Reviewer's report

Title: Development and Validation of an Algorithm to Recalibrate Mental Models and Reduce Diagnostic Errors Associated with Catheter-Associated Bacteriuria

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Reviewer: Carol E Chenoweth

Reviewer's report:

This is a very interesting and timely paper on development of an innovative algorithm for improving treatment of catheter-associated bacteriuria. The description of the algorithm and how it was developed is fascinating and I look forward to trying to incorporate their ideas when this is published.

Major compulsory revisions:

However, the paper overall becomes confusing as the reader tries to determine if the focus is on the mental models or development of the algorithm. Because the authors try to develop both ideas, the message becomes muddled. It almost seems that there are two different papers - first development of an algorithm and second a paper on how physicians make treatment decisions.

Specific comments:

Abstract: If reading the abstract alone, without the paper, it would be very difficult to discern the takeaway message. The background is about trying to improve treatment of UTI, but the results focus mostly on reliability of the algorithm and mental models for treatment. Conclusions don't seem to follow either background or results - the first two sentences in conclusions don't appear to relate to anything above.

Methods:

Algorithm face validity and Inter-rater reliability: Conclusions based on both of these measures are very suspect. Both measures are based on extremely small numbers. I am not certain that 4 residents, and NP and PA make a solid sample to test face validity of the algorithm.

More worrisome is the use of 3 team members to test inter-rater reliability. These are subjects who are designing the study. Using these people as subjects is scientifically unsound. If authors want to include a section on inter-rater reliability, they must have a larger numbers of unbiased subjects. Because of the flaws in design, there are no valid conclusions that can be made about usefulness or effectiveness of the algorithm.

Results, Table 1: May be deleted.

Discussion: Limitations are outlined; some are those I have included above, but I am not certain, that they fully explain why limitations are acceptable.
Conclusions: These conclusions don't follow methods or results. It would help to conclude key findings, then make more general conclusions.

Minor Essential Revisions:
The introduction is long and disjointed; again I believe because the authors are trying to merge two messages, first need for implementing evidence based UTI guidelines and then mental modeling. The long description of Representativeness appears out of place, since it never is referred to again in results or discussion.

Level of interest: An article of importance in its field

Quality of written English: Acceptable

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

Declaration of competing interests:

None