Author’s response to reviews

Title: Chronic Periodontitis and Community-acquired Pneumonia: A Population-based Cohort Study

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Version: 2 Date: 11 Oct 2019

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Response to Reviewer 1’s (Te Chun Shen) comments:

1. "The main outcome of the study was admission due to CAP…” This description is still unclear. How do you identify HAP (pneumonia occurring 48 hours after admission) from the pneumonia codes (J12-J18) at discharge? You have excluded previous history of admission (within 10 days after last discharge), but you do not mention how to distinguish CAP and HAP (pneumonia occurring 48 hours after admission) from the index hospitalization. Unless, you should mention the coding in the database is an admission code, not a discharge code.

   Thank you for your comments. A pneumonia event with any hospital admission within 10 days of the last discharge was considered HAP. As reviewer comments, the pneumonia code at discharge does not completely distinguish between HAP and CAP. We also recognize that we cannot distinguish CAP and HAP perfectly from this point of view. However, a recent previous study used this definition to exclude HAP subjects [1]. Therefore, we think there's enough available way to exclude HAP patients.

2. The authors have made some efforts to exclude health-care associated pneumonia (HCAP, people who have been recently hospitalized and are regularly exposed to the health care system). However, the method is not adequate because the criteria of HCAP is much extended. I just pointed out some examples (such as people undergoing regular hemodialysis or those living in
the nursing home). If the authors really want to exclude HCAP, you should check the definition again.

Thank you for your comment. We identified the diagnostic criteria (In 2005, according to the American Thoracic Society/Infectious Diseases Society of America guidelines) for HCAP and reviewed several cases.

As the reviewer noted, we do recognize that the HCAP criteria was extended too much in this study. we removed the relevant sentence.

The subjects considered the most significant and directly related risk factors were excluded such as dialysis and those living nursing home.

We revised the relevant table as follows:
Page 6, Table 1
Excluded
Care involving dialysis (ICD-10, Z49)
Dependence on renal dialysis (ICD-10, Z99.2)
Problems related to care-provider dependency (ICD-10, Z74)
Pneumonia within 10 days from the last discharge

3. I suggest to revise the conclusion:
"The results of this study show that the presence of CP is not associated with CAP in a Korean population." (in abstract)
"This study suggested that CP may be not a potential risk factor for CAP." (in full text)

We revised the relevant sentence as follows:
Page 3, lines: 56
“The results of this study show that CP may not be a potential risk factor for CAP”

4. "The study population was divided into 4 groups according to the severity of periodontitis (non-CP, mild, moderate, and severe)." should be revised to "The study population was divided into 4 groups: non-CP, mild CP, moderate CP, and severe CP)."

We revised the relevant sentence as follows:
Page 5, lines: 107-108
“The study population was divided into 4 groups according to the severity of periodontitis (non-CP, mild CP, moderate CP, and severe CP).”

5. As above mentioned, the previous comment (Table 2 and Table 3: "healthy" subjects should not be included into chronic periodontitis) did not mean to remove the healthy subjects (non-CP group). You should independently present the non-CP group, but not include into chronic periodontitis groups.

We revised the relevant tables.
REQUESTED REVISIONS:

1. The sentence "Cox proportional hazards regression was performed after …" could probably just be simplified to: "The association between CP and CAP was assessed with an adjusted Cox proportional hazards regression model."
   
   We revised the relevant sentence as follows:
   Page 6, lines: 128-129
   “For each CP group, the association between CP and CAP was assessed with an adjusted Cox proportional hazards regression model.”

2. In the abstract results, specific stratification (e.g., "In the analysis stratified by age, there were no…")

   We revised the relevant sentence as follows:
   Page 3, lines: 52-54
   “On stratification analysis by sex, smoking and Charlson comorbidity index, there were no significant differences between CAP and CP in any of the models.”

3. Background line 74 - you mention pneumonia 10th leading cause of death in 2004 but 4th in 2015? why do you think it increased so much? (you could tie this into periodontitis - as in could increases in periodontitis be responsible for this hypothetically?)

   The reason for the rapid increase in mortality from pneumonia may be due to a combination of factors, however, the biggest factor is attributed to an aging society. For elderly individuals with low immunity, pneumonia can be a fatal disease. Especially in the elderly, the symptoms are not easily manifested, and it is difficult to diagnose early pneumonia, which can delay treatment and increase mortality due to complications. As we enter an aging society, more elderly individuals are admitted to hospitals and exposed to health care systems. For this reason, the death rate from pneumonia is expected to increase gradually.
   Increasing periodontal disease due to aging is also a problem that can be linked to various types of pneumonia. Because oral diseases and poor oral hygiene have been reported as risk factors for pneumonia, well-designed epidemiological investigations are needed.

4. Can you explain why you excluded people with renal failure and those in nursing homes?

   Renal failure patients are regularly exposed to hemodialysis or peritoneal dialysis, making them one of the most susceptible subjects to health care systems. However, we do recognize that the criteria of healthcare-associated pneumonia were extended too much in this study. Therefore, we removed the relevant sentence.
   One type of pneumonia, nursing home acquired pneumonia(NHAP) is defined as pneumonia that occurs in a long-term care facility or nursing home resident. Many researchers suggested that NHAP is a separate clinical entity and should be considered separately from the CAP [2]. Therefore, we excluded people those in nursing home
5. Why did you exclude people with CP in 2002?
We excluded subjects who had been treated for CP in 2002 to exclude patients with chronic conditions and to ensure that the CP group included subjects with new episodes only.

6. Is there a reason why you don't include people with no chronic periodontitis in table 2?
Thank you for your comments.
We revised the relevant table.

7. Is there a reason why in your analyses (tables 3-4), you don't have the outcome of pneumonia regressed onto a categorical predictor with several values for CP (none, mild, moderate, severe), with the reference being none? Table 4 in particular is a bit confusing because I wasn't sure whether the non-severe CP was just people with mild and moderate CP or if it included people without CP, too.

Thank you for your comments.
We have already described why we dichotomized the 4 groups of CP in discussion section.

Page 12, lines: 204-211
“There were several limitations to this study, mostly stemming from the use of claims data based on ICD-10 and treatment codes. First, the definition of CP based on treatment codes could underestimate the actual number of CP cases, especially in the mild and moderate periodontal disease groups. Several people seldom visit dental clinics or hospital because of lack of awareness regarding oral health and economic reasons. However, codes associated with severe CP treatment such as tooth extraction and periodontal surgery can be reliably used as identifying variables because severe CP is typically more painful for patients than mild or moderate CP. Therefore, we dichotomized the 4 groups of CP in Table 3 into severe CP and non-severe CP, and the results were not altered (Table 4).”

We revised the relevant tables and added a description to Table 4, 5 footnote to avoid confusion as follows:

Page 9, Table 4, 5:
“aNon-severe CP includes non-CP, mild CP and moderate CP”
References
