

Article details: 2014-0122	
Title	Changing rates of mortality and hospitalization for non-intentional non-fire-related carbon monoxide poisoning across Canada: a trend analysis
Authors	Eric Lavigne PhD, Scott Weichenthal PhD, Joan Wong MSc, Marc Smith-Doiron BSc, Rose Dugandzic MSc, Tom Kosatsky MD MPH
Reviewer 1	Jeremy Beach
Institution	Occupational Medicine, University of Alberta, Edmonton, Alta.
General comments	<p>This is a well written paper reporting a relatively straightforward analysis of data on non-intentional, non-fire related CO poisoning in Canada. The methods appear appropriate and the discussion to the point. Limitations of the data are discussed and the findings are placed in context. The topic it deals with is of practical importance. This paper is based on mortality and hospitalisation data and so includes only individuals with severe poisoning. It would have been useful to have included some data on less severe poisonings, but the authors have already explicitly discussed this and reported that, for example, data on Emergency Dept attendances were not available. There are a couple of additional things I think it would be worth bringing up in the discussion, and I have made some other minor comments below:</p> <p>1. Do the authors think the change from ICD 9 to ICD 10 may have affected the trends seen in any way. My own thinking is probably not as looking at figure 1 the same trend appears apparent pre 2000 and after 2000, although there does appear to be a slight increase in mortality rates for both men and women in 2000. Its probably worth mentioning.</p> <p>Author response: The following sentence has been added to the discussion in the strengths and limitations section: <u>"In addition, the change from ICD-9 to ICD-10 in the administrative databases may have affected the trends observed."</u></p> <p>2. Do the authors feel there may have been significant under-recognition of cases using administrative data the way they did? I think this is possible and if so it would give an underestimate of the importance of CO poisoning. I can't see there would be a significant likelihood of over-reporting although this too should be considered. Even if there were under-reporting the trend over time may well be accurate if any under-reporting were relatively constant. I think it would be helpful to include some discussion of this also.</p> <p>Author response: We agree with the reviewer that there may be some level of under-recognition of cases using administrative data, but we believe that this limitation is already addressed in the limitations section: <u>"Finally, this study relied only on hospitalization rates to assess trends in non-fatal CO poisoning which is not optimal given that persons hospitalized for CO poisoning are among the most severely poisoned cases. Alternatively, the use of poison control centre calls or emergency department data for non-fatal CO poisoning cases should be considered in public health surveillance systems [22, 23]. However, these data were not available across Canada."</u> In addition, we refer in the methodology section to previous studies that have used similar approaches to assess trends of CO poisoning.</p> <p>3. In table 3 footnotes I think it would be useful to clarify what statistically significant results are. I think the authors mean that these AAPCs are significantly different from '0' but it would be worth saying this rather than leaving the reader to try to work out what they are different from.</p> <p>Author response: The following change has been made to the footnotes of Tables 1 to 3: <u>Results that are statistically significantly different from zero are in bold font.</u></p> <p>4. I think the legend for figure 3 should be 'by month' rather than 'by year'.</p> <p>Author response: The change has been made.</p> <p>5. The authors should ensure reference 3 is complete - it looks like it is missing some</p>

