Reviewer's report

Title: The Economic Costs of Diabetes Complications in the United Arab Emirates

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Reviewer: Awad MATARIA

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Title: The Economic Costs of Diabetes Complications in the United Arab Emirates.

Introduction:
The paper addresses an important topic of international, regional and local relevance. Researching the burden of illnesses, in different part of the worlds, in an attempt to attract attention and formulate proper policies remains an area of utmost importance. The authors justified well the importance of the study although they focused their attention to the novelty of the study in the local context. More could have been said about the usefulness of the study result in informing public health policies of preventive and management nature. The paper still needs some attempts to improve its conceptual and empirical coherence and can benefit from the comments below to fulfill its purpose.

Comments:
Title: The paper does indeed neither assess the total economic cost of DM nor it limits the analysis to DM complications. It is needed to change the title to correspond to what has effectively been pursed in the paper (an assessment of the Direct Medical Costs of Diabetes Mellitus and its Complications). This is indeed clarified by the authors in the last sentence of the Background section.

Abstract: Need to be reworked in line with the changes below.

Background:
• The section is better labeled: “Introduction”.
• There is a need to refer to some studies conducted in other developing countries in this section including countries other than Middle Eastern ones.
• The term “intangible losses” is mentioned only once in the paper – in the Background/Introduction section. These indeed represent an important component of the total economic cost of non-communicable diseases. Given that those are not attempted in the paper, it is suggested that such reference to intangible costs be left to the Discussion section, with elaboration as with regard to what those costs would include, and whether there exclusion would bias the study results given the adopted perspective.

Methods:
• The 1st and 2nd paragraphs in the Methods section need to be placed in the Introduction section, as the Methods section needs to be reserved to describing the particular methodology as applied in the study at hand.

• Page 5, 2nd paragraph: The opposite could also be said about these studies, as attributing all medical management costs to DM, might as well over-estimate the cost because some of these complications might not necessarily be due to DM. This has been also referred to by the authors at the end of the second paragraph on page 7.

• Page 6, 2nd paragraph: as presented in the paper the perspective of the study is that of the health sector (the financer or the purchaser in a publicly financed system) more than it is of the provider. It is true that these might be confounded in the public sector in the context of the UAE but it is still better to make the distinction and use the proper identification.

• It is confusing that while a provider (health sector) perspective is aimed for, still costing is done using a users’ perspective, via the use of the list of charges. In Health Economics, a distinction is made between costs and charges/prices, where the latter refers to payments made by the users and the former represents the burden on the provider. The paper indeed seems to confuse both by using charges as proxy of cost, something which could be very far from reality and needs to be alluded to. The authors can still mention that prices and charges are used as proxy of costs, and discuss the implication of this on the results in the Discussion section.

• It is well know that the market almost always fail in the area of health care and hence any price tag does not represent the value of a commodity, therefore, one should not mention that “charges are based on real market rates” because those are usually set using several factors; e.g., subsidies or profit making goals. This is very important because the analysis is said to be pursued from the perspective of health care provider and not the users or the patients.

• Page 6, 2nd paragraph: given that DM complications are limited to cardiovascular ones, this might underestimate the total cost and hence this should be mentioned as limitation at the end of the Discussion section.

• Need to comment in the Discussion section on the completeness of the patients’ treatment profiles’ used for estimating DM costs, in terms of coverage of patients and the continuity aspect, as a year time period is used for tracking all costs. Also, something should be mentioned there (in the Discussion) about why Al-Ain District was chosen and what impact this would have on the possibility to generalize the study results to the UAE and other countries in the region. Another sampling issue that needs to be defended and alluded to in the limitation in the Discussion section is why only hospitals and both primary care centers were used to recruit patients.

• The Methods section needs to mention how randomness was guaranteed in selecting the study sample and whether stratification was attempted to compare the various subcategories of the study population mentioned in the paper.

• The Methods section needs to explain how the different information and data
from secondary and primary sources were put together to follow up with the analyses.

• It is not clear why one would need ‘expert opinion’ and a ‘mean’ to assign the unit cost if the list of charges is used to estimate management costs. Those are in principle set to be used in charging private (not covered by any mean of prepayment scheme) patients. Any payment based on a pricing schedule is expected to take into account all costs (and possibly a margin of profit) and so no need to look for other cost components. This need to be checked and clarified.

• The paper mentions that a “case management costs per episode per patient” was estimated. For this to be done, patients should be followed in time from the occurrence of the event until recovery or sustained repeated management. For this to be done a longitudinal study would be needed. The present study however is said to be cross-sectional. It is nevertheless not clear what has been exactly done in the analysis. Did the authors estimate and average for per visit or per case? It is clear that the authors aimed to estimate the cost per case but for this to be done, patients need to be followed in time (prospectively or retrospectively). In this case, the issue of over sampling is no more a problem (see below)!

