Author's response to reviews

Title: Methicillin-resistant Staphylococcus aureus and Acinetobacter baumannii on computer interface surfaces of hospital wards and association with clinical isolates

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Version: 2 Date: 21 June 2009

Author's response to reviews: see over
Dear Editors,

A point-by-point response to the peer reviews of our original manuscript, #1730807432504032, is presented in this reply letter according to the editors’ suggestion. All authors have read and agreed to the re-submitted version of the manuscript. The reviewers’ queries and suggestions are addressed item by item as follows, highlighted in Bold format. In addition to the response to the reviewers’ comments, we have some changes about the affiliations of authors.

Many thanks to reviewers’ kindly instructive suggestions and corrections.

Yours sincerely,

Yen-hsu Chen M.D, Ph.D.
Reviewer Jacob Gilad

Minor Essential Revisions
1. Could the authors give a bit more description of the type of hospital and its services eg does it house paediatrics and obstetrics and gynaecology, is it a tertiary referral hospital, does it have a burns/trauma unit etc?

   The study hospital includes various departments, such as departments of paediatrics, obstetrics and gynaecology, burn unit, and trauma unit. The description of the study site was revised in the last paragraph of Page 5.

2. Throughout the manuscript and title, there were a number of instances where clinical isolates are referred to as clinical infections. No evidence has been provided that these isolates were causing infection rather than colonization and therefore, they should be referred to as “clinical isolates” rather than “clinical infections”.

   We have revised the manuscript accordingly.

3. The authors have stated that MRSA, P. aeruginosa and A. baumannii are the most common causes of nosocomial infection, however, in some institutions this is not so. The authors should state that these organisms are “among” the most common causes of nosocomial infection. For example, there is no reference to vancomycin resistant enterococcus (VRE) in this manuscript. This is a well known environmental pathogen and a common cause of nosocomial infection in some institutions.

   Thank you for the kind suggestion to make the rationale to study these three organisms clearly presented. In addition vancomycin resistant enterococcus (VRE) accounted for less than 1% enterococcus clinical isolates in the study site. That is the actual reason we did not include VRE in the study. (We have stated it in the first paragraph, page 6)

4. In the first paragraphs of the Materials and methods and the Results section “…. MRSA, P. aeruginosa and A. baumannii” should be changed to “…..S. aureus, Pseudomonas species and Acinetobacter species” in the first and second sentences respectively. Numbers of S. aureus, Pseudomonas species and Acinetobacter species were initially reported with species being subsequently reported.

   We have revised the Materials and methods and the Results sections accordingly.

5. In the discussion section, I am not sure of the relevance of healthcare worker nasal contamination to computer contamination and I would remove this sentence.
We have deleted the sentence about the nasal MRSA rates in HCWs in association with the computer contamination rate in the discussion section.
Reviewer: Didier Lepelletier

Major compulsory revisions
The authors concluded that the contamination rate was low because of the good hand hygiene rate. But no association is demonstrated in the results section. The authors have not measured the levels of contamination before and after a campaign to promote hand hygiene.

As a cross section study, we did not measure the levels of contamination before and after improvement of hand hygiene compliance. We had revised this viewpoint in the last paragraph of the discussion part and revised the conclusion part.

Minor essential revisions
1. The global contamination rate 10.1% (52/564) and the proportion of contaminated computers should appear in the "Results" section.

   We have recalculated the global contamination rate and reported it in Page 9.

2. Page 10, line 10: authors should deleted P. aeruginosa as no P. aeruginosa were isolated.

   We have revised the manuscript accordingly.

3. The manuscript need some English editing before being published (non-ICU and ICU instead of ward and ICU).

   Thank you for the suggestion to make the meaning of ‘ward’ clear in the article.

4. Table 1 can be deleted.

   Both Table 1 and 2 were rearranged in order not to confuse the readers about the numbers of positive culture according to statistician reviewer’s suggestion.

5. The quality of Figures 1 and 2 is not acceptable.

   The quality of both Figures 1 and 2 were improved.
Reviewer: Aaron M Bruce

Discretionary
Line 1, grammar, "Computer keyboards and mice are potential reservoirs for nosocomial pathogens,"

Line 4-5, wording
"the impact of these potential sources of contamination on clinical infection needs to be clarified"

Background
line 1, "In developed countries, computers are used...." Pg 12 2nd paragraph, 1st line. "Studies in ICU's indicate a more important role ".

We have revised the above three parts according to you kind suggestions and comments. Many thanks!

Pg 14 last sentence "hygiene should be paid to the keyboard" Rates of before hand washing training would be very interesting if available.

