Author's response to reviews

Title: Long term care facilities are more important than hospitals in the transmission of methicillin-resistant Staphylococcus aureus

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Author's response to reviews: see over
Dear Dr Philippa Harris
Executive Editor
BMC-series Journals

Long term care facilities are more important than hospitals in the transmission of methicillin-resistant Staphylococcus aureus

Thank you very much for revising our manuscript.

We have followed the Editorial comment to ensure
(i) The ethical approval of the study is mentioned in the manuscript.
(ii) The authors' contributions section is added.
(iii) The style of English has been edited by a native English speaking person.

We have made a point to point response to all the questions raised by our reviewers. The manuscript has undergone major revision. To facilitate your revision, our reply is marked in BLUE below. We also highlight the corresponding amendment in YELLOW in our revised manuscript.

Since it has been almost 5 months for the first-round review, we are looking forward to the prompt decision from the Editor.

Thank you for your kind attention.

Dr. Kwok-Yung Yuen
Department of Microbiology
The University of Hong Kong
Corresponding author
Reviewer’s report

Title: Residential care homes for elderly are more important than hospitals in the transmission of methicillin-resistant Staphylococcus aureus

Version: 1 Date: 4 October 2012
Reviewer: Jon P Furuno

Reviewer’s report:
Cheng et al describe the results of a study to “investigate the acquisition of MRSA in residential care homes for the elderly (RCHE) and hospitals” within a healthcare system in Hong Kong to inform regarding the relative contributions of each facility type on the transmission of MRSA in the system. While this is a worthwhile aim, unfortunately, the study is confusing as written and lacks specificity regarding most of the study methodology. As such, the resulting data as well as potential strengths and limitations of the study are difficult to know and understand.

Major Compulsory Revisions:
The study design is very difficult to understand. It is not clear when following admission “admission cultures were collected” and when prior to discharge, “discharge cultures were collected.

Ans: We appreciate the reviewer’s comment. We hope that the revised manuscript becomes acceptable after extensive revision and copy editing process by a native English speaker.

For the arrangement of “admission cultures” and “discharge cultures”, we have clarified the issue in the revised manuscript as follow:

“To investigate the number of MRSA carrier coming from LTCFs before hospital admission, MRSA screening from nasal swabs immediately taken during the first admission of the LTCFs subgroup was performed in our acute hospital.” .........................

“Similarly, to investigate the nosocomial MRSA transmission among LTCFs residents during their hospital stay, nasal swabs for MRSA screening were also taken in our acute and 3 extended-care hospitals before discharge to their LTCFs.”
It is not clear how the “subgroups” were chosen, why the exposure windows of 12 months were chosen

Ans: We appreciate the reviewer’s comment and allow us to further elaborate on how the subgroups were chosen.

In determining the differences between patients who have likely acquired MRSA from LTCFs and those who have likely acquired MRSA from hospitals, we selected 2 groups of patients for further analysis: a “LTCFs subgroup” which consisted of LTCFs residents who had not been hospitalized in the past 12 months, and a “hospital subgroup” which consisted of hospitalized patients who were not referred from LTCFs.

Since the LTCFs subgroup was to focus on the MRSA acquisition within LTCFs, in order to classify the MRSA acquisition from LTCFs, the LTCFs residents should not be hospitalized in the past 12 months. An exposure window of 12 months was chosen because of the median carriage of MRSA was found to be 8.5 months after hospital discharge


Therefore, an exposure window of 12 months is generally adopted in the epidemiological study for MRSA transmission


and


and if any patients left the healthcare system alive (i.e. discharged home, moved to a new geographic area, etc) and were lost to follow-up.

Ans: The service of Long Term Care Facilities (LTCFs) in Hong Kong may be different from that of the United States and the United Kingdom. The LTCFs are reserved for those elderly without family support or those elderly with functional incapacity which makes it difficult for their family members to take care of them at home. When the elderly persons are referred to and admitted to the LTCFs, they will usually stay in the LTCFs for the rest of their lives. They will not be “discharged” home. Of course, when the LTCFs residents develop acute illnesses, they will be referred to the acute hospital within the same healthcare region.

