Reviewer's report

Title: Applying a private sector capitation model to the management of type 2 diabetes in the South African public sector: a cost-effectiveness analysis.

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Reviewer: Agnes Walker

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BMC Manuscript Review

‘Applying a private sector capitation model to the management of type 2 diabetes in the South African public sector: a cost-effectiveness analysis’

Overall:

The manuscript reports on an economic analysis of improving the cost-effectiveness of diabetes management practices in South Africa’s public health sector. The ‘intervention’ scenario is the adoption of a potentially best practice option already operational in that country’s private sector. Estimates of the impact of implementing that ‘intervention’ are compared with a ‘comparator’ option, which assumes continuation of the status quo (ie ‘no intervention’).

The ‘intervention’ takes a risk-adjusted capitation approach to the reimbursement of accredited providers within South Africa’s National Health Insurance (NHI) scheme. It has policy relevance as its implementation could improve the effectiveness and equity of public health delivery in South Africa, and thus line up with one of the aims stated in the 2011 NHI Policy “Green” Paper. Thus the findings of this paper, if published, are likely to have significant policy relevance.

Since the authors use the cost-benefit method of evaluation, the benefits of implementing the ‘intervention’ will be expressed as ‘incremental cost (in ZAR) per life years gained (LYG)’. This ‘value for money’ measure could help policy makers decide whether the ‘intervention’ studied in this paper would be worth implementing, compared with other reform proposals.

The authors made considerable efforts to apply established cost-benefit techniques to the limited data that is currently available in South Africa. Because of data limitations, and because the results presented do not take account of the uncertainties associated with future events and limited data, the research findings are unlikely to be seen by readers as ‘robust’. However, robustness could be increased if the authors presented ‘sensitivity tests’. For example they could use input-data-groups that they considered ‘best’ and ‘worst’ scenarios. Some examples of the use of the ‘sensitivity test’ technique to increase robustness are in References 1 (Chapter 8) and 2 below. If these ‘tests’ are extensive, then they could be the subject of a follow-up manuscript. Otherwise they could be added to this paper.
Major Compulsory Revisions

Generally the methods and analyses are sound and the manuscript is well written. However, the text needs major re-structuring and in some areas major revisions. Detailed comments are below.

1. The question posed by the authors needs to be more clearly worded, and summarised early in the paper. This could be achieved by adding a short section titled Aims (or Objectives) after the “Background” section. Also, most of the last paragraph of the “Background” section should be shifted to the new ‘Aims’ section.

2. Data source descriptions should be under a new heading, 'Data', followed by the existing text on the sources of the data used and their pre-analysis characteristics. Most of the related text could be extracted from the current “Methods” section. Description of how such data were used in your study should of course remain in the “Methods” section.

3. Methods section should start with a brief overview, so that readers can better comprehend the rest of the text (which is long and technical). Starting with Figure 1, and a brief description of its major elements should achieve that, but some extensions to the text may be needed.

Next, the rest of the “Methods” section should be re-organised under sub-headings that line up with the element descriptions in Figure 1. For example the sub-headings could indicate the ‘intervention’ to ‘comparator differences found, for example: Cost estimates, Risk reductions, Life Years Gained, etc. Lining up with the Figure 1 elements here would greatly help readers to understand the big picture while they are reading about the technical details of your study.

Apart from the ‘value for money’ of the ‘intervention’ option and the robustness of the study results, policy makers will also be interested in the limitations of the models and analyses before deciding on implementation. So there should also be a main heading labelled “Limitations” into which the existing text on limitations should be shifted. Also, more limitations could be added (for example the ones due to scarce data - see comment (c) below).

A few areas of the text also need to be clarified and/or strengthened.

(a) I found brief mention of the use of “probabilistic modelling” first in the “Abstract”, and then in the “Background” section. Next, a little more is said about such modelling in the “Results” section under the “ICER” sub-heading. Here, in a final mention of that type of modelling, the authors state that “Probabilistic modelling was used for ICER analysis.”. Such a brief general sentences are clearly not sufficient even for readers familiar with probabilistic modelling. The authors should clarify why probabilistic modelling was chosen, and explain how that type of modelling was implemented in the ICER analyses. Reference 3 below includes a description of a probabilistic model, the UKPDS, which was also used by the authors in this study.

