Author's response to reviews

Title: Smoking-attributable morbidity: acute care hospital diagnoses and days of treatment in Canada 2002

Authors:

Dolly Baliunas (dolly_baliunas@camh.net)
Jayadeep Patra (jayadeep_patra@camh.net)
Rehm Jurgen (jtrehm@aol.com)
Svetlana Popova (lana_popova@camh.net)
Benjamin Taylor (benjamin_taylor@camh.net)

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Author's response to reviews: see over
Dear Iratxe Puebla,

Please find attached our revised manuscript that we resubmit for publication in BMC Public Health.

Below is an itemized list of our response to the reviewers’ comments.

Regards,
Dolly Baliunas

**Reviewer 1**

**Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)**

- The results in table 3 come as a something of a “black box”. More detail on how they were derived would be helpful. The formula on page 7 will be meaningless to most readers. A worked example would help more. For example “at age 60-69 years 15.1% of women and 17.2% of men were current smokers. For stroke (or some other specific disease example) there were x cases in region A, the age-specific relative risk of stroke in smokers compared to non-smokers was r, so simple algebra would apportion these x cases to y in smokers and z in non-smokers, to be consistent with the relative risk r”. Something like this would help greatly. Passive smoking would presumably also need to be taken into account, as may the proportion of people smoking variable numbers of cigarettes per day.
  - An example has been provided in the methods section.

- Additional information in the Methods would help, some of this may have been given, but if so I missed it. For example were the relative risks of diseases in smokers compared to non-smokers age-specific? Was the prevalence of smoking, in the various categories, determined by region like the hospitalization rates? How were former smokers taken into account.
  - Age-specific estimates were available for ischaemic heart disease, cardiac arrhythmias, heart failure, and cerebrovascular disease. This is now stated in the methods section.
  - The prevalence of smoking was estimated for Canada as a whole and not by region. This is now stated in the methods section.
  - The categorizations of smoking varied depending on the relative risks estimates for a given disease. For example, for COPD, the relative risks available were for current smokers and former smokers (relative to never smokers) thus prevalence was categorized by current, former, and never. For stomach cancer, the relative risks available were for former smokers, current smokers consuming <= 20 cigarettes per day, and current smokers consuming > 20 cigarettes per day, and a crude measure of current smoker. Thus prevalence was categorized using the same categories (the
crude ‘current’ smoker categorization was used for current smokers for whom sufficient information did not exist to determine if they smoked greater or less than 20 cigarettes per day and for current smokers who were non-daily smokers). The methods section has been modified to make this procedure more clear.

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

- There are a few issues relating to table 3. Inevitably there will be surprises at one or two diseases included as smoking-related, and surprises at one or two excluded (aortic aneurysm for example). But we do need explanation as to what “tobacco abuse” is – I have never heard of anyone being admitted to hospital for tobacco abuse. Yet there are as many hospital days as for cancers for the mouth, pharynx and oesophagus combined, so it seems fairly common. Many readers will look at the table without reading the Methods, and it needs to be clear to these people what SAF is – this should be explained in plain English with a footnote if necessary. Under “number of diagnoses” it is not clear whether second and subsequent admissions for the same disease count as “diagnosis”. Some of the diseases have asterisks by them but there is no footnote. The asterisk seems to correspond to missing SAF values, and it is not clear why SAF could not be calculated for these diseases.
  - Tobacco abuse is the ICD-10 code for mental and behavioural disorders due to use of tobacco. As with all the codes which pertain mental and behavioural disorders due to psychoactive substance use (F10-F19) it includes acute nicotine intoxication, harmful use, dependence syndrome, withdrawal state, withdrawal state with delirium, psychotic disorder, amnesic syndrome, residual and late-onset psychotic disorder, other mental and behavioural disorders, and unspecified mental and behavioural disorders. The ICD-10 code for each condition included in our analysis is listed in table 1 to allow interested readers to search out fuller descriptions which, we believe, cannot be included due to space limitations.
  - SAFs were calculated for those diseases but where age-specific, and as the presented numbers have been combined for all ages, the age-specific SAFs are not presented. A footnote has been added to explain the asterisk.
  - Hospital morbidity statistics reflect the number of hospitalizations (or discharges), which is somewhat higher than the number of individuals hospitalized since individuals with multiple admissions during a single year would be counted more than once in the discharge totals. A statement to this effect has been added to the methods section.

- The Abstract would attract more Medline scanners to read the entire paper if it reported on more of the major results. For example the result that smoking accounts for 10% of all acute care hospital days in Canada, and the value of the SAF for some of the major smoking-related diseases. Numbers like 463,625 are difficult to interpret in an Abstract, people find proportions easier to understand. If the Abstract has a strict word count some of the detail (such as fire deaths, reasons for the decline) could be omitted.
  - The abstract has been changed slightly.

Reviewer 2

Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)
P3. The aim of the present study (..to estimate the proportion of acute care hospital diagnoses and hospital days attributable to…) seems not too appropriate as the title is "Smoking-attributable morbidity and acute care hospital costs in Canada 2002"
  o The title of the paper has been changed.

