Article details	
Title	Osteoarthritis in Family Physician Practices in Canada: A Report of the Canadian Primary Care Sentinel Surveillance Network (CPCSSN)
Authors	Morkem, Rachael; Birtwhistle, Richard; Peat, George; Williamson, Tyler; Green, Michael; Khan, Shahriar; Jordan, K.
Abstract	**Background:** Osteoarthritis (OA) is a common chronic condition that affects a large proportion of the older Canadians and is a major source of disability. The objective of this study is to describe the primary care epidemiology of OA using electronic medical records (EMR) in the Canadian population. **Methods:** We analyzed the electronic medical records (EMR) from 207,610 patients over 30 years of age extracted on December 31, 2012 who had at least one clinic visit in the last 2 years. We calculated the age-gender standardized EMR prevalence of OA and its association with co-morbidities and covariates available in the Canadian Primary Care Sentinel Surveillance Network (CPCSSN) database. **Results:** The estimated prevalence of OA found was 14.2% (15.6% women, 12.4% men). OA was associated with other comorbidities such as hypertension (PR 1.17, 95% CI [1.15-1.18]), depression (PR 1.26, 95% CI [1.22-1.3]), chronic obstructive pulmonary disease (COPD) (PR 1.16, 95% CI [1.11-1.21]) and epilepsy (PR 1.27, 95% CI [1.13-1.43]). We also found that 56.6% of patients received a prescription for a range of nonsteroidal anti-inflammatory drugs (NSAID), 45% of which were topical NSAIDs. Opioid medications were prescribed to 33% of patients for pain. **Conclusions:** This study is the first to report on the diagnosis of OA using primary care EMR data in Canada. Many patients are being treated with narcotic analgesics which may increase risk of fall and injury in these patients. Primary care EMR data can be a valuable tool for the ongoing assessment of chronic disease, risk factors and management.
Version 1	
Reviewer 1	
Name	Dawes, Martin
Position	—
Institution	University of British Columbia, Family Medicine
Competing interests	—
Date review returned	17-Feb-2015
General comments	A great cross sectional study that answers half my questions, and adds another half so I am back with the same number of questions. It is sound methodologically though we can always question what OA really means, definitions, measurements etc. Some interesting prescribing information, multi morbidity and biophysical findings. You address the biases, make comparison with other countries and other prevalence data and do not make exaggerated claims in the

	abstract. Overall this is really important data for health systems planning. It is an important foundation paper for the network and establishes the scientific credibility of primary care data.
Author response	A great cross sectional study that answers half my questions, and adds another half so I am back with the same number of questions. It is sound methodologically though we can always question what OA really means, definitions, measurements etc. Some interesting prescribing information, multi morbidity and biophysical findings. You address the biases, make comparison with other countries and other prevalence data and do not make exaggerated claims in the abstract. Overall this is really important data for health systems planning. It is an important foundation paper for the network and establishes the scientific credibility of primary care data. Thank you for those supportive comments.
Reviewer 2	
Name	Ewald, Ben
Position	—
Institution	University of Newcastle, Centre for Clinical Epidemiology and Biostatistics
Competing interests	—
Date review returned	10-Feb-2015
General comments	The background in the abstract tells us that OA is a common chronic condition, and that is still what we know on reaching the end of this paper. It escapes this reviewer what new understanding can be reached from the presented research. The paper is weak on the question of what it means and why it is interesting. Methods We are not told who does the coding for the EMR. Have the clinicians had training in coding? Is there any incentive for them to code, or quality measures to make sure it is done well? Is there a limit of one code per consultation? The big problem with studying OA is the large number of people with mild disease, so that changes in definition or diagnostic enthusiasm can make a large difference to prevalence. This issue is mentioned in the discussion when considering other's work, but is not considered in the author's own work. There is a potential bias that the probability of having ever been coded as having OA will increase with the number of years the EMR has been running. This could be examined by comparing the length of record for those with and without OA. Details P6, line17 The term "kissing spine" is not in general use in my country, and needs explanation. P6 line 25 The general reader will not already know what is included in ICD9 codes 715 and 721, so the descriptors should

