Article details: 2014-0040	
Title	Chronic obstructive pulmonary disease in Canadian primary care: a CPCSSN study
Authors	Michael E. Green MD MPH, Nandini Natajaran MD, Denis E. O'Donnell MD, Tyler Williamson PhD, Jyoti Kotecha MPA MRSC, Shahriar Khan MSc, Andrew Cave MB ChB MCISc
Reviewer 1	Wilson Pace MD
Institution	Department of Family Medicine, University of Colorado, Boulder CO
General comments	This manuscript utilizes electronic health record (EHR)) data from a number or practice-based research network practices across Canada to describe the current state of clinical activities related to chronic obstructive pulmonary disease (COPD) in that country. The Canadian Primary Care Sentinel Surveillance Network (CPCSSN) has networked a reasonable number of family practices across Canada from which EHR data can be extracted. CPCSSN has also spent considerable effort to develop validated clinical phenotypes for 8 common conditions in the primary care setting, one of which is COPD. It is against the backdrop of previous work the currently reported upon data analysis was conducted. The group has validated the sensitivity and specificity of the clinical algorithm used to define COPD (commonly referred to as a clinical phenotype) which is a strength of this report. The manuscript reports on raw observed prevalence as well as adjusted prevalence of disease based on Canadian census data. This is another strength of the network and this report. The observed and adjusted rates are in line with reports from other countries and somewhat low compared to population based diagnoses based on screening activities. This is also reassuring as screening for COPD is not supported by current data and thus observed diagnosis rates should be below rates established through active screening. The group only assessed co-morbidity for the 7 other conditions for which clinical algorithms has been validated. This is a conservative approach to characterizing co-morbidities but still highlighted the high prevalence of other chronic diseases in association with COPD- as would be expected. Medication prescribed data was overall consistent with expectations for COPD. The analyses appeared to have been reasonably conducted and the results are in line with reports from other countries from similar data sources. The overall writing was clear and easy to follow. Tables and figures were for the most part easy to interpret (see comments below.) The limitations of EHR data for health services research/analysis are well described. Figure 2 provides an interesting view of the co-morbidity data by age. Minor Concerns: The Methods does not describe the underlying population from which the COPD patients were extracted and studied. Table 1 lists number of patients by age group with the percent with COPD as 0% in the 18-29 age group. Thus, the n in this table presumably is for the entire adult population. The total N for the adult population is thus approximately 250,000. The Methods indicates that the network contains 444 physicians- this works out to only slightly over 560 patients per physician. This is a very low number. Is this because many physicians did not supply data for this analysis or due to problems with data extraction? In either case this discrepancy needs to be clarified. In fact, the only place the reader can find the actual number of COPD patients included in this analysis is either by adding up all the categories in Table 3 or the footnote in Table 3. The size of the full population and the size of the study population should be included in the text of the Results, not just observed and adjusted percentages of the population. The interpretation of the medication data, indicating that some patient's treatment is more in line with asthma guidelines than with COPD guidelines appears to presume that physicians reserve the diagnosis of COPD for patients whose lung obstruction occurs from some other cause than asthma (presumably dominated by smoking.) While this is clearly the vast majority of COPD cases could it be that at least some physicians are using the term for individuals who have developed chronic obstruction from persistent severe asthma? The diagnosis is a clinical diagnosis devoid of underlying causation. Thus, perhaps the use of asthma medications in this small group of individuals was appropriate. Is asthma one of the validated clinical phenotypes and was this diagnosis found concomitantly with COPD? The interpretation of medication data indicating that a diagnosis is made later in the course of the disease also fits with the fact that treatment doesn't alter the course of the disease and thus is reserved for symptomatic patients, later in the course of the disease. The low prevalence compared to a diagnosis based on spirometry screening in a population of patients is not surprising but may not represent poor recognition or diagnostic skills of the clinicians but the simple fact that screening for asymptomatic individuals is not recommended and early treatment has no real impact. Offering a stop smoking message to smokers is independent of a COPD diagnosis and thus not an indication for screening. If the screening based prevalence studies indicate the stage of

	disease by percentages it would informative to examine the CPCSSN data to stage 2 to 4 and 3 to 4 disease from screening data which may be even more in line with the findings from EHR data. Overall this report demonstrates both the ability of primary care EHR data to inform health services research and the limitations of primary care EHR data for population based surveillance. Therapeutic intent can be determined, though without a distinct measure of severity (as spirometry results were not available) it is more difficult to gage logical versus illogical therapies. This is not the case for all diseases but a clear limitation for COPD and asthma research using these data. Given that COPD is not evenly distributed across the globe it is reasonable to review this information on a regional basis, such as within a country.
