ARIC Manuscript Proposal #3731

PC Reviewed: 11/16/20 **Status: _____** **Priority: 2**
SC Reviewed: _____ **Status: _____** **Priority: ____**

1.a. Full Title: Trajectories of Self-Rated Health before and after Acute-care Hospitalization: A 30 Year Cohort Study

b. Abbreviated Title (Length 26 characters): **Self-rated health and hospitalization**

2. Writing Group:

Writing group members: Scott Ziming Mu, Natalie Daya; Caitlin Hicks, Randi Foraker, Anna Kucharska-Newton, Pamela Lutsey, Josef Coresh, Elizabeth Selvin; others welcome
I, the first author, confirm that all the coauthors have given their approval for this manuscript proposal. _SZM__

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3. Timeline:

Analysis will begin immediately after approval of manuscript proposal. Draft manuscript anticipated late 2020.

4. Rationale:

The period immediately following acute-care hospitalization is a high-risk state. Post-hospitalization syndrome is the term used to describe the transient condition of generalized risk after hospitalization (Krumholz, 2013). Readmission rates and mortality after hospitalization for common illnesses including heart failure, acute myocardial infarction, and pneumonia are highest immediately after hospitalization (Dharmarajan 2015). Both physiologic and psychologic factors including disturbances in sleep, mobility, nutrition, and mood contribute to higher risk of poor outcomes. (Rawal 2019)

Self-rated health is a potent prognostic indicator of mortality and other clinical outcomes in the setting of both acute and chronic illnesses and across diverse populations (Schnittker, 2014, Araújo 2019, Farkas 2010, Gerber 2009, Robinson-Cohen 2014, Godaert L 2018, Inkrot 2016). However, the associations of hospitalization on self-rated health and its trajectories are not well characterized.

Prior studies of self-rated health and hospitalization have focused on immediate (6 week) or 1 year outcomes and virtually no studies have examined self-reported health prior to hospitalization (Gerber 2009, Godard-Sebillotte 2016). Self-rated health could succinctly translate post-hospitalization health into one summary statistic.

In this proposed study, we will leverage the annual self-reported health assessments obtained from all participants in the Atherosclerosis Risk in Communities (ARIC) Study. We propose to study long-term trajectories of self-rated health before and after all-cause and cause-specific

hospitalizations. We will also investigate the prognostic value of self-rated health for mortality in the year following hospitalization.

5. Main Hypothesis/Study Questions:

1. To describe global trends of self-rated health in the ARIC cohort
    a. Understand temporal trends of self-rated health by calendar year
    b. Understand age-related changes in self-rated health within the entire cohort

2. Describe the changes in self-rated health in the years preceding a hospitalization and the years following.
    a. For individuals with at least 1 recorded hospitalization, we will evaluate trajectories of self-rated health preceding and following any recorded hospitalization episode
    b. Characterize the associations of age, race, gender, education, marital status, and chronic conditions (CHD, stroke, heart failure, diabetes, obesity, hypertension, cancer, or Charleston Comorbidity Index) on self-rated health trends
    c. Compare the self-rated health trends by major condition diagnosed during hospitalization according to ICD-9/10 CCS.

3. Explore prognostic value of self-rated health following hospitalization on short- and long-term mortality
    a. For each value of self-rated health reported in the first year following hospitalization, 5-year post-hospitalization and long-term survival outcomes can be followed over time

6. Design and analysis (study design, inclusion/exclusion, outcome and other variables of interest with specific reference to the time of their collection, summary of data analysis, and any anticipated methodologic limitations or challenges if present).

Study Design:
Longitudinal study before-after hospitalization in the ARIC cohort data using data over the full study time period 1987- 2018.

For study question 1, all reported self-rated health within ARIC will be used for analysis, and self-rated health can be plotted as a function of calendar year, as well as age of the participant.
For study question 2, participants with a recorded hospitalization within ARIC at any time period will be considered. The year of hospitalization event will be considered time 0 for the analysis, and all other annual follow-up self-rated health values will be plotted following or preceding time 0. The mean self-rated health at each annual time point will be compared over time, plotted yearly before and after hospitalization, with a smoothing curve connecting the points and shaded boundaries for confidence intervals.
For study question 3, 4 survival curves can be constructed, using self-rated health values after a hospitalization event. Again, year 0 will be the hospitalization event, and the four Kaplan Meier curves (corresponding to self-rated health= excellent, good, fair or poor) will be compared.

Primary Outcomes:

Self-rated health:

Self-rated health was measured at baseline and at each annual followup as question # 6, "Over the past year, compared to other people your age, would you say that your health has been excellent, good, fair or poor?"

Other authors followed a transformation of the 4 point ordinal question to a 100 point numerical scale (excellent= 95, 80= good, 30- fair, 15= poor, 0= death) as described in Diehr et al, but our preference is to preserve the 4 point self-rated health rating, and perform statistical analysis with an equally spaced scale (excellent=4, good=3, fair=2, poor=1) (Diehr 2003). Under the previous analysis, with a hypothetical example of a group of 2 individuals, an individual with fair health together with a deceased individual would have a mean self-rated health of 15, which would be equivalent to a 2nd group of 2 individuals both with poor health. We consider these 2 scenarios dissimilar, and under our analysis, decease individuals do not contribute to self-rated health measures as they could not respond to self-rated health. Thus, only living participants can contribute data for post-hospitalization self-rated health.

