Reviewer’s report

Title: A PCR-based diagnostic testing strategy to identify carbapenemase-producing Enterobacteriaceae carriers upon admission to UK hospitals: early economic modelling to assess costs and consequences

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Reviewer: Yaling Yang

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The authors report a study to assess the potential costs and consequences of implementing a test strategy involving a polymerase chain reaction (PCR)-based diagnosis test for CPE among high risk patients upon admission to UK hospitals to replace the current culture-based testing strategy. This study and its findings are important to clinicians, test developers and health economist who are interested in this area. I have some comments:

1. Abstract: The authors claimed that the objective of this study was to assess both potential costs and consequences of introducing the new test. However in the following methods and results sections, they seemed to only focus on costs and cost saving. It is not entirely clear what consequences they examined, e.g. test accuracy, patient’s health outcome?

2. Background: The authors used an estimated cost of an outbreak of CPE in a London hospital group to justify the burden of CPE and hence economic case. Can the authors provide national or/international figures on managing CPE to strengthen the case?

I don't agree that 'early health economic models are useful predictors of the likely health outcomes and costs'. Early HE models are tools or methods used to explore/predict potential costs and outcomes of technologies under development but the models themselves are not predictors. Personally I think the early HE modelling methodologies are still an emerging area under development and currently lack a framework and guidance. It is arguable that the early modelling should 'generally involve simple analyses based on a small number of inputs' or should be comprehensive as late stage modelling. The authors may find it helpful to refer some key references here, e.g. Ijzerman 2017 on PharmacoEconomics, and Frempong 2018 on Expert review of Pharmacoeconomics and outcomes research. It would be helpful if the authors provide some information of the development and adoption status of the PCR-based test strategy.

3. Methods - prevalence: it is not clear what population does this prevalence figure of 0.6% applies: the whole population, all patients in both primary and secondary care, or hospital patients.

- sensitivity analysis: various one-way sensitivity analysis were performed. Are there particular reasons why probabilistic sensitivity analysis have not conducted?
4. Results: I don't understand Table 2 on the test performance: 0.6% is the prevalence of CPE in the population, and whether and to what extent the tests could detect these CPE from the population are based on the performance of the tests. Can you explain the figures in more details by linking with the model?

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