

ARIC Manuscript Proposal #2155

PC Reviewed: 6/11/13
SC Reviewed: _____

Status: A
Status: _____

Priority: 2
Priority: _____

1.a. Full Title: Patient Characteristics and Outcomes Associated with In-hospital Onset of Acute Decompensated Heart Failure (ADHF)

b. Abbreviated Title (Length 26 characters): In-hospital Onset of ADHF

2. Writing Group:

Writing group members: Laura Loehr, Patty Chang, Kunihiro Matsushita, Sunil Agarwal, Melissa Caughey, Hanyu Ni, Wayne Rosamond, Lisa Wruck

I, the first author, confirm that all the coauthors have given their approval for this manuscript proposal. LR [**please confirm with your initials electronically or in writing**]

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3. Timeline: Analysis to begin immediately, manuscript to be written over 6 months after approval

4. Rationale:

Heart failure is the most common reason for hospitalization in the US among those 65 years and older, and has a poor prognosis[1]. Studies of hospitalized HF focus mainly on patients that present to the hospital with symptoms of decompensated HF, however, acute decompensation of HF often onsets after admission to the hospital for some other

reason[2]. In-hospital onset of ADHF may be iatrogenic such as precipitated by procedures/surgery, intravenous fluid administration, changes in medications, or it may be precipitated by a comorbid medical problem such as myocardial infarction, a pulmonary embolus, or atrial fibrillation[3]. Though empirical evidence is lacking it is likely that such in-hospital occurrences of ADHF are associated with increased length of hospital stay, morbidity, and increased mortality. With the aging of the population, HF is increasing in prevalence. Identification of those most likely to decompensate in the hospital would be helpful to target those in need of closer monitoring.

We could not find prior population-based studies that focus on HF decompensation that starts after admission; however we did find two small studies. One study focusing on HF with onset after hospital admission was an observational cohort study published in 1996 of 401 HF patients 70 years and older admitted to a university hospital[2]. They defined iatrogenic HF as precipitated by intravenous fluids, a procedure, or a medication. There were 28/401 (7%) with an iatrogenic cause for HF. Compared to HF that was not iatrogenic, patients with iatrogenic HF had longer hospital stays, and a higher mortality rate at one year. A second study from a single hospital in Australia of 359 consecutively admitted internal medicine patients that either had ADHF at admission or developed while in-hospital.[4] They found that infection (mainly respiratory) (39.8%), myocardial ischaemia (17.3%) and tachyarrhythmia (16.2%) were common precipitants of ADHF with onset after hospital admission. In addition there were iatrogenic precipitants that could be potentially avoidable, including complications due intravenous fluid use. The case fatality rate for the group with in-hospital onset of decompensation was significantly greater than for the group with onset by hospital admission (12/47 [25.5%] versus 29/312 [9.3%], respectively, $p < 0.01$). These findings from these 2 small single site studies show the need of studying characteristics and outcomes of those with ADHF with onset after hospital admission in a larger and population-based study.

We have the unique opportunity to evaluate patient characteristics, comorbid conditions, and type of HF associated with in-hospital onset of decompensation of HF in the ARIC surveillance communities. In addition, we will compare case-fatality mortality, one year case fatality, and hospital length of stay for those with onset of decompensation at presentation to the hospital as compared to those with onset after presentation.

5. Main Hypothesis/Study Questions:

1. Describe the proportion of hospitalized acute decompensated heart failure (ADHF) that develops in-hospital onset of ADHF compared to those with onset prior to hospital admission.
2. Does the prevalence of certain comorbid conditions (hypertension, coronary artery disease, diabetes, renal failure, atrial fibrillation), or type of HF (HFpEF or HFrEF) differ by in-hospital onset of ADHF compared to those with onset prior to hospital admission?

We hypothesize that comorbidity will be more prevalent with in-hospital onset of ADHF compared to those with onset prior to hospital admission

We hypothesize that HFpEF will be more common than HFrEF for those with ADHF onset after admission compared to those with prior to hospital admission.

2. Do patient demographics (race, age, gender) and differ by in-hospital onset of ADHF compared to those with onset prior to hospital admission?

3. Describe frequency of ICD code disease groups (COPD, pneumonia, arrhythmia, surgery or other procedure, renal failure) in the first, second, and third position by in-hospital onset of ADHF compared to those with onset prior to hospital admission.

3. Does case fatality (in-hospital, 28-day, one-year case fatality) for ADHF differ by in-hospital onset of ADHF compared to those with onset prior to hospital admission.

We hypothesize that case fatality will be higher for those with onset of ADHF after hospital admission than onset at hospital admission.

4. Does hospital length of stay differ for those with in-hospital onset of ADHF compared to those with onset prior to hospital admission?

We hypothesize that hospital length of stay will be longer for those with onset of ADHF after hospital admission than onset at hospital admission.

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).

Data abstracted from heart failure medical records from 2005 and onward from the ARIC Community Surveillance will be used. Heart failure events that were classified as definite or possible acute decompensated heart failure with linkage to the National Death Index (for case fatality) index will be used. It is abstracted from medical record whether presentation of ADHF occurred after hospital presentation (Q4b on HF abstraction form. ADHF in which it is unknown as to whether ADHF onset occurred at admission or after will be excluded We will exclude those that were transferred to or from another hospital for the analysis of hospital length of stay. ADHF will be divided into those with onset at the time of hospital admission and those with onset at some time after hospital admission.

Demographic and clinical variables will include age, center, gender, race, heart failure type (HFpEF or HFrEF), weight, creatinine (worst), history of renal disease(dialysis), smoking, COPD, hypertension, diabetes, history of coronary disease, ejection fraction, medicines, edema, smoking, arrhythmia and health insurance status, Charlson comorbidity index, length of hospital stay, and in-hospital, 28-day and 1 year mortality. In addition, ICD codes in the first, second, and third listed position will be requested. ICD codes will be grouped to define other leading causes of hospital admission, other than HF.

All analyses will be weighted by sampling fractions specific to each of the ARIC Communities. Descriptive characteristics will be compared for those with onset of ADHF at admission compared to those with ADHF onset after admission. For continuous variables, mean values will be compared by t testing (or Wilcoxon testing), and categorical variables compared using chi square testing.

In-hospital, 28-day and one-year case fatality will be compared for ADHF with onset at admission and onset after admission using logistic regression, after controlling for confounders. Hospital length of stay will be compared for ADHF with onset at admission and onset after admission using linear regression, after controlling for confounders.

7.a. Will the data be used for non-CVD analysis in this manuscript? Yes
 No

b. If Yes, is the author aware that the file ICTDER03 must be used to exclude persons with a value RES_OTH = "CVD Research" for non-DNA analysis, and for DNA analysis RES_DNA = "CVD Research" would be used?
Yes No

(This file ICTDER03 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
 No

8.b. If yes, is the author aware that either DNA data distributed by the Coordinating Center must be used, or the file ICTDER03 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.csc.unc.edu/ARIC/search.php>

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)?

#2051 Prevalence and prognostic impact of kidney dysfunction among patients with acute decompensated heart failure in community setting: ARIC Community Surveillance. Multiple co-authors included in this proposal.