	be given. P7 line 18 needs more explanation if readers outside Canada are going to understand postcodes and rurality. Results As BMI is missing from 34% of records, and this is unlikely to be missing at random, and 59% were missing smoking, the estimates are highly likely to be biased. The small observed prevalence ratios in table 2 are likely to be due to selection bias, and the statistical precision does nothing to overcome this. The BMI and smoking analysis is so flawed it is not worth reporting. Five of the comorbidities reported in table 3, are associated with physical activity so the associations are not unexpected. They may all however be explained by comparing better documented patients to worse documented ones. This weakness is acknowledged in the discussion, p11, line 46 "propensity to consult" . P9 line 8 It is unclear why a patient would be prescribed an OTC medication. Surely they just buy it. Discussion Its unclear why other studies are mentioned here rather than as background. • P10 line 34 The mention of radiological confirmation is confusing. There is a lack of correlation between radiological signs and patient symptoms, so plenty of people have early OA and normal Xrays. See Ann Rheum Dis 2011;70:1944-1948 in which 31% of older adults with knee pain had normal X rays, however radiological changes followed later. P10 line 41 the reference to administrative data is confusing. Which administrative data? P11 lines 25 to 30 make no sense. There must be typos. P11 line 53 Seems to suggest that ibuprofen and naproxen are not NSAIDs. P12 line 18. The National Physician Survey needs explanation. Is this a complete list of physicians? P16 table 1 and figure 1 present the same data. The figure is better and the table should be removed. Overall This paper gives a poor look at the epidemiology of OA, and might better be framed as a methodological study of what can or cannot be learned from the EMR. The problem with variable diagnostic criteria is acknowledged, but I think it is a fundamental problem that flaws the whole work.
Author response	The background in the abstract tells us that OA is a common chronic condition, and that is still what we know on reaching the end of this paper. It escapes this reviewer what new understanding can be reached from the presented research. The paper is weak on the question of what it means and why it is interesting. This paper describes the epidemiology of the diagnosis of osteoarthritis in primary care practice in Canada using

	extracted EMR data. These findings are consistent with information from other sources and come from a novel data source for primary care. An advantage of longitudinal EMR data is that it can be used for ongoing surveillance of this chronic condition at the population, practice and individual level. EMR data also has the potential to find associations with other clinical data not available in other data sources. Methods 1. We are not told who does the coding for the EMR. Have the clinicians had training in coding? Is there any incentive for them to code, or quality measures to make sure it is done well? Is there a limit of one code per consultation? The big problem with studying OA is the large number of people with mild disease, so that changes in definition or diagnostic enthusiasm can make a large difference to prevalence. This issue is mentioned in the discussion when considering other's work, but is not considered in the author's own work. The data used for this study is routinely collected data from patient charts which includes billing data and health conditions. Practitioners are not expected to code. Data is not limited to one diagnostic code and the unit of analysis is not the encounter. We agree that there are challenges in the definition and diagnosis of osteoarthritis. Our case definition validation found a sensitivity of 78% and specificity of 90%. However for the purpose of this study a positive predictive value of 88% is acceptable. 2. There is a potential bias that the probability of having ever been coded as having OA will increase with the number of years the EMR has been running. This could be examined by comparing the length of record for those with and without OA. This is a good point. Practices have been using EMRs for 2-10 years in the network. Details 3. P6, line 17: The term "kissing spine" is not in general use in my country, and needs explanation. This term has been removed. It was part of the definition of the ICD-9 code. 4. P6 line 25: The general reader will not already know what is included in ICD9 codes 715 and 721, so the descriptors should be given. Done. 5. P7 line 18 needs more explanation if readers outside Canada are going to understand postcodes and rurality. Sentence added. Results 6. As BMI is missing from 34% of records, and this is unlikely to be missing at random, and 59% were missing smoking, the estimates are highly likely to be biased. The small observed prevalence ratios in table 2 are likely to be due to selection bias, and the statistical precision does nothing to overcome this. The BMI and smoking analysis is so

	flawed it is not worth reporting. While we agree that the missing data for smoking and obesity result in biased estimates but we think given the number of patients in the database it is worth reporting. The issue has been highlighted in the limitations section. 7. Five of the comorbidities reported in table 3, are associated with physical activity so the associations are not unexpected. They may all however be explained by comparing better documented patients to worse documented ones. This weakness is acknowledged in the discussion, p11, line 46 "propensity to consult". No comment. 8. P9 line 8: It is unclear why a patient would be prescribed an OTC medication. Surely they just buy it. This is true but there are also OTC medications that can be prescribed by the practitioner which are covered by drug plans for those >65 yr or on social welfare. Examples are acetaminophen and ibuprofen. Further some practitioners will add OTC medications to the patient's EMR medication list. Discussion 8. It's unclear why other studies are mentioned here rather than as background. Revised 10. P10 line 34: The mention of radiological confirmation is confusing. There is a lack of correlation between radiological signs and patient symptoms, so plenty of people have early OA and normal Xrays. See Ann Rheum Dis 2011;70:1944-1948 in which 31% of older adults with knee pain had normal X rays, however radiological changes followed later. We understand this but is some studies xray change is used for diagnosis of OA. 11. P10 line 41 the reference to administrative data is confusing. Which administrative data? Definition provided. 12. P11 lines 25 to 30 make no sense. There must be typos. This has been rewritten. 13. P11 line 53: Seems to suggest that ibuprofen and naproxen are not NSAIDs. Sentence clarified. 14. P12 line 18. The National Physician Survey needs explanation. Is this a complete list of physicians? No NPS is a voluntary survey of physicians with a very poor response rate but there is no better comparison at the moment in Canada. 15. P16 Table 1 and figure 1 present the same data. The figure is better and the table should be removed. Table has been removed. Overall 16. This paper gives a poor look at the epidemiology of OA, and might better be framed as a methodological study of what can or cannot be learned from the EMR. 17. The problem with variable diagnostic criteria is

	acknowledged, but I think it is a fundamental problem that flaws the whole work. We respectfully disagree.