Author's response to reviews

Title: Barriers and opportunities for evidence-based health service planning: the example of developing a Decision Analytic Model to plan services for sexually transmitted infections in the UK

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Barriers and opportunities for evidence-based health service planning: the example of developing a Decision Analytic Model to plan services for sexually transmitted infections in the UK

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We thank the reviewer for the detailed and constructive feedback. We were particularly encouraged to read that they considered our paper to be interesting and useful. We have taken on board the reviewer's comments in revising our paper, and we have used Track Changes to highlight our changes. We have numbered the reviewer's points (1-5) and respond to them here:

**Major points:**

(1) "It would be helpful for the readers to have a description of what the generic structure of a DAM as applied to service delivery as this would be very helpful to the non-specialist reader. I could not find this easily from accessing the references"

We have revised the Background in the Abstract and also the Background section of the paper to explain more clearly what DAMs are, including a DAM applied to service delivery.

(2) "The article conveys the impression that a DAM will be reliable once constructed and it is evidence based. Sadly the experience from Chlamydia screening has caused considerable anxiety among clinicians about the validity of complex modelling in which uncertainty exists about many parameters. DAMs were initially used and then discarded in favour of dynamic models but such was the uncertainty around some of the parameters that three models gave very different results (even allowing for sensitivity analysis) [1]. One of the uncertainties is - transmission per episode of sexual intercourse - as this will be related to infectious load, use of barrier protection and host immunity[2-4] – both the former and latter are poorly understood certainly in the context of chlamydia and I would be sceptical of any model seeking to simulate transmission unless explicitly validated through experimental and/or observational data which would be extremely hard to do. Thus although the transmission model developed, as part of the DAM, takes into account age/sex structure it will have major uncertainties which cannot be allowed for using sensitivity analysis. Although you contend that uncertainties can be explored through sensitivity analysis in the context of chlamydia modelling this often relies on making assumptions about key characteristics of the model (which usually includes transmission) which may or not be correct (page 9) – otherwise all models would have arrived at the same result. You should state uncertainties will exist within DAMs and detail the example above"

We thank the reviewer for suggesting we reference this excellent example. We now cite the 2009 paper by Kretzschmar *et al.* as this compares three models of chlamydia, as well as the corresponding 3 modelling papers, in the section of the Discussion headed "Why are quantitative, model-based tools for service planning helpful? And why are they not more popular?" (p.11). In addition to this example, we note throughout our revised paper that uncertainties do exist within DAMs, as they do with any model, and more generally, as we conclude: "all service planning methods make simplifications and assumptions, and are reliant on the accuracy of the available data." (We also refute the reviewer's claim that a DAM can not be a dynamic model, as it is possible to have a DAM that requires a dynamic model or one that does not).
(3.1) Have any DAMs simulating service delivery been validated using real data? Have you any explicit examples of their utility if so these should be detailed explicitly. Until this happens I suspect many clinicians and managers will be sceptical of the value of such tools and it is hard to see how they can be considered evidence-based until this happens.

As noted throughout our paper, the use of DAMs (as well as web-tools) is novel in the planning of STI services specifically, and health services more generally (as opposed to individual clinical decision-making). As stated (p.11), the potential role for DAMs for service planning is “untested and their use under-developed.” It is for these reasons that we undertook stakeholder consultations to engage with potential users and to ascertain their attitudes about using models for service planning so we could tailor the delivery of our web-tool accordingly. This paper documents our findings and experiences from these consultations. As the reviewer hypothesised, and our paper documents, clinicians and managers were sceptical as to the value of a web-tool based on a DAM. This contradicted our hypothesis when we started the MSTIC study, and which, as we note on page 10: “may reflect epistemological differences in the ways in which we, as academic researchers, and our stakeholders approach STI service planning, including what constitutes valid evidence and how this evidence should be brought together.”

(3.2) “You mention swine flu as a positive example of the use of modelling 2nd para page 10. However the dire predictions derived from modelling did not occur (http://www.guardian.co.uk/commentisfree/2010/jan/14/swine-flu-elusive-as-wmd). Climate change in my opinion is also not a good example of the validity of using DAMs as uncertainty exists as to the extent of temperature rise [5] which is likely to occur. This is likely to continue to be revised as more information becomes available and can only be validated in the future. This leads to concern among the public about model validity (http://www.dailymail.co.uk/sciencetech/article-2065954/Climate-change-fears-exaggerated-say-“)

We intended to cite swine flu and climate change models to illustrate how the results of modelling in general are widely used and reported, rather than to illustrate the validity of using DAMs. We agree with the reviewer that modelling within these two areas has been problematic, and so to avoid confusion, we have redrafted our reference to these examples, which now appears in the section of the Discussion headed ‘Why are quantitative, model-based tools for service planning helpful? And why are they not more popular?’ (p.11).

(4) “I think there needs to be a discussion on how robust validation of such tools is needed before they can be advocated and considered evidence based. Particularly in the light of such major errors as the modelling assumptions predicted for the swine flu pandemic – which led to considerable wasting of public monies. This might allay many of the concerns by those for whom the tool is intended. I suspect a validated DAM would be very helpful in informing delivery of sexual health services but in my opinion this needs to be demonstrated before it can be widely adopted.”

We thank the reviewer for recognising the potential for a validated DAM to inform the delivery of sexual health service. We completely agree that any such model must be validated, but also from our stakeholder consultations, how this evidence must be communicated to potential users to ensure their ‘buy-in’. We now make these points on page 11 and in the Conclusion. In addition, throughout our paper we now use more cautious language as to the potential of modelling in this field, e.g., in the first paragraph of the abstract we now use the conditional tense (DAMs ‘could’, instead of ‘can’, inform local service planning). In addition, as noted in response to point 3.1 above, we do state in the paper (p.11) that the potential role for DAMs for service planning is “untested and their use under-developed”, thus we recognise that there is still considerable work to be done before wide-scale adoption.
Minor point:

(5): "I have accessed the references quoted (some incorrectly reft 9&10) and cannot find a clear example."

We have checked the references quoted to make sure they are appropriate for the points they support. We have also added in the chlamydia screening modelling papers they reviewer recommended.

Editorial points:

In response to these, we have:
- Checked that the Abstract is included in the manuscript file and that this is identical with the one in the submission system.
- Checked that the abstract and manuscript follow the correct structure for BMC HSR 'Debate' articles, according to the instructions for authors.

We hope our changes have adequately addressed the reviewer's comments, and look forward to hearing from the journal.

Yours sincerely,

Catherine Aicken, MSc. and Catherine Mercer, PhD. on behalf of the authors