	<p>information - publisher, year of publication.</p> <p>Author response: The publisher and year of publication have been added.</p> <p>6. On page 4, methods, para 1, line 4 there appears to be a word missing:and tenth revisions (2000-2009 [12] were used as the basis.....</p> <p>Author response: We added the missing word: <u>"used"</u>.</p> <p>7. It would be helpful for the authors to give a little more explanation of how place of CO exposure was recorded in and extracted from the hospital database. Was it already in the categories used in Table 3 or did the authors need to re-categorise?</p> <p>Author response: Place of CO exposure was categorised based on categories used in a previous paper investigating places of CO occurrence. This paper has already been referred in the text in the following sentence in the methods section: "and place of CO poisoning occurrence was also extracted. The latter was categorized as the following: home/residential, occupational, recreational/sports, public areas and other/unknown (5)." We have also added the following sentence in the methods section when describing the hospital data: "The latter was recorded using ICD codes in secondary diagnosis fields and was categorised as described previously for the mortality data."</p>
Reviewer 2	Michael Brauer
Institution	University of British Columbia, School of Environmental Health
General comments	<p>This is a very useful and straightforward analysis of an important preventable health issue that has not been systematically analyzed in Canada. The methodology is very clearly described. I have a few suggestions to improve the interpretation and contextualization of the findings.</p> <p>The manuscript suggests that CO poisoning is a leading cause of accidental poisoning (in Canada) but there needs to be some more quantitative information on other causes of accidental poisoning to put this in context. Ideally this would be contextualized with Canadian data but if not available then at least using US data would help put the magnitude of this issue in perspective.</p> <p>Author response: To our best knowledge, there is no published data on national quantitative information on other causes of accidental poisoning in Canada. In addition, the most recent data for the US that reports mortality rates for different unintentional poisoning causes is from 2004. Therefore, we believe we should not emphasize much on the quantitative information, but rather refer the reader to the references from the US that highlight that CO poisoning is a leading cause of accidental poisoning. A reference has been added to the first sentence of the introduction in this matter.</p> <p>A related point would be the need to add some comparisons between the Canadian mortality/hospitalization rates and those reported for other countries.</p> <p>Author response: The purpose of this paper is to evaluate trends in CO poisoning rather than strictly comparing rates from one country to another. We mention at the beginning of the second paragraph in the interpretation section that "Decreasing mortality and hospitalization rates reflect the tendency observed in other developed countries (1,9,10)." We believe we are providing sufficient information since the subsequent discussion is focusing on the potential factors related to this decreasing trend. By providing comparisons in rates across countries we would need to focus the discussion of the paper on why there are differences in rates and that was not the purpose of this study.</p> <p>Although this is alluded to at the end of the manuscript, is there any information (from one or more of the provinces or even from outside of Canada) to indicate the proportion of emergency room visits for (confirmed or suspected) CO poisoning that result in hospitalization? I would have thought that only a small portion of actual poisonings lead to hospitalization so that the true burden is higher than indicated in this paper. Some discussion of this issue would be useful to include.</p> <p>Author response: There is no published data for Canada on this issue, but some data exists for the US. The following sentence has been added to the limitations paragraph in the discussion section: <u>"For instance, in the US, only 10% of unintentional non-fire related CO poisoning cases get admitted to the hospital."</u></p> <p>Occasionally there are large community-scale CO poisoning events (ice arenas especially)</p>

	<p>and there is a suggestion of such events in the data (sports/recreation and public). Would it be possible identify any specific episodes affecting multiple individuals (>10 for example) by combining the specific ICD codes related to vehicle exhaust/incomplete combustion and by spatial and temporal clustering? These events have a different etiology (and different prevention implications) than the home environment exposures. This source of potential CO exposure should also be mentioned in the Introduction, and perhaps in the discussion as well - since the data reassuringly suggest that such events are likely to be rare.</p> <p>Author response: This is a very interesting suggestion provided by the reviewer. However, the administrative data that was used for this paper does not include very fine scale spatial resolution information for confidentiality reasons. Therefore, the spatial-temporal clustering analysis suggested by the reviewer is not possible. We believe that sources of CO exposure in the introduction are being emphasized when mentioning the following sentence: "Finally, little is known about who in Canada is poisoned by CO, where and when."</p> <p>Greater decreases in mortality, but not hospitalization, seem to have occurred in provinces with the highest initial numbers of events – this could be assessed and mentioned in the manuscript. In general the manuscript would benefit from some more analysis/discussion of heterogeneity in rates of change by province (and discrepancies in changes for mortality and hospitalization – related to this would be some discussion of how to interpret these together – is a less dramatic decrease in hospitalization vs mortality in a province a sign of improved poisoning management or reductions in exposure?) as this can be helpful for future programs.</p> <p>Author response: We do not agree that greater decreases in mortality seem to have occurred in provinces with the highest initial numbers of events. For instance, the provinces of Quebec and Ontario which are the ones with the highest initial numbers of event had AAPC's of -5.44 and -5.51, respectively. These decreases are lower than other provinces with smaller initial numbers of events. In addition, we understand that a more thorough discussion on differences of rates across provinces would be beneficial. However, the purpose of this paper was to describe trends that might generate hypotheses about why such changes occurred, and could help provincial health-policy makers to identify provincial factors that could affect this trend, and act accordingly. As well, the following sentence in the limitations section addresses the issue of variability in rates across provinces: "The great variation observed in average annual rates of hospitalization by province compared to mortality rates suggests a lack of consistency across provinces in coding for CO poisoning."</p>
--	--