Reviewer's report

Title: Accuracy of Tracheal Aspirate Gram Stain to predict Staphylococcus aureus in Ventilator-Associated Pneumonia

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Reviewer: Dan Drzymalski

Reviewer's report:

This paper describes the sensitivity, specificity, positive predictive value, and negative predictive value of the gram stain to diagnose staph aureus pneumonia. What is the question posed by the authors? Based on what I could understand, the purpose of this paper appears to be to find evidence to support using empiric vancomycin in patients who have a negative gram stain. Basically, the authors are trying to prove what we already know: that the gram stain is not a perfect test to rule in or rule out a disease.

Major compulsory revisions:

1. Although after many readings of this paper I finally understood the question/purpose, I don’t think it is very well defined. Part of the problem is that the introduction talks extensively about the background of VAP, and only in the last two sentences do the authors finally get to their purpose/aim. Ultimately, these authors are trying to disprove their hospital’s policy of restricting vancomycin to patients who have gram positive cocci on gram stain of tracheal aspirate. I think most of the introduction prior to line 70 carries very little relevance to the purpose of the paper and could be deleted. I would recommend **completely rewriting the introduction, and talking more about epidemiology,** the clinical relevance of sensitivity, specificity, PPV, NPV, and likelihood ratio. The authors are trying to make an epidemiological argument for their cause, but they don’t really explain how these epidemiological numbers are clinically relevant. Because they base much of their final arguments on negative predictive value, they also need to discuss a little bit more about how predictive values are based on prevalence, and that what they observe in their hospital may be different from that observed in another hospital with a different prevalence. Yes, I know that the authors have a sentence about this, but they never develop or explain it further. I would suggest the authors focus more on sensitivity and specificity (especially, since they found a high specificity, which is good to rule in a disease). The authors could very well make their argument by saying: the gram stain is great to rule in a disease because of its specificity, but it is poor at ruling out a disease because of its low sensitivity. I think this would be much stronger than talking about the NPV. At the same time, the great part of this paper is that it brings to the scientific community at large more data on the sensitivity and specificity of gram stains when compared to the “gold standard,” which in this case is the culture data. This paper would add to the overall body of literature data which can be used by future authors to create a metanalysis.
2. Methods: “The present study was approved by the Hospital de Clinicas de Porto Alegre Research 95 Ethics Committee, 96 which, considering the nature of the study, waived requirements for informed consent.” The inclusion criteria sentence is written in poor English which makes it difficult to understand. Please rethink and rewrite the inclusion criteria to more clearly define who was included. Furthermore, I think we need more explanation why the requirements for informed consent were waived; just saying “considering the nature of the study”, isn’t enough. According to the U.S. Department of Health and Human Services, informed consent can only be waived when doing emergency research. I do not believe the authors gave indication that this is emergency research.

3. Results:
--Table 1 is very clear, job well done.
--Table 2. Accuracy of Gram stain to predict Staphylococcus aureus in tracheal aspirate. The title of this table (and the title of the paper) has to be changed. I think using the word of “accuracy” is inappropriate, because it makes too sweeping of a conclusion. Switch this out for “sensitivity and specificity” or something relating to the fact that this paper is all about the epidemiological numbers.
--Table 1 and Figure 1 show some data that is the same in both table/figure, so I would suggest trying to use consolidate.

4. Discussion/Conclusion:
In the first two paragraphs of the discussion, the authors basically just regurgitate data from other similar studies but never delve any deeper into any discussion. They need to explain more about why the other studies data is important, why their own data/results are important, and how they help us to understand their question/purpose.

These sentences supports the point of their paper:
-- “Namias et al. showed poor overall correlation of Gram positive cocci with the aspirate culture results in a study in which Gram stain was used to guide empiric antibiotic treatment of pneumonia in surgical ICU patients”
-- “It is well established that early and appropriate empirical treatment reduces mortality”

However, again, they never develop these ideas and never use them in a way that can strongly support their aims.

5. The conclusion arguments that “7.2% of patients would not be covered if they do not have vancomycin” sounds weak. This is because the number by itself does not mean anything. What the authors have to do is a “risk-benefit” analysis. If 7.2% of patients with a negative gram stain end up getting sicker because they did not get appropriate antibiotic treatment for 72 hours, what is the mortality of these patients? They talk about the Luna paper which apparently has a mortality of 91%. If they argue that having 72 hours of inappropriate antibiotics will results in most of those patients dying, then it would be a good argument. But, these
authors just loosely mention these things in their paper but never tie them together. At the same time, I think that if the authors talk about the risks of developing antibiotic resistance, it would make their argument even stronger because it would give us the pros and cons.

6. OVERALL IMPRESSION:
Overall, I think the authors have gathered some interesting data which is worth publishing for the scientific community at large, but their ability to argue their point is limited. They have a lot of good references, but never tie their arguments together and they have a poor structure. Finally, a major concern I have about this paper is the quality of the written English. This paper is not ready for publication in its current state because it does not communicate well its message, part of which is because of grammar, and part of which is because of overall arguments are not cohesive. There needs to be more development of the authors ideas, ranging from the introduction all the way to the conclusion. The quality of the English could be significantly improved, which would further help make the arguments better because it would make it easier to understand. I think this paper need to be rewritten completely.

Level of interest: An article whose findings are important to those with closely related research interests

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:
I declare that I have no competing interests