We have mentioned this point in the revised manuscript as follow: “Patients being referred from LTCFs within our healthcare region were admitted to the acute hospital for management. They were either discharged back to LTCFs when the acute problems were settled or transferred to one of the 3 extended-care hospitals within the hospital network of our healthcare region for convalescent care before their return to LTCFs.”

Minor Essential Revisions:
The authors introduce a number of terms e.g. colonization-days as the denominator incidence if transmission (abstract) and comparative analysis (introduction) which are neither clear nor defined. In addition, the reported “incidence” of MRSA carriage in the introduction should likely be the “prevalence” carriage.

Ans: Thank you very much for the reviewer’s comment.
In the Abstract, due to the word limitation, it is impossible to clearly explain the definition of colonization-days, as other authors may need a
review article to clearly explain its definition e.g. (Adebola et al, Infect Control Hosp Epidemiol 2011 32:481-9). In the Method section, we have tried our best to define the calculation of colonization pressure of LTCF residents and hospitalized patients for our study group (Page 6 Paragraph 2) with reference quoted for methodology on calculation.

We have revised the description of “colonization” as follow:
“In order to estimate the MRSA colonization pressure in different patient groups, the calculation formula on colonization pressures per 1000-LTCFs resident-days was used as described previously [20]. The colonization pressure for the LTCFs residents was defined as the ratio of MRSA carrying LTCFs resident-days over the total number of LTCFs resident-days, while the colonization pressure for hospitalized LTCFs residents was defined as the ratio of imported-MRSA hospitalized-days over the total number of hospitalized days during the study.”

To avoid confusion, we omitted the term “comparative analysis” and revised the term as “we perform an analysis.....”. We have also changed the term “incidence” to “prevalence” according to the reviewer’s suggestion.

Methods:
Are the extended-care hospitals 1600 beds each or 1600 beds combined between the three?

Ans: We have clarified the point in the revised manuscript as “a tertiary referral university-affiliated acute hospital with 1600 beds, 3 extended-care hospitals with a total of 1600 beds............".

The authors used a number of atypical abbreviations (e.g. CGAT, HKWC, RCHE), which make the paper difficult to read. Rather than RCHE, the authors should consider LTCFs for long-term-care facilities, which is common term familiar to most readers.

Ans: To facilitate the understanding of our readers, we have omitted the atypical abbreviation, CGAT and HKWC in the entire manuscript. We have used the full name of “community geriatric assessment team”
instead of “CGAT”. In addition, we have used the term “our healthcare region” to replace “HKWC”.

Residential Care Home for Elderly (RCHE) is a term used in Hong Kong. It is a collective description of skilled nursing homes or long-term care facilities for elderly.

RCHE has been used in the peer-review publications in Hong Kong:

Diagn Microbiol Infect Dis. 2008 Jun;61(2):135-42. Epub 2008 Feb 12. Molecular epidemiology of methicillin-resistant Staphylococcus aureus in residential care homes for the elderly in Hong Kong. Ho PL, Lai EL, Chow KH, Chow LS, Yuen KY, Yung RW. Division of Infectious Diseases, Department of Microbiology and Centre of Infection, Queen Mary Hospital, The University of Hong Kong, Hong Kong SAR, China. plho@hkucc.hku.hk


However, we respect the suggestion from our reviewer to change the term from RCHE to LTCFs (long-term-care facilities), which is a common term familiar to most readers.

Residents of long-term care facilities are notoriously difficult to collect informed consent from. It is not clear what proportion agreed to participate and whether those excluded for this study were different than those included?

Ans: During the study period, 2900 residents were living in 40 RCHE, among whom 2020 (70%) gave consent to be recruited. We have presented the data in the RESULT section. However, we did not obtain
the clinical data of those who failed to provide consent to be recruited. We have addressed this point as one of the limitations of this study.

