Author's response to reviews

Title: Redistribution of Heart Failure as the Cause of Death: The Atherosclerosis Risk in Communities Study

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Version: 2 Date: 10 February 2014

Author's response to reviews: see over
To: Population Health Metrics Editorial Office

From: Michelle Snyder  
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Date: 02/10/2014

RE: Revised manuscript for review, MS: 1447885428111533

Dear Dr. Editor(s),

On behalf of my co-authors, I would like to submit the revised manuscript entitled, “Redistribution of Heart Failure as the Cause of Death: The Atherosclerosis Risk in Communities Study,” for consideration for publication in Population Health Metrics.

We would like to thank the reviewers for their comments and questions, and are pleased with how the manuscript was received. The comments were excellent and improved the clarity of the manuscript. Our responses to individual questions are listed below and all edits to the manuscript are indicated with track changes.

Thank you again for receiving our manuscript and considering it for review. We appreciate your time and look forward to your response.

Sincerely,

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Reviewer's report #1
Title: Redistribution of Heart Failure as the Cause of Death: The Atherosclerosis Risk in Communities Study
Version: 1 Date: 21 November 2013
Reviewer: Andrew Moran

Reviewer's report:
Snyder et al. present an excellent analysis that extends recent work on the problem of redistributing ill-defined deaths, particularly heart failure deaths. Many of these analyses have been empiric analyses of coded vital statistics data, and this analysis attempts to ground the methods by comparing with CHD deaths ascertained with standard high quality methods in an established surveillance study.

One complaint with the paper is that the ARIC study only ascertained CHD deaths, but this is a limitation of the original study design. Another complaint is that the investigators did not apply the coarsened exact matching procedure to the ARIC deaths. Are the ICD codes from these death certificates, other than CHD, still available? If so, direct comparison of the CHD proportion using the two methods on the same data would provide a firmer link between the state-level data and the ARIC data.

- Although it would be interesting to use coarsened exact matching on the ARIC data there were too few deaths listing HF as UCD for stable estimates from coarsened exact matching. Further, deaths abstracted and reviewed by epidemiologic surveillance in ARIC are sampled based on ICD-10 codes; although the range of codes is wide the matching group would not represent all deaths occurring in those areas.

In the discussion, there is a lack of discussion of the limitations of the ICD system. Do the authors agree that heart failure should not be an UCD? The rationale probably has to do with notion that the designated UCDs are preventable upstream of HF deaths. CHD and hypertension, and other causes, often co-exist in the same HF patient. What do the authors think of the lack of overlap in the one-cause-one-death approach of the ICD?

- The ICD-10 coding instructions are explicit in that heart failure should not be listed as the UCD, which is mentioned in the text of the revised manuscript (page 5).
- On pages 14 and 15 we discuss the inaccuracies in the coding the UCD and its sources. We also mention on page 15 and 16 that emphasis needs to be on improving the quality of medical records and the training of physicians on death certification, as well as on reporting multiple cause of death information to provide a more accurate estimation of the burden of disease. We expanded this section in the revised manuscript to include reference to co-morbid diseases (page 16). Despite the possibilities of inaccuracy and misclassification, the ICD system is used around the world to monitor diseases and for public health policies (this sentence was also added to page 16).

Abstract:
Instead of “HF is an ill-defined UCD”, state “HF is sometimes incorrectly entered as an UCD”
Delete “to our knowledge”
Change “sex- and race-specific redistribution of deaths and” to “sex- and race-specific redistribution of deaths on”
- Thank you for the suggestions. We edited these sentences in the abstract.

Background:
Page 5: Need to explain UCD better: state explicitly that HF is considered a mediator between UCD and death
We added the statement to the background section on page 5, which we feel helped to clarify the original sentence.

“considered” too weak in para one of page 5—it is a requirement not to use HF as an UCD by ICD rules
- We agree and changed “considered” to “used” on page 5.

State how the ARIC study plays in the analysis on page 6 last para: “High quality coronary heart disease cause of death ascertainment from the population disease surveillance study of U.S. communities, the ARIC study, was used to assess the accuracy of the coarsend exact method”
- This sentence was added to the last paragraph of the introduction (page 6).

**Methods:**
Reason for excluding age <55? It makes sense but must be stated openly
- Heart failure before age 55 typically reflects etiologies and coding practices that differ from those among older adults in industrialized countries. We should also note that only 8 records with heart failure as the UCD occurred among decedents under 55 years old. Our rationale was added to page 7.

ARIC classification versus “preferred diagnosis” mentioned in the appendix tables not described
- On page 9 the revised manuscript states: “We also considered a reviewer’s preferred classification in which the clinical judgment of the reviewer was used to complement the standardized ARIC classification.” The term “reviewer’s preferred classification” is consistent with the appendix tables. The preferred classification allows the physician reviewer to disagree with the ARIC algorithm for a CHD death based on information in the medical record and his/her expert opinion (detail added to page 9).

**Results:**
End of page 11: as above; what is the “preferred clinical classification used by reviewers”?
- We changed all terms to “reviewer’s preferred classification” to be consistent throughout the text and tables.

**Discussion:**
Page 12: three percent is a “small %, but on a national scale this represents X deaths”
- We added this sentence to the discussion on page 13.

See the major comments above about the need for more discussion of the ICD system and its limitations.
- Please see the response to the major comment above (in Reviewer’s report).

