Reviewer’s report

Title: The risk of Type 2 oral polio vaccine use in post-cessation outbreak response

Version: 0 Date: 21 Apr 2017

Reviewer: Walter Orenstein

Reviewer’s report:

This is an extremely important study and the authors are to be commended for taking on this difficult question. The manuscript is well written. This reviewer's major concerns deal with more documentation in the form of studies, if available, to support the assumptions made in the model.

For example, are there any references that can be cited to support the various values used for the final base reproductive rate? Are there any data to support the exponential time scale of Ro reversion?

And any data that parent Sabin OPV2 has an Ro as high as 25% or 50% of the final VPDV2s. Could the Ro be lower? How do the authors explain no VDPVs in Israel or Yogyakarta despite being surrounded by OPV using areas and going for multiple years with IPV only in their immunization programs. This is particularly interesting with regard to Israel since WPV1 spread widely in the same population. Some comment on this would be appropriate in the discussion, probably in the paragraph beginning on line 219 dealing with routine IPV immunization.

This reviewer had difficulty understanding what "Distance-dependence of migration rates (c) meant. Can the authors explain in the text?

In Table 1, is population immunity systemic immunity, intestinal immunity, or both?

Modelers may understand what a Separatrix algorithm is and the authors give a reference to explain it. But to most readers, going to another reference would be a hassle. Can the authors devote a few sentences or even a paragraph to describing it?

Figure 1 is difficult to understand. What do the log negative migration rates mean? Is -2 a larger rate than -5? Again, an explanation for what the numbers for migration mean would be very helpful. For the legend does a cross mean a cVDPV was generated and a circle mean it was not? What is the difference between the red and blue areas?

For the Figure 2 legend, it would be helpful to redefine what the 50% Sepatrix line means.

The authors make no recommendations, given the risks they mention of use of mOPV2 for control of type 2 virus, regarding how to deal with such an outbreak if it occurs. They mention surveillance and other aspects but if you can't use mOPV2, what do they suggest if a type 2 outbreak occurs 5 years from now? For example, better surveillance makes for detection earlier.
Presumably, the authors mean that a smaller outbreak will limit mOPV2 use and hence decrease the risk for emergence of new cVDPV2 viruses. Can they please clarify?

Minor comments:

Line 48 - "marks" should be "marked" since the tOPV to bOPV switch has already happened.

Line 51 - the authors should insert "naturally occurring" into the sentence since there was an outbreak in northern India from reintroduction of a laboratory strain of WPV2 in 2002-2003 (see Deshpande et al Indian J Med Res 118, December 2003, pp 217-223)

Line 93 - what does "vaccine take" mean in this context? Is it systemic immunity, intestinal immunity, or both?

Line 241 - insert "to" between "present" and "the polio eradication".

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

Unable to assess

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

Yes

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

Unable to assess

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.

I recommend additional statistical review

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