As a cross section study, we did not measure the levels of contamination before and after improvement of hand hygiene compliance. We addressed the limitation in the discussion part.
Reviewer: John H Kalbfleisch

Major Compulsory Revisions
(1) Statistical analyses and presentations in the manuscript need revision. In this study the sampling unit is the computer (N = 282). A mouse/keyboard pair belong to each computer. The authors need to report results (infection or positivity rates) on the N = 282 basis. In the current paper, the authors use N = 564; this assumes the keyboard and mouse devices are independent (as if from 564 different computers). Analyses and report presentations must correctly reflect the study design. One solution would be for the authors to define “computer +” if at least one of (keyboard, mouse) is “+” (for a chosen pathogen, or for any pathogen assayed). Then, the impact of hospital descriptors (location, function) can be analyzed and reported on a “computer unit” basis.(also see 3 below).

Many thanks for reviewers’ suggestions. The data were re-analyzed based on computer unit.

(2) The authors (incorrectly) use a independent sample Chi-square test procedure to compare the keyboard infection rate with the mouse infection rate. Since each computer has a keyboard and mouse observation, the appropriate statistical method is the “paired sample” version of the Chi-Square (usually labeled the McNemar test procedure). The authors will need to enumerate (and report in the manuscript) the number of computers that were (a) “pathogen +” for both keyboard and mouse, (b) “pathogen +” for only the keyboard, (c) “pathogen +” for only the mouse. The remaining number of computers would be only computers negative on both the keyboard and mouse. There will be no difficulty finding a reference or source for this paired-design test. Since there were more “+” keyboard cases than “+” mouse cases, readers will want to know if the “+” mouse computer was also “+” for the keyboard (this is absent in the manuscript).

The analysis of data was revised accordingly. McNemar test was performed to answer the question that if the contamination of mouse devices was associated with the contamination of keyboards.

Minor Essential Revisions
(3) Since there are two or more descriptor variables (location and function in table 1), the authors should consider multiple logistic regression (Y = 0 or 1 for computer not infected or infected) to test the effect of the predictors in the presence of each other. The manuscript can report results of univariate testing and/or multiple variate testing in a table.

We re-analyzed data accordingly.

(4) Small frequency counts in contingency tables have been traditionally viewed as problematic for the usual Chi-Square analysis (a concern of a
reviewer). Since the contingency tables in this study do have small frequencies the authors should consider performing a statistical test that is an exact probability calculation – in lieu of the approximate Chi-square method used. There are also exact statistical methods (software) for multiple logistic regression. In either analysis class (approximate or exact), the computer is still the study sampling unit (N = 282).

Since no significant difference was found with Univariate analysis (Fisher’s Exact test and McNemar test) and binary logistic regression analysis, we did not report the result of multivariate analysis.

(5) Although assumed, the authors need to clearly state whether every computer had both the mouse and keyboard assayed. If not, statistical analyses need adjustment for this imbalance feature.

Every computer had both the mouse and keyboard. The sentence was added in the first sentence of the results section.

(6) SPSS and SAS are different software packages. Clarify the last paragraph in the Methods Section (page 8). Also, p<0.05 is considered statistically significant.

We revised with Correct description about the software SPSS. p<0.05 is considered statistically significant.

(7) The authors might provide a better description of “compliance rate” (page 9, how is it defined or computed).

Hand hygiene compliance has been continuously educated and monitored every three months with method as previously described [Rosenthal VD, et al. Am J Infect Control 2003, 31(2):85-92.] by members in infection control room and the department of nursing. Every week, HCWs’ hand hygiene compliance was monitored for 30 minutes in each ward. The mean of the rates from four times of monitoring was regarded as the hand hygiene compliance rate of every ward. The above is added in the results part.

Discretionary Revisions

(8) The aforementioned revision of statistical analyses of computer pathogen positive rates and the impact of hospital predictors can be performed for (a) any pathogen, or (b)each pathogen of interest (current manuscript). Table data should report infection frequency counts, the corresponding infection rate and the level of significance for rate comparisons of interest.

The re-arrangement of the tables was according to the (1) comments.

(9) Figure 2 needs a better explanation. Many readers will not know how to
interpret this figure, especially since it mixes computer units that were “+” with patient-case-isolates.

We improved the description of figures in the legends of figures and the results section.

(10) Just to check, did any keyboard (or mouse) have more than one species isolate? (I think only 5 computers produced multiple species).

Yes, the number is 5.

(11) Although not a study aim, some readers might be curious about computer infection levels during nosocomial outbreaks in the hospital (possibly material for discussion).

The contamination levels of computer interface surfaces when nosocomial outbreaks occurred were not regularly measured, though some studies did report computer contamination when screening all inanimate surfaces around patients. To avoid the related data might be biased due to computer surface contamination was not routinely measured, we did not make a summary on the reports of computer contamination during outbreak period in the discussion part.