Reviewer's report

Title: Gaseous air pollution and emergency hospital visits for hypertension in Beijing, China: a time-stratified case-crossover study

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Reviewer: Shia Kent

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The paper directly explores the relationship between gaseous pollutants (SO2 and NO2) and hypertension hospital emergency visits. The study takes places in a prime location, Beijing, where air pollution is an important and persistent problem. The paper results indicate that gaseous pollutants do not have large associations with emergency room visits for hypertension, but due to widespread exposures, with air pollution even small relative risks can lead to large population effects. The question is well defined. The writing is mostly clear, although minor grammar mistakes remain. The primary issue involves better description of the epidemiological methods and issues. Specifically, the exposure assessments need to be better described and limitation might be more thoroughly considered. The Y axes of Figures 2, 3 and 4 should be uniform. This is a timely paper with a good question and clear presentation, but epidemiological issues need some attention.

MINOR ESSENTIAL REVISIONS

Abstract: Accurately summarizes results.

Background: Adequately covers rationale, and why it matters both to the target audience (US) and to the study population (China).

Materials and Methods: From the information given, the methods are fairly clear and appropriate, but need much more detail. It is unclear how the exposure was determined. It is described that there is a pollution monitoring network, but not much about them or how the data from these monitors were applied to determine each participant’s exposure. Spatially: How are the monitors spatially distributed (how many, where located, etc...). Did the authors use the entire city-wide network to determine a city-wide value? If so, how did they use all of the city’s monitors to obtain this single value? A simple city-wide average? If they used a local rather than city-wide pollution value, did they use the hospital location or the patient residences? To determine this local value, did they simply use the closest available monitor available to determine the value, or create a GIS-generated surface? Temporally: what is the temporal distribution of the monitors? Do they take hourly readings? Daily? Weekly? Different for different monitors? How much of the monitoring data for this study was missing? More description of the monitoring network is needed

Case selection could use a bit more elaboration. For example: Is hypertension
the primary reason for the EHV used in this analysis, or is any EHV for any primary reason, but with a patient that was hypertensive used as a case?

In addition, the selection of the control time periods need further elaboration. The method is a time-stratified case-crossover, and they used the day of the week within a 28 day strata, and 3 control days were chosen. Does this mean that if the EHV occurred on a Monday, Jan 22, that Jan 8, Jan 15, and Jan 29 were used? How is this 28 day strata chosen?

What is the typical population of this hospital? Are they a genuine cross-section of this area of Beijing, consisting of all those who live and work in the area? Or do certain sub-populations (higher or lower SES, certain occupations, etc…) tend to visit this particular hospital?

Results: Clearly presented. The extensive paragraph regarding Table 2 might be unnecessary. One could simply refer to the general findings one would be interested in when looking at Table 2, rather than restating was has already been displayed in the table.

It is mentioned that for multiple pollutant models, the current and 3 day lag values were chosen for SO2 and NO2. From Figure 2, 2 and 3 day lag values for NO2 look similar, so choosing the 3 day lag value may be appropriate. However, for SO2, the 2 day lag value appears larger than the current day value. Why was the current day SO2 value chosen for adjustment, if ORs were used for selection of lag day value?

Discussion: Paper presents a clear review of past literature. Discussion of limitations could be expanded. Specifically, how much of a participant’s actual exposure is determined by what is captured by the outdoor air pollution network? Is indoor and outdoor pollution different for many potential hospital patients? Is it common for Beijing residents to stay indoors during extreme weather conditions, when air pollutants might also be more extreme? This would potentially bias the results towards the null, if indoor pollution varies less than outdoor pollution. Are different types of people who have differing exposures (e.g. construction workers vs. office workers) more or less likely to visit the hospital due to cultural or social factors (e.g. differing government support due to urban vs. rural hukou, financial considerations of hospital visits, family support and cultural differences)? What is the population that is actually likely to visit the hospital for hypertension, an issue that by itself might not have obvious or immediately pressing symptoms? Again, is hypertension the primary reason for the EHV used in this analysis, or is any EHV with a hypertensive patient used as a case? These issues might also introduce bias and need further clarification in the discussion.

Tables and Figures: Tables and figures are mostly clear and present the most important information. As previously mentioned, one important note is to keep the Y axes for similar graphs consistent so that they can be compared. Specifically, the Y axes showing the OR ranges in Figures 2, 3, and 4 should be the same.

MINOR DISCRETIONARY REVISIONS

Abstract: the last sentence is a bit misleading and might be changed to
something such as “However, no research has directly examined the relationship...” Previous research, including research by the authors, have previously examined these relationships, but not as primary exposures.

Methods: While temperature and humidity have been adjusted for as confounders, it might be interesting to explore whether the relationship differs by season.

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

One of the authors of this article has recently reviewed my article currently being considered for publication my EH. This is a problem with EH because the reviewers are not kept confidential.

I declare that I have no other competing interests.