Reviewer's report

**Title:** Construction of a simulation model and evaluation of the effect of potential interventions on the incidence of diabetes and initiation of dialysis due to diabetic nephropathy in Japan

**Version:** 0  **Date:** 07 Sep 2017

**Reviewer:** Stanley Kuo

**Reviewer's report:**

Using the system dynamics modeling, authors developed a simulation model to predict the number of people with diabetes and of people on dialysis due to diabetic nephropathy. The model was calibrated to population data in Japan and was used to assess the effects of two hypothetical interventions on the prevalence of people with diabetes and people on dialysis due to diabetic nephropathy. They concluded that from a 20-year simulation time horizon, the ESRDP intervention is an important means of bending the increasing curve of dialysis in the population with diabetes, and that simulation analysis may be useful when making and evaluating health policies related to diabetes and other chronic diseases. The strength of this study includes the important topic, novel approach, and population-based outcomes. However, there are quite a few of issues that authors need to address and clarify in order to further improve the manuscript and ensure the validity of study results.

1. The primary aim of this study should be developing a simulation model to predict the number of people with diabetes and of people on dialysis due to diabetic nephropathy in Japan, and the secondary aim was to use the model to evaluate the effects of two hypothetical interventions on the prevalence of people with diabetes and people on dialysis due to diabetic nephropathy. However, the primary aim and its results were not either described at all or emphasized sufficiently in the following four sections: the title of this manuscript, the Results section of the abstract, the Conclusions section of the abstract, and the Conclusions section of the main text. Authors should consider revising these four sections.

2. On page 11, authors included patients aged 20 or older. Does this imply that this simulation model only considered patients with type 2 diabetes? If not, please make more clarifications about health conditions that were being considered in the simulation model.

3. On pages 11-12, authors stated that "The number of individuals on dialysis due to diabetic nephropathy is considerably lower in younger compared to older age groups…Thus, we considered those on dialysis due to diabetic nephropathy under 40
years to be outside the model (a cloud)." It would be interesting to conduct a sensitivity analysis that considered people on dialysis due to diabetic nephropathy under 40 years to see how study results may change. If conducting such a sensitivity analysis is not feasible, authors should make comments or justifications about this in the Discussion section.

4. On page 14, authors stated that "Because a specific value for diabetes prevalence (%) at the age of 20 years was unavailable, we used 0.2% as an estimate for all years." Why did authors use 0.2%, and what is the reference or evidence to use 0.2%? Authors should also conduct a sensitivity analysis to vary this estimate and see how the study results change. In addition, what does "for all years" in this statement mean? Authors should make some clarifications about it.

5. On page 15, authors stated that "...we generated estimates for a specific year from aggregated data from that year and available sex- and age category-specific data from other years." This statement is not clear, and authors should provide more clear and specific statements about how they generated these estimates.

6. On page 17, authors described how the model was calibrated. Validation of a risk prediction model is of paramount importance, so this model should be validated. Authors should conduct the validation analysis for this model. If the validation of this model would not be feasible, authors should make comments or justifications about this in the Discussion section.

7. On pages 18 and 19, authors made several assumptions about the effects of two hypothesized interventions (DMP and ESRDP) on the incidence of diabetes and of dialysis initiation due to diabetic nephropathy. Authors should provide references or comments to justify how and why these assumptions about the intervention effects were made.

8. In the Discussion section, authors should discuss why a system dynamics model was used in this study, and its advantages and disadvantages in comparison to other modeling approaches that have been used in the literature to project the number of people with diabetes and the prevalence of diabetes.
9. On page 24, what is Health Japan 21? Authors should provide more detailed descriptions about Health Japan 21, and how the number of people with diabetes was predicted in Health Japan 21. In addition, authors should provide a citation for the article by Charvat et al. when they mentioned it in the text.

10. On page 25, authors stated that "However, our study showed that this effect would not become evident until more than two decades had passed. In order to understand the impact of diabetes prevention intervention correctly, a very long-term observation or simulation would be required." Authors could perform a sensitivity analysis to extrapolate the model simulation up to 2045 or 2055 and see how study results change. If this extrapolation would not be reasonable or feasible, authors can make comments or justifications about this in the Discussion section.

11. On page 26, authors stated that "In the base run, we did not allow the diabetes incidence rate and dialysis initiation rate to change within the study period; this assumption would not be realistic." So, authors should conduct several sensitivity analyses to vary incidence rates of diabetes and dialysis initiation to see how study results change and provide comments about those changes.

12. This manuscript needs editorial changes and checks for better readability and consistency. Each section of the manuscript needs to be carefully reviewed and revised so that clarity and consistency in presentation can be achieved.

Are the methods appropriate and well described?  
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?  
If not, please specify which controls are required in your comments to the authors.

No

Are the conclusions drawn adequately supported by the data shown?  
If not, please explain in your comments to the authors.

Yes
Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

Not relevant to this manuscript

Quality of written English
Please indicate the quality of language in the manuscript:

Needs some language corrections before being published

Declaration of competing interests
Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

I declare that I have no competing interests

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments
which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal

Do you want to get recognition for reviewing this manuscript

Add a record of this review Publons to track and showcase your reviewing expertise across the world’s journals. Signing up is quick, easy and free!

Yes