**Conclusion:**
Should this method be used by government agencies and researchers?
Is further research needed before it is implemented?
- Thank you for highlighting this point. We modified the conclusions (on page 16) as follows: In summary, coarsened exact matching offers a practical way to redistribute ill-defined UCD. Further research is needed to validate this method, but our results indicate that redistribution of deaths attributed to heart failure modifies cause-specific mortality estimates, and may significantly impact mortality patterns for subgroups or regions prone to suboptimal certification of the UCD. Government agencies and researchers should calibrate vital statistics through reclassification of ill-defined UCD in order to improve the accuracy and comparability of mortality statistics, to the benefit of monitoring mortality trends, public health policies, and the allocation of public health resources.
Figures:
Need to label Y axis as “percent increase in CHD mort rate” and no need to use (%) twice
  • We edited figures 2, 3 and 4 as recommended.

Supplement:
Figure A1, A2, A3 would benefit from color coding of states
  • We added color to the figures in the additional file and we think it looks much better.

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

Reviewer's report #2
Title: Redistribution of Heart Failure as the Cause of Death: The Atherosclerosis Risk in Communities Study
Version: 1 Date: 3 December 2013
Reviewer: Ryan Ahern

Reviewer's report:
DISCRETIONARY
I would spend some time rewording some of the language in the introduction.
  • We appreciate the suggestion. We edited the introduction and feel that the clarity of the introduction was improved. Thank you.

Level of interest: An article whose findings are important to those with closely related research interests
Quality of written English: Needs some language corrections before being published
Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.
Declaration of competing interests: I declare that I have no competing interests.

Reviewer's report #3
Title: Redistribution of Heart Failure as the Cause of Death: The Atherosclerosis Risk in Communities Study
Version: 1 Date: 9 December 2013
Reviewer: Mohsen Naghavi

Reviewer's report:
• Major Compulsory Revisions
1- In Discussion part page 13 “An advantage of coarsened exact matching in this regard is that no a priori assumptions about the UCD are necessary” but this is not correct because in the method part page 7 we have “Before matching we eliminated deaths due to external causes, ICD-10 codes V00-Y98, and deaths due to ill-defined UCD on the basis that they were not plausible as an UCD of a heart failure death” then you have priori assumptions that injuries and ill-defined codes are implausible underlying death for HF. Why you did not decide that Cerebrovascular disease, Digestive diseases, Dementia, Alzheimer's disease are not plausible for UCD for HF? We know that these causes cannot be underlying cause of HF.

- This is an excellent point. We meant that no a priori assumptions about the UCD target groups are necessary compared to methods where the target groups are defined in advance. This distinction was added to the pertinent sentence on page 14 of the revised manuscript.
- We eliminated UCD due to external causes and ill-defined UCD to be consistent with the methods published by Stevens et al. We concur with Stevens and colleagues that inclusion of external causes and ill-defined UCD would undermine efforts to improve the accuracy of cause of death classification for heart failure listed as UCD.

2- In the result part of this study 50.7% of cause cannot be underlying causes of HF, if we add 9.9% of other to this list implausible causes increase until 60.7%

Look to this table
- Lower respiratory infections 3.3
- Cancers 6.7
- Diabetes 4.9
- Cerebrovascular disease 4.4
- Digestive diseases 2.3
- Dementia 2.7
- Alzheimer's disease 2.1
- Other 9.9

All of these diseases can be comorbidity of HF or these are prevalent diseases in this age group that coarsened exact matching captured these diseases

- Some of these diseases and conditions are manifestations of pathophysiologic processes that are plausible antecedents to heart failure. Others are not, and represent valid UCDs that co-vary with HF being listed as UCD on death certificates, possibly reflecting death certification practices or even coding practices.

3- Also you dropped age under 55, if you add age under 55 to this analysis and do not drop injuries (V00-Y98) make more implausible results

- Although it would seem preferable to conduct the analyses on all records, we feel that this would not be good practice given the age distribution of HF. For the same reason, it would not change our results given the very small number of records (8 records) with heart failure as the UCD among decedents less than 55 years of age at death.

4- In this study you considered “I11-I13”: as hypertensive heart diseases, but “I12, I12.0 and I12.9” are code for Hypertensive chronic kidney disease not hypertensive heart diseases
- I11 Hypertensive heart disease
- I11.0 Hypertensive heart disease with heart failure
- I11.9 Hypertensive heart disease without heart failure
- I12 Hypertensive chronic kidney disease
- I12.0 Hypertensive chronic kidney disease with stage 5 chronic kidney disease or end stage renal disease
- I12.9 Hypertensive chronic kidney disease with stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease
I13 Hypertensive heart and chronic kidney disease
I13.0 Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease
I13.1 Hypertensive heart and chronic kidney disease without heart failure
I13.10 Hypertensive heart and chronic kidney disease without heart failure, with stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease
I13.11 Hypertensive heart and chronic kidney disease without heart failure, with stage 5 chronic kidney disease, or end stage renal disease
I13.2 Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease
I13.9 Hypertensive heart and renal disease, unspecified

- Thank you for clarifying the classification of hypertensive heart disease. We adopted this classification and term “hypertensive heart diseases” from Stevens et al. (Population Health Metrics 2010) and Ahern et al. (Population Health Metrics 2011). However, to explain that this group encompasses hypertensive heart and kidney diseases, we changed “hypertensive heart diseases” to “hypertensive heart and kidney diseases” in the text and tables.

Minor Essential Revisions:
In Background part When you are saying that percent of ill-defined in USA are 7% it depends to your definition for ill-defined code, for ill-defined codes there are not any standard definition, first we have to clarified that which codes we included in ill-defined code then we can present fraction of ill-defined code
- Excellent point. We revised the sentence and removed the percentage since there are different definitions of ill-defined UCDs (page 5).

Level of interest: An article whose findings are important to those with closely related research interests
Quality of written English: Acceptable
Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.
Declaration of competing interests: I declare that I have no competing interests