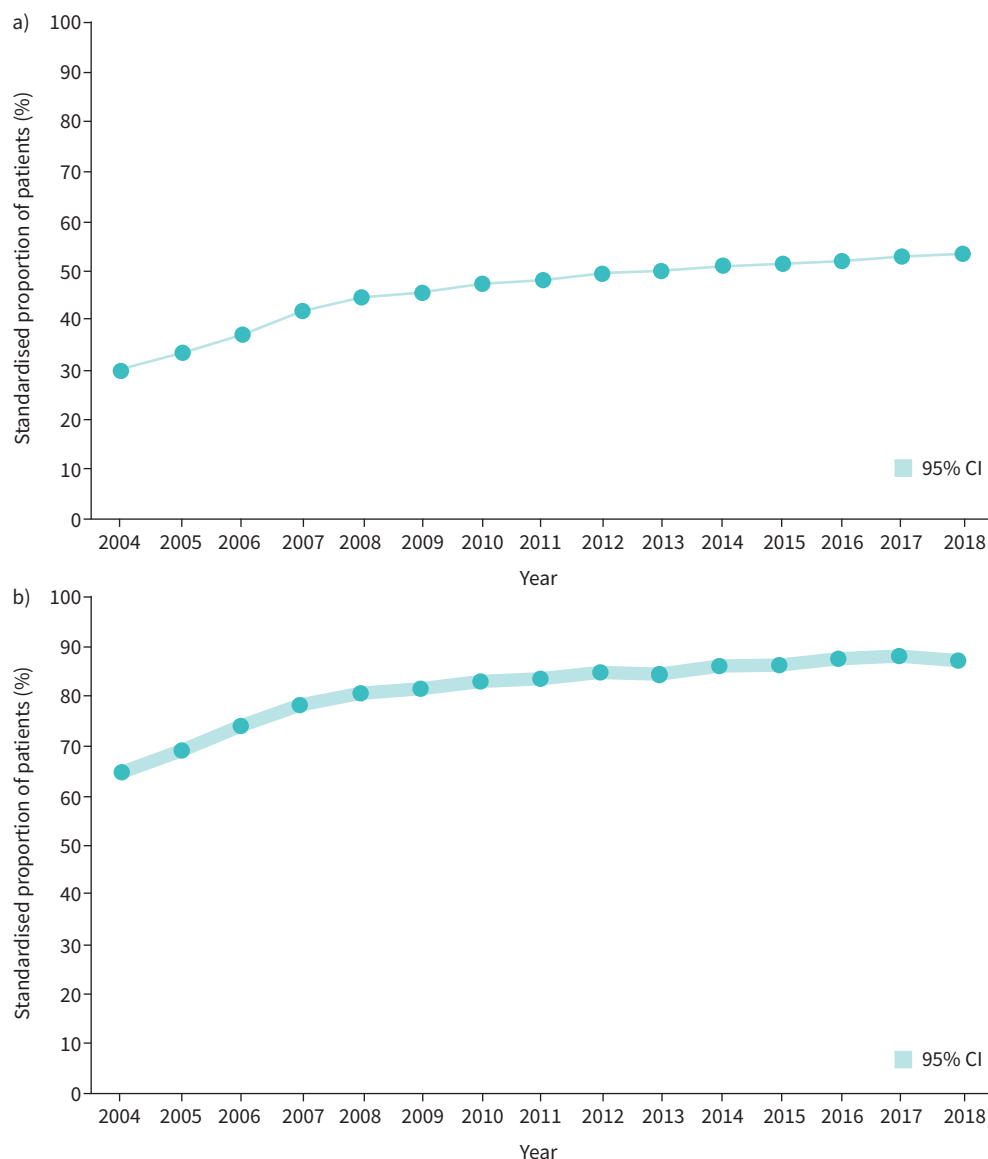

FIGURE 1 Age–sex-standardised proportion of people with chronic obstructive pulmonary disease aged ⩾66 years at a) low risk of exacerbation who received a long-acting β_2-agonist (LABA) or long-acting anticholinergic bronchodilator, alone or in combination, and b) high risk of exacerbation who received both an inhaled corticosteroid and LABA or long-acting anticholinergic bronchodilator, in Ontario, 2004–2018.

A total of 174 001 individuals were identified with physician diagnosed COPD between 1 April 2004 and 31 March 2018. Of these, 16 592 died and 179 were either ineligible for health insurance or moved out of the province.

Over the study period, the number of individuals at low risk of exacerbation increased from 103 056 to 140 822. An upward trend in the standardised proportion receiving recommended medications was observed with an absolute increase of 23.7% (figure 1). 53% of patients with COPD at low risk of exacerbation appropriately received a LABA or LAMA in 2018.

From 2004 to 2018, the number of people at high risk of exacerbation increased from 15 874 to 16 408. An upward trend in the standardised proportion receiving recommended medications was observed with an absolute increase of 22.8% (figure 1). >87% at high risk of exacerbation received recommended medications in 2018.

Our longitudinal, retrospective, population-based study of recommended medication use for patients with differing severities of COPD found a marked increase in the proportion of people receiving long-term maintenance therapy over the study period. However, 47% and 12% of those at, respectively, low and high risk of COPD exacerbation did not receive sufficient therapy in 2018.

Our findings are consistent with previous studies that also found people with COPD to be undertreated [13, 14]. A study of US managed care and Medicare patients with severe COPD found that 59% and 69%, respectively, received no long-term pharmacotherapy [5]. Similarly, an analysis of a large commercial medical and pharmacy claims database in the USA found that only 84% of people with very severe and 66% of people with severe COPD received LABA with ICS [6]. We extend upon this literature by evaluating medication underuse in a complete population of COPD patients over 14 years.

Our study is primarily limited by lack of patients' symptom data, which could lead to misclassification of disease severity. This could have affected our ability to delineate COPD patients at lower risk of exacerbation. However, such potential misclassification was minimised by our COPD case definition that was mostly likely to identify people with symptomatic moderate COPD warranting long-acting inhaled treatment. A second limitation is that we only examined recommended medications until 2018. GOLD 2019 guidelines included prominent suggestions about de-escalation of therapy [15] and future studies should examine how this impacts sufficient medication use. Finally, this study may not be generalisable to healthcare systems where cost is a barrier to accessing medications. However, this would be unlikely to affect trends over time.

In summary, while receipt of sufficient COPD medication is improving, recommended therapy continues to be underused, especially in patients at lower risk of COPD exacerbation. Future strategies should be aimed at optimising medication receipt with the goal to improve patient's health and reduce burden on healthcare systems.

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