Author's response to reviews

Title: The impact of central line insertion bundle on central line-associated bloodstream infection

Authors:

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Version: 3
Date: 22 May 2014

Author's response to reviews: see over
Miss Sheryl Ramos  
BMC Infectious Diseases  
MS: 1976163721125606  
Article title: The impact of central line insertion bundle on central line-associated bloodstream infection

We deeply appreciated your kind consideration for accepting our manuscript (MS-1976163721125606) for publication in *BMC Infectious Diseases*. We also thank very much for your instructive suggestions. In this manuscript, we addressed all items the reviewer pointed out. I hope the revised manuscript is now fully acceptable for publication in *BMC Infectious Diseases*.

Best wishes,

Chih-Cheng Lai
Editor’s comment

"Your manuscript has now been reviewed by two expert reviewers of the journal. The reviewers raised some concerns about the limitations of this study as well as the English writing. I am willing to consider a revised version of the manuscript provided that you can satisfactorily answer these questions. The authors should significantly improve the English writing in the revision. Please keep in mind that sending a revised version does not guarantee acceptance."

Reply: Thanks for your comment. All of the reviewers’ suggestions were incorporated into the revised manuscript accordingly. In addition, the revised manuscript had received extensive English edition.
Reviewer: 1
Reviewer's report

Title: The association between each central line insertion bundle and central line-associated bloodstream infection

Version: 2

Date: 29 April 2014

Reviewer: Koen Blot

Reviewer's report:

The study by Lin et al. implemented compliance surveillance, a labour-intensive task. Their central line-associated bloodstream infection rate appears to decrease through implementation of quality improvement interventions (education, insertion bundle, and process surveillance through use of a checklist). Compliance with the care bundle items (hand hygiene, chlorhexidine skin disinfection, maximal sterile barrier precautions, and optimal catheter site selection) was measured only in the post-intervention period. Compliance adherence between patients with central lines that did and did not develop CLABSI was performed. Maximal sterile barrier (MSB) precautions and catheter insertion by intensivists were identified as protective factors for CLABSI prevention.

Major compulsory revisions

Unfortunately, the inappropriate English made it difficult to read and should be revised. As an example, the title should read “The association between each central line insertion bundle item and central line-associated bloodstream infection”. The primary objective was to identify protective care items. The authors conclude that their results suggest that MSB may be the most effective preventive strategy among the four central line insertion bundles. There are limitations that need to be discussed before making this statement.

Reply: Thanks for your comment. The title was revised and English edition was done.

1. Lack of the fifth Institute for Healthcare Improvement (IHI) care item (daily review of line necessity) as part of the bundle impedes this reasoning.
Reply: Thanks for your comment. We did agree with you. However, this study focus on insertion bundle, but not on maintenance bundle which including daily review of line necessity.

2. The CDC guidelines identify all five items to be crucial for infection prevention. A lack of MSB compliance will (as with other care items) lead to an increased CLABSI risk. A lower adherence to chlorhexidine skin disinfection will likely increase CLABSI risk, however since the compliance was near 100% in this study, the association was not found. Therefore it's inappropriate to conclude that MSB is the most effective preventive strategy.

Reply: Thanks for your comment. We did agree with you. The conclusion was revised accordingly.

As mentioned in the discussion section, this kind of analysis is conducive to local ICU CLABSI prevention. With this knowledge the ICU can improve awareness for MSB use and subsequently prevent infections. This difference between external and internal validity should be nuanced.

Reply: Thanks for your comment. We had added this issue into limitation.

The secondary objective was to identify CLABSI rate changes due to the quality improvement interventions. Assessing the impact requires improved intervention descriptions, adjusting for confounding factors (length of catheterisation), and preferably interrupted time series analysis. Unfortunately the lack of pre-intervention compliance data prevents any definite conclusions concerning the impact of the quality improvement interventions on the CLABSI rate.

Reply: Thanks for your comment. We did agree with your concern. However, the length of catheterization is not available. We added this issue into the limitation.

1. The initiatives should be described by intervention length, scope and frequency.
   What was the content of the education intervention? What are the care items of the maintenance bundle?

Reply: Thanks for your comment. We had added the relevant description about the initiatives, and the maintenance bundle in the method section accordingly.

2. Pre- and post-intervention CLABSI data (CLABSI, patient days, catheter days) and mean length of catheterisation is missing.
Reply: Thanks for your comment. We had added the associated data according to your suggestion. However, the mean length of catheterization is not available and it is one of the limitations of the present work.

3. An interrupted time series regression analysis is preferred.

Reply: Thanks for your comment. We used the chi-square analysis for trend to assess temporal changes in rate of infection and catheter utilization in the present work. However, an interrupted time series regression would be used in the further study.

