Reviewer's report

Title: A Retrospective Analysis of Microbiota-Targeted Therapies in Patients with H7N9 Infection

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Reviewer: Liisa K Selin

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This is interesting paper showing how antibiotic therapy influences the intestinal microbiota in humans and how it can be restored with pro- and pre-biotics in the vast majority of patients (shown in comparison analysis between all studied groups). The question remains why this does not work in some patients such as group D and E such and why some patients developed secondary infections. Those two groups did include critically ill patients who obviously received more antibiotics to fight different infections so their microbiota may recover differently. It is also possible that the secondary infections were more frequent in older patients (age median for those who had secondary infection was 64.5). If so, it would mean that in general therapy worked but in the case of older people due to impaired immune systems new secondary infections occur even if probiotic therapy was used (maybe this is Group E?). Maybe older people have B/E ratio already changed as compared to younger individuals and the therapy couldn't be successful in general? Therefore, age-dependent comparison may explain those differences. As a matter of fact they were looking at flu infected people which can be more severe in the elderly due to changes in their immune response. The issue becomes even more complicated as the authors found that patients who didn't receive probiotics and were only treated with antibiotics no secondary infections were found (Fig. 5a and 5b). It would be useful if the authors did and age dependent analysis to determine if age influenced outcome. Other minor issue sin the manuscript that should be addressed are:

1. Information how H7N9 infection was diagnosed
2. Table1: more information (age, gender) about healthy controls
3. DGGE analysis (Fig.8): add samples from representative healthy donors to compare with all the analyzed groups of patients infected with H7N9 and it looks like representative patients from group B and E are missing
4. It is not clear what is the difference between group A and B since both were treated with antibiotics and had no probiotic therapy applied (Fig.1). Based on Fig. 1 patient B1 was treated with the antibiotic, which is not indicated in legend (pink line).
5. Fig. 1-4 descriptions on x and y axis; perhaps all the groups could be shown in one Fig. and divided into subgroups e.g. Fig. 1a for group A etc. Authors would then have one legend with color-coded different antibiotics usage. It would make things clearer if the authors showed in a different way the probiotic usage
(different labeling such as open bars or so) to discriminate it from antibiotic treatment.

**Level of interest:** An article of importance in its field

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

No competing interests.