Reviewer's report

Title: Comparing Estimates of Influenza-Associated Hospitalization and Death among Adults with Congestive Heart Failure Based on how Influenza Season is Defined

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Reviewer: Anthony J Hedley

The authors attempt to address an important issue in the identification of avoidable morbidity and mortality attributable to influenza and this is a potentially interesting contribution to the field.

Possible methods for defining influenza include analysis of respiratory and cardiovascular health outcomes, based on epidemics (defined by a proportion of respiratory mortality; or laboratory viral isolates.

The authors use four defined measures based on either the % positivity of isolates (2) or the number of weeks in which either any isolates were obtained, or the proportion of isolates were at least 5%.

The presentation of the data throughout the paper needs considerable improvement for it to become a useful contribution to the literature on this subject. The following major concerns should be addressed:

Major compulsory revisions:

1. There are no descriptive statistics for the influenza seasons defined by the four methods. We therefore cannot assess the degree of coherence between the methods.

2. Table 2 and Table 3 are misplaced and should be interchanged.

3. The authors should clarify whether influenza seasons were regards as time-dependent or time-independent covariates.

4. Weekly influenza isolation rates should be plotted so that the readers can observe where are the periods corresponding to the first and last isolates. In the tropics and subtropics, influenza viruses are in circulation throughout the whole year, and although there may be peaks, they may be multiple or ill-defined and unlike the sharp single peak epidemics in temperature countries (eg Europe/Australia) and so the method using first/last isolates cannot be implemented.

5. It is not clear how the incidence rates for hospitalization or mortality (Tables 1 or 2) were defined. Are the incidence rates during influenza season defined according to the patient-days of observation during the influenza season, or
defined according to total patient-days and the adverse outcome occurring in the influenza seasons.

6. It is important to control for seasons, for example by putting the indicator variables for calendar months in the model. Influenza seasons are often confounded by cool and warm seasons as indeed has been pointed out by the authors.

7. The authors use a moving average of positive isolates with different decision rules (eg 5% or 10% as cut-off points relative to the total number of positive isolates in the whole season); as such these constitutes tests. They are effectively trying to validate these tests as detectors of congestive Heart Failure deaths induced by influenza infection.

We need to make some assumptions about the inflammatory responses which lead to these circulatory problems, but given the existing evidence that is reasonable.

I suggest that the authors consider how they could improve the presentation of their model by using

(1) different cut-offs (ie not simply 5% and 10%)
(2) “incidence” (detection of influenza associated CHF deaths with different cut-off points.
(3) plotting ROC curves to demonstrate the errors incurred at different cut-off points.

8. The authors could consider using Receiver operating characteristic curves to demonstrate the power and errors of the different methods to detect variations in admissions and deaths.

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article of importance in its field

Quality of written English: Acceptable

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

Declaration of competing interests:

I have no competing interests.