Reviewer's report

Title: What potential could there be for a S. aureus vaccine in a hospital setting on top of other preventative measures? A model-based analysis.

Version: 5  Date: 11 April 2014

Reviewer: Leigh Anne Shafer

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The paper is much improved in terms of readability. However, I still have a large concern about the model, some smaller concerns about what simulation results you are choosing to present, and some minor edits.

Major

1) In mathematical modelling, the key is the force of infection. Everything else is easy. Please explain more fully your force of infection (the FH and FC) parameters. It appears from your equations – lines 169 and 170 on p. 8 – that you are assuming that each susceptible patient has contact with just 1 other hospital patient. So you have provided the proportion of hospital patients who are infected – (CH + CHV)/N – and multiplied this by the transmission rate – BCH – to get the FOI. Why do you assume in the equations that each patient only has contact with one other hospital patient?

2) Further with the force of infection (FOI) equations. You state in the text that susceptible patients could get infected through infected patients, fomites, or health care workers. Where is the portion of infections that occur through fomites or health care workers shown in your FOI equations?

Less Major, but needs to be addressed

3) How far prior to admission do you expect that the vaccine would need to be given? How often could patients be identified and thus given the vaccine, prior to admission? This needs discussion in the introduction or discussion of the paper.

4) It seems that the most important scenario to be discussed would be the impact of the vaccine when other prevention measures are very high. Surely it would be cheaper to improve the other prevention measures than to develop a new vaccine. For this reason, I believe that in the abstract and the paper, we should report and emphasize the impact that the vaccine would have in scenarios of, for example, 90% or above hygiene, 90% or above decolonization, and 90% or above screening. If you disagree with this and think that it would be impractical to believe that we could achieve such high preventive measures, or that developing a vaccine might be cheaper than the effort required to achieve such high preventive measures, then this argument and it’s reasons should be provided in the paper. If you agree with this, then your main outcome results (in both abstract and main paper) should discuss the impact of vaccine in a setting of very high levels of the other preventive measures.
A few of the edits that I found:

In Abstract: “… to assess potential of a …” should be “… to assess the potential of a…”

Intro: “… following 3-year intervention period.” should be “… following a 3-year intervention period.”

“… reported 62% and 45% decrease in rates…” should be “… reported 62% and 45% decreases in rates…”

“… but to rather serve…” should be “… but rather to serve…”

“… In the analyses presented here, for the time being we have … “ should be “… In the analyses presented here, we have… “