Reviewer's report

Title: The Impact of Social Distancing Measures on Antiviral Treatment Demand during a Severe Pandemic

Version: 1 Date: 28 February 2013

Reviewer: Joel Kelso

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General Comments

This is a solid modelling paper addressing the question of the magnitude of antiviral drug usage that is likely in an influenza pandemic, given various assumptions about how individuals will curtail their social contact behaviour due to the pandemic.

There are a number of (relatively minor) issues I think the author should address; these are listed below.

Major Compulsory Revisions

1) More explanation is needed on what simulations were done, what combinations of parameter values were simulated, and how these relate to the error bars that appear in Figure. As I understand it, the possible dimensions of variation for the simulation were $R_0$ (three values), pre-existing immunity (3 values), participation in social distancing (3 values), magnitude of behaviour change (3 values), duration of behaviour change (3 values). Of these 5 dimensions, results for full combinations of 4 (all except pre-existing immunity) are given in the Figure (81 data points). Does that mean the error bars relate to pre-existing immunity? Unless I missed it, the error bars are not mentioned anywhere.

Minor Essential Revisions

2) p7 l 156-158: It should be made clear at this point that non-influenza ILI does not consume antivirals. This is stated in the conclusion p10-11 l233-235, but on page 7 the statement about "We assume
that for ethical reasons, all individuals who present for treatment with respiratory symptoms will be eligible to receive antivirals" may give the impression that non-influenza ILI cases have been taken into account.

3) p1 l9 "Divisionof" -> "Division of"

4) Broaden the list of references to other modelling studies that have explicitly considered contact behavioural changes during pandemics. I think it is important to give the reader some context to compare the model of behavioural change used in this paper with other models that have been studied. Some papers are listed at the bottom of this review that may be relevant or contain pointers to relevant research: [Epstein2008,Fenichel2011,Perra2011,Poletti2011].

5) Add the final attack rate (and/or infection rate) corresponding to each of the three (R0) transmissibility scenarios in Table 1.

Discretionary Revisions
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6) Reference could be made to other modelling studies that have estimated antiviral usage for scenarios that combine AV treatment and social distancing interventions e.g. [Ferguson2006 Supporting Info, Halder2010].

7) Can a more specific comment be made on the public health planning consequences of the results? Looking at the overall results, the message that I would take away is that you can't expect behavioural changes to significantly reduce demand for AVs during a pandemic - unless you can get most people to make major reductions in their contact behaviour, for at least three months.

8) If I understand correctly, the main outcome quantity of the model is "cases seeking medical attention". This is taken as a measure of the quantity of antiviral drugs used for treatment; but it is also a measure of any usage of health care resources that stem from (or occurs proportionally to) an instance of "medical attention sought". This is implied in the abstract and conclusion, in which antiviral drugs are mentioned as an instance of "limited health care resources", but it
could be made explicit by adding a sentence of two in the discussion. I think it makes sense to present the results mainly in terms of antiviral usage, but the results are a little more general and it would be a shame if that point were missed.

9) Even if for a severe pandemic, it might be the case that "social distancing fatigue" occurs in less than 3 months. Presenting simulation results for, say 4 or 8 weeks (and possibly dropping the 16-week results) would give a more comprehensive picture.

10) In the figures, change the "Distancing" column heading to "Participation" would be clearer. The caption is good, but just looking at the figure, its a little hard to interpret "Distancing" vs "Reduction in Contacts".

11) p4 l79 "may become stretch thin" -> "may become thinly stretched"

12) The statement "even the largest stockpile is unlikely to contain enough treatment courses to treat more than 25% of a population" (on page 4 line 82-85) needs further support with references (or, failing that, personal communication from a senior Canadian public health official?).

13) Method details and model parameters from [9] and the Tuite et al 2010 CMAJ paper could be included in an Additional File. The model is nice an concise, would only take up a few pages, and would make the paper more self-contained.

14) A comment could be made in the discussion about the importance of reserving a supply of AVs for hospitalised cases and other small, vulnerable groups e.g. pregnant women. AVs used in these circumstances would be much more effective at preventing deaths per-dose, and the results show that if they're not reserved, the general AV supply is likely to be used up. I assume hospitals hold their own reserves, but I don't know the situation for other vulnerable groups.

15) In the model, antiviral treatment does not decrease transmission, whereas in fact they might (see Yang reference below). This model simplification is probably fine and is correctly stated on page 7 lines 158-160. However, it could also be noted in the "limitations" section
of the discussion, along with a brief comment on the possible consequences. It is possible that reduced transmission due to antiviral treatment leads to a lower attack rate, and in turn to lower antiviral usage. This self-limiting effect of antiviral usage may be very small for a treatment-only strategy (as opposed to prophylactic strategies, where it could be significant, see [Arinampathy2010,Kelso2010]), but might be worth mentioning.

(also, sorry, I know its probably a perfectly fine approximation in this context, but exponentially distributed gestation periods made me giggle).

**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