• A full listing of all cost components should be presented.

Statistical analysis:

• The use of logarithmic transformation needs to be justified.

• The manner in which the over-sampling due to more frequent visits is dealt with needs to be reconsidered as if the approach is based on estimating total management cost per case, then having more frequent visits does not indeed bias the results as it should reflect what a certain group of patients does and hence this should in principle be taken into account by the analysis.

• It is needed to make clear how costs was estimated and to mention that these are only average costs over a year and hence does neither represent total costs or even annual costs for a single patient. Indeed, there is a major problem with the approach used to estimate the cost of DM in the paper, where the results seem to represent the average cost per visit. It is not clear in the paper if the authors have added up the costs borne by the same patient and then estimated an average of those. This seems not to be the case and hence the authors’ worry of over-representing patients with repeated visits. The way the cost estimation is to be conducted should consist of listing all services received by an average patient during a certain period of time, multiplying those with the unit cost for each and then adding up and taking the average before generalizing to all DM population in a society to have an estimation of the total burden of DM in a society.

Results:

• It seems from this section that the authors had indeed considered patients and not visits and this confirms the validity of the comment made above with regard to repeated visit as it does not imply over-sampling a certain category patients, except if the sampling was done using the visits as a sampling frame, something which should bias the whole study results. This seems not to be the cases,
otherwise, how the estimations 27% and 9% (1st paragraph, page 10) were calculated.

• Page 9, last paragraph: do not use the past participle ‘paid’ in this context as it is confused with monetary payment.

• It is needed that some statistical testing be conducted to assess the statistical significance across the difference socio-demographic groups. It is mentioned that Chi-2 and t-test statistics were calculated. The results from those need to be put in Table 1 and summarized in the text when talking about differences.

• The Discussion section should include some explanations of the obtained results. First, it should be reminded that these are only costs from the purchaser/payer/providers perspective; and hence, and explanation for higher costs on those coming from nearby GCC countries might be due to complicated cases coming to those hospital for lack of care in own countries. Expatriates are relatively healthier, something which could explain the lower cost. Another explanation is that they might be discriminated against or simply do not have the resources to demand needed care.

• In Table 1, confidence intervals should be presented for costs themselves and not for the % from total.

• Page 11, last paragraph, it should be mentioned “other GCC patients” because those exclude UAE patients.

• Do not use unit management cost because this is not what was done and it looks meaningless in the present context.

• Table 2: having “provider” among the list of classifying variables is confusing as the same patient might be going to several providers. The Table indeed confuses unit costs with management cost of a category of patients.

• Page 12, last paragraph: do not use the word “model”.

• Type of Diabetes and Insulin: there might be a problem of colinearity to be checked between both variables.

• Stroke: may be due to sample size.

• The analysis as conducted does not indeed consider the presence of covariance between variables. It just adjusts for collective effect but not interactions.

Discussion:

• Page 13, 1st paragraph: one cannot say that the result shows that …

• Page 13, 2nd paragraph: information presented at the end of the paragraph is not accepted as such and results need to be compared and differences need to be explained.

• Information presented in the first two paragraphs on page 14 needs to go to the introduction. The Discussion section should be used to discuss differences and compare comparable results.

• The conclusion made at the end of page 14 on the importance of prevention is
outside the scope of the present paper and no evidence is being presented in the paper to support it.

Minor Comments:
1. Page 3, paragraph 1: DM is mentioned for the first time; need to be put in full with the abbreviation DM in brackets.
2. Page 3, paragraph 1: the 3rd statement in the paragraph is mal-placed and does not go with the flow of the paragraph, as the following statement mentions cardiovascular and other complications that could be attributed to DM mismanagement. Better to remove or place after the statement that follows.
3. Page 3, paragraph 1: Does the term “non-national” refers to other GCC countries and expatriates? Please clarify as the distinction is made later on in the paper.
4. Page 3, paragraph 1: The last sentence needs to be qualified as while the authors mention that DM is rarely reported as the underlying cause of death in UAE, they also report that, as per MoH records, DM is the 6th leading cause of death. One would expect that MoH reporting is based on actual numbers and hence the conflicting information in the statement.
5. Page 3, paragraph 2: 1st sentence needs a reference.
6. Page 4, paragraph 2: to which countries does the phrase “in these countries” refer? US, Canada and the EU? As the UAE is mentioned in between!
7. Some calculated percentages are presented along with the associated CI and others are not. Please keep consistent in presenting the study results. It is also preferred that such CI be presented in all the associated Tables.
8. Table 4 could be more helpful if the percentage of those seeking treatment is also presented along with the prevalence of the various health conditions.
9. The order of Tables is mixed up and the reader finds that after presenting the results in Table 4, one has to go back to Table 1. This needs to be amended.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

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

Declaration of competing interests:
I declare that I have no competing interests.