Mortality:

This is the outcome for annual follow-up question #2, and assessed via active surveillance in all ARIC participants. Mortality rate can be calculated at 1, 5 and 10 years post-hospitalization for differing self-rated health groups.

Hospitalization:

Hospitalization events were assessed on ARIC annual follow-up questions #23 and #24. Single level ICD-code CCS diagnoses are provided and will be used to subgroup individuals according to disease processes (e.g. coronary atherosclerosis, congestive heart failure, acute MI, pneumonia, etc.) during hospitalization.

Proposed analyses:

For study question 1, previous studies have suggested a decline in self-rated health as individuals age. However, because the assessment used in ARIC was formulated to compare an individual to individuals of the same age, this effect could be attenuated. Comparing self-rated health to calendar year will reveal trends in self-rated health that could be due to broader changes over the past 30 years, independent of an individual's age.

For study question 2, We will plot the mean and compare the trajectories between the baseline cohort (as studied in question 1) and post-hospitalization cohort. We may be able to uncover differences in post-hospitalization self-rated health between subgroups (age, race, gender, education, marital status, and ICD-code CCS diagnosis). For study question 3, we expect that worse self-rated health at year of hospitalization will be associated with increased mortality, but the degree and short- and long-term associations will be quantified.

Methodological Challenges:

Some hospitalizations may have been missed due to lack of reporting, which could tend to be more minor hospitalizations or hospitalizations without cardiovascular interventions or outcomes. In addition, the use of ICD codes to stratify hospitalizations can be confounding because individuals could be misclassified and underlying causes of hospitalization could be misattributed.

In addition, hospitalizations prior to enrollment in 1987 – 1989 are not captured.
Because hospitalization can occur as a repeat exposure, multiple hospitalizations can be assessed within the same individual. We will conduct sensitivity analyses excluding and potentially accounting for (via weighting) for individuals with high hospitalization counts from exerting excess influential value. For example, an individual with 10 hospitalizations will have each of their hospitalization events counted for the analysis, but each with a 1/10 weight.
Missing data for self-rated health will be assessed. Previous methods for interpolating data have been described (MS #1798) and this will be compared with simple omission of missing data points from analysis (complete case analysis).
Lastly, the timing of hospitalization in relation to annual follow-up survey could lead to bias as a recent hospitalization within 1 month could have a different effect on self-rated health as compared to a hospitalization 11 months prior. However, the particular wording of the self-reported health question, which specifically asks the participant to consider average health over 12 months, should ameliorate some of this bias.

7.a. Will the data be used for non-ARIC analysis or by a for-profit organization in this manuscript? ____ Yes __X_ No

b. If Yes, is the author aware that the current derived consent file ICTDER05 must be used to exclude persons with a value RES_OTH and/or RES_DNA = "ARIC only" and/or "Not for Profit" ? __X_ Yes ____ No
(The file ICTDER has been distributed to ARIC PIs, and contains the responses to consent updates related to stored sample use for research.)

8.a. Will the DNA data be used in this manuscript? ____ Yes __X_ No

8.b. If yes, is the author aware that either DNA data distributed by the Coordinating Center must be used, or the current derived consent file ICTDER05 must be used to exclude those with value RES_DNA = "No use/storage DNA"? ____ Yes ___ No

9 The lead author of this manuscript proposal has reviewed the list of existing ARIC Study manuscript proposals and has found no overlap between this proposal and previously approved manuscript proposals either published or still in active status.
ARIC Investigators have access to the publications lists under the Study Members Area of the web site at: http://www.cscc.unc.edu/aric/mantrack/maintain/search/dtSearch.html

___X_ Yes _____ No

10. What are the most related manuscript proposals in ARIC (authors are encouraged to contact lead authors of these proposals for comments on the new proposal or collaboration)?

#MS 1462 Foraker et al. "Socioeconomic status (SES) and the Trajectory of Self-Rated Health (SRH): Before and After a Heart Failure Event"

#MS 1798 Irwin, et al. Trajectory of Self-Rated Health and Functional Status Before and After Cancer Diagnosis

11.a. Is this manuscript proposal associated with any ARIC ancillary studies or use any ancillary study data? ____ Yes _X__ No

11.b. If yes, is the proposal

___ A. primarily the result of an ancillary study (list number* _____)

___ B. primarily based on ARIC data with ancillary data playing a minor role (usually control variables; list number(s)* _____ _____ _____)

*ancillary studies are listed by number https://sites.cscc.unc.edu/aric/approved-ancillary-studies

12a. Manuscript preparation is expected to be completed in one to three years. If a manuscript is not submitted for ARIC review at the end of the 3-years from the date of the approval, the manuscript proposal will expire.

12b. The NIH instituted a Public Access Policy in April, 2008 which ensures that the public has access to the published results of NIH funded research. It is **your responsibility to upload manuscripts to PubMed Central** whenever the journal does not and be in compliance with this policy. Four files about the public access policy from http://publicaccess.nih.gov/ are posted in http://www.cscc.unc.edu/aric/index.php, under Publications, Policies & Forms. http://publicaccess.nih.gov/submit_process_journals.htm shows you which journals automatically upload articles to PubMed central.

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