4. The total number of CLABSI, catheter days and patient days per quarter (or month) is missing.

Reply: Thanks for your comment. We had added the total number of CLABSI, catheter days, and patient days per month in the new table 3 accordingly.

5. To assess the impact of the quality improvement intervention, an adjustment could be made based on device-utilisation rates and duration of catheterisation.

Reply: Thanks for your comment. The device-utilization rates were similar between pre- and post-intervention period. Therefore, its impact on rate of infection may be minimal. However, the duration of catheterization is not available in this study. Thus, we cannot assess its effect.

6. The use of retrospective data is not mentioned in the discussion section.

Reply: Thanks for your comment. We had added the retrospective data in the result section in the text and table 3.

7. Which quality improvement interventions were applied in the pre-intervention period?

Reply: Thanks for your comment. No specific and uniform quality improvement intervention was applied in the pre-intervention period in all of the ICUs in our institution.

These factors are important to take into account before stating that an intervention was successful. The authors should reflect this in their conclusion and abstract: it is premature to state that the intervention effectively reduced the rate of CLABSI.

Other comments concern general aspects of the manuscript:
1. The applied CLABSI terminology/definitions should be mentioned (CDC NHSN?)

Reply: Thanks for your comment. The definition of CLABSI was based on NHSN (ref 12).

2. Can the data showing differences in compliance between intensivists and non-intensivists be reported in this manuscript?

Reply: Thanks for your comment. Part of data has been reported in our previous study and mentioned in the revised manuscript (ref 11).

Finally, considering the multiple aspects that come into play during quality improvement implementation, I would be interested in reading what (if any) of the barriers to bundle and checklist introduction and process measurement were.

Was there a reason MSB precautions were less likely to be implemented? It would be interesting to see the effect of a follow-up intervention to improve awareness on the CLABSI rate.

Reply: Thanks for your comment. We added the explanation of the lower compliance to the MSB precautions in the revised manuscript.

Minor essential revisions

CLASI is written instead of CLABSI. Sentence structure, grammar and syntax should be reread and edited.

Reply: Thanks for your comment. The error was corrected. Sentence structure, grammar and syntax were reread and edited.

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

Reply: Thanks for your comment.

Quality of written English: Not suitable for publication unless extensively edited

Reply: Thanks for your comment. English edition had been extensively done.

Statistical review: No, the manuscript does not need to be seen by a statistician.
Reply: Thanks for your comment.
Reviewer: 2
Reviewer's report

Title: The association between each central line insertion bundle and central line-associated bloodstream infection

Version: 2 Date: 6 May 2014

Reviewer: darren J malinoski

Reviewer's report:

Major:

1. The duration of catheter insertion is not mentioned and this is a well-known risk factor for CLABSI. If these results are not available, then this should be mentioned as a limitation.

Reply: Thanks for your comment. We did agree with your concert. However, the data is not available, and we added this issue into limitation.

2. How many patients had multiple catheter insertions and how was this handled in the analysis?

Reply: Thanks for your comment. There were a total of 134 patients had multiple catheter insertions. We handled the data base on the number of catheter, not by the patients.

3. Did the 6 clabsi's occur in 6 patients or fewer?

Reply: Yes, the 6 episodes of CLABSI occurred in 6 patients, respectively.

4. How long after insertion were the clabsi's diagnosed?

Reply: Thanks for your comment. These 6 episodes of infections were diagnosed 7 – 15 days after insertion.

*If the above data are not available, they should be discussed in the limitations section

Minor:
1. results paragraph 2: the results state that the intervention period had 6 clabsi and a rate of 1.65/1000 catheter days. this number should be 0.64/1000 catheterdays.

Reply: Thanks for your comment. The errors were corrected.

2. results paragraph 2: "Five CLABSIs were CVC related and one was double-lumen catheter-related" - how do you differentiate CVC related from double-lumen?

Reply: Thanks for your comment. The six patients with CLABSIs had only one catheter at the time of diagnosis of CLABSI. Therefore, the diagnosis would be sure.

Discretionary:

1. table 1: the data are presented as the percent of each variable within the clabsi and no-clabsi groups. it might allow the reader to infer more of the relationship between each variable and the occurrence of clabsi to display the results as "% of patients with clabsi when variable present vs. absent". While these data have the same p values regardless of how they are expressed, a better assessment of direct association can be illustrated with the suggested approach.

Reply: Thanks for your comment. The table was revised according to your suggestions.

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

Reply: Thanks for your comment.

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

Reply: Thanks for your comment. English edition had been done.

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

Reply: Thanks for your comment.