P4. Pls explain why English et al was used when a more current meta-analysis did not exist. Does it mean that English et al provide the most accurate and reliable ones?
  o Our phrasing here has been changed. The previously published estimate (using 1992 data) used the relative risks from English et al. Because part of the rationale for this study was to incorporate more recently published estimates of relative risk, we meant only to convey that for diseases where such publications did not exist, we used English et al. Thus, we believe the English et al. estimates are the most current.

P4. When a meta-analysis was published later than 1995, why there was usually *only* one that presented data on smoking dose?
  o This is a difficult question to answer. There simply are not that many meta-analyses of smoking and some health outcomes that include categorizations of smoking exposure beyond current/former/never that were published after 1995. It may be that these associations are considered by many to be well-documented and thus not requiring update.

P4. If there was more than one, why choose the most comprehensive based on age and smoking dose categories? The most comprehensive one does not necessarily imply a more accurate risk estimate. The choice should also be based on the quality of the published report.
  o We agree completely with this statement and did in fact choose the meta-analyses with this in mind. The methods section has been modified to reflect this fact.

P5. The passive smoking-attributable morbidity was derived from lung cancer and IHD to the population of Canadians who have never smoked, but are exposed to ETS. However it is reported that passive smoking affects both never smokers and current smokers (eg Environmental tobacco smoke and respiratory ill health in current smokers, published in Tobacco Control). The figures will considerably be underestimated.
  o This underestimation is now acknowledged in the methods section.

P5. CCHS sample was weighted to ensure comparability with Canadian population. Does it mean that CCHS is not comparable to Canadian population. For example, if smokers were less likely to cooperate and be included in the CCHS study, the smoking prevalence would be underestimated. If so, is there any selection bias in smoking prevalence?
  o In order for estimates produced from survey data to be representative of the covered population, and not just the sample itself, a user must incorporate the survey weights into their calculations. Statistics Canada provides this sample weight in the dataset and it is this sample weight that was used to ensure comparability with the Canadian population. Our language has been changed slightly in an effort to make this point more clearly.

P6. As the national level data were actually composed of only 7 provinces and 2 territories, pls explain how data for whole Canada were estimated using the total population.
  o The explanation of this has been expanded slightly in the methods section.

P6. The title of the present title (Smoking-attributable morbidity and acute care hospital costs in Canada 2002) is confusing. Smoking-attributable morbidity should not just be restricted to those recorded on the Hospital Morbidity Database. How about these attending GP? In some countries, patients will see a GP, rather than go to a hospital for some health problems. The
smoking attributable estimates based on GP data can be very different from those based on hospital data.

- Unfortunately, no systematic morbidity database exists in Canada that collects all diagnoses of illness in the same way that our mortality database collects all deaths (with the exception of cancer). Our study is limited to that data which we were able to, with some considerable effort, obtain. The title of the paper has been changed to better reflect the data we actually have and not mislead the reader.

- P6. It is said that there is still overlap in the MRD database, and these were scaled down by the factor of overall hospital days. Why there is still overlap, and how many overlapped records?
  - These data were provided by CIHI who conceded that there were overlaps and provided the raw data that enabled us to calculate the province-specific scaling factors.
  - For Canada as a whole, the number of hospital days was scaled down by a factor of 0.6.

- P10. The decline in mortality due to heart disease is also observed in many countries. This phenomenon is not specific to Canada.
  - We do not claim that the decline in heart disease is specific to Canada or comment on any lack of similar phenomena in other countries.

- P11. It is mentioned that the same approach was utilized in calculating the smoking-attributable fractions in both 1992 and 2002, and different inputs were used. It may partly explain why there is difference in cost estimations. For comparison between 1992 and 2002, it is also useful to see the SAF used previously in the 1992 article. Suggest to conduct a sensitivity analysis applying the same set of SAF to 1992 and 2002 to determine whether the difference is robust. It is also informative to include some contextual information, eg smoking policy in Canada, to assist especially international readers for a better understanding of the possible cost decline from 1992 to 2002.
  - A number of sensitivity analyses have been conducted and published (please see ref 14). SAF itself was not held constant, as suggested, since smoking prevalence changed between 1992 and 2002 but RR was held constant (SAF being calculated by combining prevalence and RR). The reader is encouraged to read this separate article for information on the sensitivity analyses.

Reviewer 3

- It is unclear however, how smoking related diagnoses and smoking related hospital days for the various sub-categories of cardiovascular diseases were calculated, since they seem not to be calculated via smoking attributed fractions (SAF). Which in fact also in unclear, since other publications have used the same material as the authors to calculate SAF for sub-categories of cardiovascular diseases as well. Here further clarification is needed. THIS IS A MAJOR, COMPULSORY REQUIREMENT.
  - They were calculated using SAFs. The source of this confusion may be due to the fact that the table does not display the SAF. A footnote regarding the SAF for these diseases has been added.

- As only secondary data are used, their origin is documented well. We propose that the authors should compare their SAF with those from other published studies on smoking related diseases.
Our SAFs were calculated using relative risks from a collection of meta-analyses and corresponding prevalence categorized as determined by the RR in the meta-analyses. Other SAFs published for Canadian data (applied to mortality and not morbidity!) used RR from CPS-II and prevalence from a previous national survey. Thus direct comparisons are difficult. However, we conducted several sensitivity analyses comparing our method applied with the method of the previous similar Canadian study applied to the 2002 and 1992 data. Readers are encouraged to read ref 14 for these sensitivity analyses.