Were all hospital patients discharged to the RCHE or extended-care facilities?

Ans: Thank you very much for the question.

Patients being referred from LTCFs within our healthcare region were admitted to the acute hospital for management. They were either discharged back to LTCFs when the acute problems were settled or transferred to one of the 3 extended-care hospitals within the hospital network of our healthcare region for convalescent care before their return to LTCFs.

We have presented this point in the METHOD section of revised manuscript.

None were discharged home, another acute care hospital, etc?

Ans: The service of Long Term Care Facilities (LTCFs) in Hong Kong may be different from that of the United States and the United Kingdom. The LTCFs are reserved for those elderly without family support or those elderly with functional incapacity which makes it difficult for their family members to take care of them at home. When the elderly persons are referred to and admitted to the LTCFs, they will usually stay in the LTCFs for the rest of their lives. They will not be “discharged” home. Of course, when the LTCFs residents develop acute illnesses, they will be referred to the acute hospital within the same healthcare region.

We have mentioned this point in the revised manuscript as follow: “Patients being referred from LTCFs within our healthcare region were admitted to the acute hospital for management. They were either discharged back to LTCFs when the acute problems were settled or transferred to one of the 3 extended-care hospitals within the hospital network of our healthcare region for convalescent care before their return to LTCFs.”
The authors should be more descriptive regarding the source of the patient data. Currently, it just says it was “retrieved,” but all data sources and methods of collection have their strengths and weaknesses.

**Ans:** Patients’ demographic information, history of hospitalization, underlying conditions, and the presence of indwelling devices, wound or ulcer, were collected by patients’ chat review and the hospital computer information system. This point has been addressed in the METHOD section of the revised manuscript.

By selecting the subgroup patients in 1) hospitals without exposure to RCHE and 2) RCHE without exposures to hospitals, how representative do they think their results will be?

**Ans:** The analysis of these subgroups is aimed at examining the differences in MRSA acquisition from exposure to LTCF (previously termed RCHE) and hospital care. As the subjects in these subgroups have been exposed to one environment only, selection of these subjects avoids potential interaction among factors during analysis. Additionally, <10% of the local elderly population (age >60) stay in LTCF, but the elderly population constitutes the majority of public hospital service users in Hong Kong. Hence, the subgroup of hospital users without exposure to LTCF is rather representative of the elderly population in Hong Kong.

The use of resident’s living area is atypical and may be highly specific to the study setting. It is also not clear to me how this would serve as a proxy for the “hygienic standard” of the RCHE and what exactly is meant by hygienic standard. While the square footage was validated, what was not validated was the variable that is being approximated.

**Ans:** As in the United States and the United Kingdom, space is very precious in Hong Kong. The majority of the citizens have a very limited living area. For citizens in the lower social class, more than one family live in the same apartment, sharing kitchen and toilet facilities. Therefore, it is well known in Hong Kong that the hygienic standard is relatively poor among those who live in small residential areas.
This principle is also applicable to LTCFs. In Hong Kong, LTCFs are mostly run by private companies and operated in a profit-making business model in which the average living area is kept at a minimum which satisfies the legal requirement of the government. Therefore, the average living area usually correlates with the hygienic standard because the smaller the average living area is, the more difficult it is for appropriate infection control measures to be done.

To the best of our knowledge, it is the first time that quantitative analysis of living area per person is found to be a determinant influencing the MRSA prevalence in LTCFs.

However, we agree with the reviewer's comment that the resident's living area may not completely serve as a proxy for the "hygiene standard". We have therefore softened the tone in the METHOD and DISCUSSION sections in the revised manuscript as follow:

"the average living area, which may correlate with the hygienic standard of the LTCFs in Hong Kong."

"Since the average living area makes up a major portion of the expenditure of the LTCFs and is also an important indicator of the degree of spatial separation for successful implementation of infection control measures, it may possibly correlate with the overall standard of care, hygiene and infection control of the LTCFs."