Reviewer 2	Pat Camp PT PhD
Institution	Pacific Lung Health Centre, St. Paul's Hospital, Vancouver BC
General comments	This well-written study by Green M, et al utilized electronic medical record (EMR) data obtained from the Canadian Primary Care Sentinel Surveillance Network to estimate the prevalence of COPD in Canada. Additionally, the authors sought to determine the association of COPD with specific comorbidities and to describe the pattern of medication prescription. Data was abstracted in December 2012 and was comprised of EMR records from 444 primary care physicians in Canada. Major Comments 1. The primary concern regarding this paper is the lack of new information provided on the prevalence of COPD in Canada. Previous studies using BC administrative health record data (Camp PG et al, Can Respir J 2008) and population-based surveys (Life and Breath in Canada, PHAC) have estimated the prevalence of COPD at approximately 4%. This study reports a prevalence of 3.2-3.4%. EMR data would have many common characteristics to administrative physician billing data so it is not surprising that the estimates would be similar. In contrast, two papers recently reported on COPD prevalence in Canada by measuring lung function in population-based samples. Tan et al (Int J Tuberc Lung Dis 2011; 15(12): 1691-1696) reported a prevalence of 11.6% using the lower limit of normal of the FEV1/FVC ratio in a population of over 3000 individuals randomly sampled from 5 Canadian cities. Similarly, Evans et al (Health Reports 2013) reported a prevalence of 16.6% for COPD Gold I and 8.1% for COPD Gold II and higher, using data from the randomly sampled Canadian Health Measures Survey. Although the numbers for this study by Green are higher, they are not population-based so may not be representative of the true prevalence. The authors do not emphasize why this new source of data provides important information about COPD prevalence that was not already known. 2. The authors state that the lower prevalence found in their survey may be due to misdiagnosis or underdiagnosis. While this may be true, it does not reflect the nature of the data source. EMR data reflects the prevalence of individuals with COPD who are sufficiently symptomatic to seek care for their condition from their primary care physician. Therefore, it will only estimate those individuals who are symptomatic or who are diagnosed through screening or other reasons. Minor Comments 1. The authors used algorithms for COPD but these were not provided in the paper. As the algorithm is extremely important in confirming the validity of the findings they should be provided, especially since two of the three cited algorithms are not available. 2. For Table 1, it is a bit confusing, is the values for 'n' the total numbers of individuals with COPD, or the 'n' for the total population? I am assuming it is for the total population, but the n for COPD would be important to include. This value shows up as a note in Table 3. 3. As the data is cross-sectional, a bar graph instead of a line would be more appropriate for Figure 1. 4. The n for each type of medication is the same, regardless of the %. 5. The medications section of the discussion is very speculative and awkwardly worded. How can someone have 'less detected' disease and also be treated? Also, the discussion around the concurrent diagnosis of asthma is confusing. I'm surprised that asthma was

	not a comorbidity included in the list as the diagnostic overlap with COPD is widely-known and would help confirm whether this is true COPD prevalence. 6. Dr. Gershon's name is misspelled in the text. 7. The discussion should include more Canadian estimates of COPD prevalence, of which there are many (administrative, population-based measures of lung function, and population-based surveys). 8. Several STROBE criteria were missed.
Author response	**Comments from Reviewer 1** 1. New table 1 created, additional section on the network as per editors comments. 2. Tables revised to address this concern. Many of the networks include academic practices with physicians who may carry smaller case loads. 3. This is possible, but it is also likely that there is some misclassification. The medication section as been revised as per the editors comments. This study is not able to sort out misclassification from appropriate treatment of co-existant asthma and copd. 4. Asthma is not one of the cpcssn validated conditions nor is it one of the validated copd phenotypes. As noted the medication interpretation section has been revised. 5. This is quite possible, however we still feel that it is likely that there is an element of likely underdiagnosis. Whether this changes long term outcomes is a different question that we agree remains uncertain. 6. Certainly we agree that the prevalence is closer when limited to stages 2+, however it is still lower than expected for rates reported for population based screening using stage 2 as a cut off. We have added some references about this to this to the paper (also to address comments from reviewer 2). **Reviewer 2** 1. We have added some reference to the discussion to bring forward comparisons to the Evans et al and Camp et al studies noted here. We believe that we have addressed the importance and value of primary care derived E.H.R. data in the introduction and discussion. It reflects how patients with COPD are identified and treated in primary care settings. The data available include many elements that are not readily available through other sources and offer opportunities for additional studies exploring a wide range of aspects of the treatment of COPD in primary care in the future. 2. This point is similar to point 5 of Reviewer 1. It is noted in the discussion which has been expanded with additional references and also noted in the limitations. We agree with the sentiments expressed and hope that the paper reflects this appropriately. 3. We have added the algorithm link as per our response to the editor's comments. 4. We have reworked the tables. 5. We have revised the medication use section. 6. We have corrected the spelling of Dr. Gershon's name. Thanks for noticing this! 7. Additional references were added. 8. As the specific criteria of concern were not listed we were not able to respond fully to this comment.