(b) Similarly, brief descriptions of the key parts of the ‘intervention’ and ‘comparator’ models should be added. These should include the key equations
embedded in the authors' EXCEL software. Examples of using equations when describing model detail can be found in References 1, 3 and 4 below. In this manuscript the only equation I found is:

\[ \text{ICER} = \frac{\text{Cost (intervention)} - \text{Cost (comparator)}}{\text{Effect (intervention)} - \text{Effect (comparator)}} \]

This is a very general formula, and thus does not specifically describe the economic analyses reported in this manuscript. The formula states that ICER is the ratio of the ‘difference in cost’ to the ‘difference in health outcomes’ between the ‘intervention’ and the ‘comparator’. As an aside, note that I added square brackets in red ‘[ ]’. Without these the manuscript’s ICER equation is incorrect (ie it is not the ‘Cost (comparator)’ that needs to be divided by the ‘Effect (intervention)’, but the differences in these). What the specific key equations – such as those describing the Risk Factor and Life Year estimation processes – will do is to clarify for the reader the study-specific details. Currently these are only implied by the above general ICER equation.

(c) It is not clear in the manuscript whether – due to data limitations – only the ‘intervention’ to ‘comparator’ changes that involved hospitalisation were accounted for, and whether the health effects could only be measured by changes in CVD mortality rates among those with diabetes. If this is the case, then the health benefits of the ‘intervention’ are considerably under-estimated. This is because the lowering of the HbA1c risk factor for diabetes is expected to result in a lowering morbidity – as well as mortality - rates and in lesser need for outside-hospital diabetes management services.

So clarification in the manuscript of what changes could be estimated is essential. Once this is done, then it will be possible to explain to readers the key reasons for the estimated differences reported in the “Results” section in total costs and in health benefits (see item 4 below).

4. “Results” section needs to start with a brief explanation of how the findings will be presented. For example, ‘Below we present and compare the results for simulations over a 10 year period of the ‘intervention’ and ‘comparator’ options.’

Next, all text under the section’s sub-headings should adopt the same - just described - format. Once this format is followed throughout the “Results” section, the sub-headings could be more specific and more informative to users. For example, instead of “Costs of Models”, the 1st sub-heading could be ‘Higher costs under the intervention’; and the 2nd sub-heading could be: ‘Lower Cardiovascular Risk’, etc.

Under the manuscript’s 1st sub-heading, “Costs of Models”, the 1st sentence is already in this the format, ie:

“The annual per capita cost of intervention model was ZAR 5950 (USD 725) while that of the comparator was ZAR 4946 (USD 602), representing a cost difference of 20.3%.”

So this is a good start. However, because readers are likely to be very interested in the sign (+ or -) of that difference, the last part of the above sentence could be
Reworded as: ‘indicating that the costs under the intervention option would be 20.3% higher than the cost under the comparator (or ‘no intervention’) option.

Readers would also like to know the reasons for the 20.3% higher costs. For example, this could be because of a 40% (??) reduction over 5 years in the hospital admission rates of those with diabetes, and a considerable (?? %) lowering in the risk of acquiring diabetes. Thus policy developers/deciders would not only be interested in the extent of the extra costs, but also in the reasons for these costs and for the subsequent increases in health benefits. The authors should add text explaining why they think the simulated cost and benefit changes are believable, and what factors have – or are likely to have - contributed to the study’s findings.

Minor Essential Revisions

1 In ABSTRACT:
   (a) please add a heading: ‘Aims’ or ‘Objectives’ after “Backgound”
   (b) shift last sentence of the “Background” para under the new ‘Aims/Objectives’ heading
   (c) under “Results” clarify “Modelling found” to – for example - ‘Model estimates over a 10 (??) year period were’
   (d) under “Conclusion” replace “Initial probabilistic” with ‘Probabilistic’; and “Piloting” with ’As a first step, piloting’. Also, repeating the ICER result four lines below where it is first mentioned is not necessary. You might like to replace it with a clarification of what is meant by “service within the public sector” (eg ‘the proposed adoption of the private sector’s diabetes management program within the South Africa’s public sector).

2 Throughout text:
   (a) shorten long, hard to read sentences. Often simply creating two sentences by replacing a ‘;’ or ‘,’ with a full stop (ie ‘.’) will make the text much easier to comprehend.
   (b) I got confused about the use of the term ‘model’ in several contexts other than the ICER analyses themselves. The text would be considerably clearer if you only used ‘model’ when referring to the model-based impact-estimates of implementing the ‘intervention’ option or ‘no intervention’, or the ‘comparator’ option). For expressiona such as: (1) “cost-effective models of care”; (2) “life-table model”; (3) “model the mortality experience”; (4) “in Thailand the use of a contract capitation model” – you could use terms such as, ‘systems of’ or ‘approaches to’ for (1); ‘method’ or ‘approach’ for (2); ‘quantification’ or ‘measure’ for (3); and ‘capitation program’ for (4).

3 In Background section:
   line 1: delete “observable”

Recommendation

Major Compulsory Revisions (which the authors must respond to before a
References


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Declaration of competing interests:

I, Agnes Walker, declare that I have no competing interests