The statistical analysis section is brief and it is clear that there was specific hypothesis addressed in this study. In addition, all measures of effect are bivariable and there is no statistical adjustment to adjust for potential confounders.

**Ans:** Although our statistical analysis section is brief, we actually had performed both bivariate correlation and logistic regression in our study as listed in Table 4 and 5.

**Results:**
Were there any differences between the RCHE that participated and those that
did not? Also, there are no data on those who consented and those who refused and any differences between them.

**Ans:** There are 17 RCHE (now known as LTCFs in the revised manuscript) chosen not to join this study. The nature of these 17 LTCFs has no difference with those 40 LTCFs. The median number of resident is 74 (range 29 – 196) in 17 LTCFs, and the median number of resident is 60 (range 24 – 199). There is no statistical difference between the median number of residents in those LTCFs who participated or not participated in this study (p=0.839).

During the study period, 2900 of residents were living in 40 RCHE, among whom 2020 (70%) gave consent to be recruited. We have presented the data in the RESULT section. However, we did not obtain the clinical data of those who failed to provide consent to be recruited. We have addressed this point as one of the limitations of this study.

The term “rate” is used incorrectly. Rates are events per units time.

**Ans:** Thank you for the suggestion. We have change the term “rate” into “prevalence of MRSA” in the revised manuscript.

Were the subgroup patients “selected” or where all patients lacking the necessary exposure included?

**Ans:** All patients fulfilling the selection criteria for subgroup analysis have been included.

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

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

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**
I declare that I have no competing interests

**Reviewer's report**
Title: Residential care homes for elderly are more important than hospitals in the transmission of methicillin-resistant Staphylococcus aureus
Version: 1 Date: 7 October 2012
Reviewer: Adam L Gordon

Reviewer's report:
The authors present a longitudinal cohort study comparing the prevalence and incidence of MRSA in care home-dwelling and non-care home dwelling elders within the Hong Kong Healthcare System. Their methodology is sound and their results are clearly and transparently reported but the report has a one major shortcoming which I would suggest is rectified prior to acceptance for publication:

The residential care sector around the world varies along a continuum from highly socialised long-term care (the UK is at this end of the spectrum) through to highly medicalised long-term care (the USA is at this end of the spectrum). At the socialised end of the spectrum, residents live in small (circa 21 resident) house-style accommodations, with individual rooms, carpeted living conditions, no regular nursing input, and low levels of instrumentation, apart from long-term catheters. Feeding tubes would not be routine. Other forms of medical intervention would not be allowed to take place. At the other end of the spectrum, residents are cared for large (circa 200 resident) hospital-style accommodation, with hospital-style furnishings, with routine nursing input and high levels of instrumentation up to, and including, tracheostomy. To understand the broader applicability of the research presented here, we have to understand what Hong Kong RCHE’s are in some more detail and where they lie on this spectrum.

- How big are the facilities?
- Do residents have private rooms with en-suite bathrooms or do they share toilets?
- Is nursing care provided by on-site staff, or visiting professionals?
- What type of medical instrumentation is accepted and what proportion of residents have catheters/feeding tubes/tracheostomy tubes/etc?

Ans: Among these 40 LTCFs in this study, the median area was 4320 square feet (range, 1200 – 16380 square feet), with a median number of resident of 60 residents (range, 24-199). The LTCFs residents had to
share the toilet facilities. The nursing cares were provided by on-site staff but the medical problems were taken care of by the community geriatric assessment team on a regular basis. Thirteen percent of residents required special care for feeding tubes, urinary catheters and other medical devices.

Once I can understand the answers to the above, I can understand whether this research applies to the UK, the Netherlands, the USA, Australasia, Taiwan......without such exposition on the nature of the facility considered, it becomes difficult to interpret or extrapolate the findings outside the relatively limited setting of Hong Kong.

**Level of interest:** An article of importance in its field

**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.