ARIC Manuscript Proposal # 1881

PC Reviewed: 12/13/11	**Status: A**	**Priority: 2**
SC Reviewed: _____	**Status: _____**	**Priority: ____**

1.a. Full Title: Quality of care for hospitalized patients with chronic heart failure. The Atherosclerosis Risk in Communities (ARIC) Surveillance Study

b. Abbreviated Title (Length 26 characters)

2. Writing Group:

Writing group members:

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

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ARIC author to be contacted if there are questions about the manuscript and the first author does not respond or cannot be located (this must be an ARIC investigator).

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3. Timeline:

Analysis to begin immediately. Plan for manuscript within 6 months

4. Rationale:

Individuals with heart failure experience high rates of hospitalization and mortality. Given the significant morbidity associated with heart failure, a substantial effort has been placed on ensuring that heart failure patients receive guideline endorsed care that is associated with improved outcomes. To encourage quality care in the inpatient setting, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and the Centers for Medicare and Medicaid Services (CMS) have developed four core performance for hospitalized patients: evaluation of left ventricular (LV) function, use of an ACE inhibitor or ARB for individuals with systolic heart failure, smoking cessation counseling when appropriate, and discharge instructions. [1] The American College of Cardiology/American Heart Association (ACC/AHA) endorsed similar quality measures in 2005, with the addition of anticoagulation for comorbid atrial fibrillation. [2]

Both the JCAHO/CMS and ACC/AHA performance measures are specifically targeted to patients whose primary reason for admission is heart failure,[1,2] and thus do not apply to patients with heart failure who are hospitalized for other reasons. Similarly, registries of heart failure hospitalizations, which were created to evaluate and improve inpatient care, are limited to patients who are hospitalized with acute decompensated heart failure. [3-5] However, the majority of hospitalizations of heart failure patients appear to be for reasons other than heart failure. [6,7 8] Furthermore, many of the care measures for heart failure, including LV function assessment and ACE inhibitors use, are beneficial to all patients with heart failure. [2] Therefore, by focusing only on patients admitted for decompensated heart failure, hospital quality improvement initiatives may be missing an opportunity to improve care, and potentially improve outcomes, for a substantial number of individuals who suffer from heart failure.

The purpose of this study is to determine the quality of care for individuals with chronic heart failure who are hospitalized for reasons other than heart failure. As quality improvement initiatives for heart failure have not typically reached this population, we hypothesize that individuals with chronic heart failure admitted for other causes will be receiving suboptimal care for heart failure, particularly as compared to individuals who are specifically hospitalized for heart failure.

5. Main Hypothesis/Study Questions:

1) Among individuals with heart failure as adjudicated by ARIC (i.e., adjudicated as either definite or probable acute decompensated heart failure or chronic heart failure) with no evidence that the primary reason for hospitalization was heart failure, there will be low rates of compliance with the two available quality measures in ARIC:
    a. Assessment of left ventricular function
    b. Prescription for ACE inhibitor or ARB at time of discharge, for individuals with systolic heart failure
2) Compliance with core measures for individuals with heart failure but hospitalized for another reason will be lower than those measures for individuals specifically hospitalized for heart failure.
3) Performance measures will be associated with reduced 30 day and 1 year mortality measures among individuals with heart failure who are admitted both for heart failure and for another reason.

4) Compliance with other guideline endorsed treatment measures that are not core quality measures (e.g., beta blockers or aldosterone antagonists in systolic heart failure, anticoagulation in atrial fibrillation) will be lower than those measures for individuals specifically hospitalized for heart failure.

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).

We will perform a cohort study of individuals from the surveillance component of ARIC who were hospitalized with heart failure between 2005-2008. Inclusion criteria will be all individuals whose hospitalizations were fully abstracted and adjudicated as either acute decompensated heart failure or chronic stable heart failure. Individual who died during hospitalization will be excluded.

We will evaluate the rate of compliance with quality of care measures for both individuals admitted for reasons other than heart failure and individuals specifically admitted for heart failure. Reason for admission will be determined by the response to the following question by trained abstractors: was there evidence from physician notes that heart failure was the primary reason for hospitalization. We will use this definition as we believe that the physician's perception of the reason for admission that will most determine treatments and will be most influenced by quality measures. Additionally, we will repeat the analyses using two alternative definitions of heart failure as reason for admission. The first will be based on primary ICD-9 diagnosis codes for heart failure, which is the definition for inclusion in performance measure by JHACO/CMS. [1] We did not use this definition as the primary exposure due to concerns that discharge diagnoses may be subjective to variations in coding practices that are not related to clinical care. The second alternate definition will be the ARIC adjudicated definition of acute decompensated heart failure. As the adjudication process occurred months to years after patient discharge, this definition will be less directly related to clinical care as compared to the primary exposure definition.

The primary outcomes will be the two inpatient heart failure quality measures available in the ARIC dataset: assessment of left ventricular function and discharge ACE-inhibitor or angiotensin receptor blocker (ARB) for individuals with LV dysfunction. Individuals will be considered to have had LV function assessed if the chart shows evidence of cardiac imaging prior to hospitalization or if the individual had any of the following procedures performed during the hospitalization: echocardiogram, catheterization, radionucleotide ventriculogram, cardiac CT or cardiac MRI. For the quality measure of ACE inhibitor or ARB at time of discharge, we will include individuals with known left ventricular dysfunction and exclude individuals with a known contraindication such as allergy, acute kidney injury, and significant hyperkalemia.

We will also analyze rates of compliance for three additional measures that are not JHACO/CMS performance measures: prescription of a beta-blocker at time of hospital discharge for individuals with LV dysfunction, prescription of a aldosterone antagonist at time of hospital discharge for individuals with LV dysfunction, prescription of anticoagulation at time of hospital discharge for individuals with atrial fibrillation.

We will evaluate the association between mortality for the core measures among both individuals admitted for reasons other than heart failure and individuals specifically admitted for heart failure. For this analysis, the outcome will be both 30 day and 1 year mortality and the exposure will be the heart failure quality measures.

Rates of compliance with quality measures will be calculated by dividing the number of individuals who received the recommended care by the number of individuals eligible for the quality measure. For example, the entire cohort is eligible for the measure of LV assessment, while only those individuals with known systolic heart failure are eligible for the measure prescription ACE inhibitor/ARB prescription. Chi-squared tests will be used to compare rates of compliance between individuals admitted for reasons other than heart failure and individuals specifically admitted for heart failure.

We will use cox proportional hazard models to determine the associations of quality measures with mortality during follow up. Results will be presented in both unadjusted and adjusted forms, with adjustment for important demographic and clinical characteristics. Results will then be adjusted for hospital characteristics using hierarchical models.

7.a. Will the data be used for non-CVD analysis in this manuscript? ____ Yes __X_ 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 _X_ 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.cscc.unc.edu/ARIC/search.php

__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)?

1490- Utilization of optimal medical therapy for hospitalized heart failure and outcomes: the ARIC Study.

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 at http://www.cscc.unc.edu/aric/forms/

12. 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.

1. Specifications Manual for National Hospital Inpatient Quality Measures. Available at: http://www.qualitynet.org/. Accessed November 8, 2011.
2. Bonow RO, Bennett S, Casey DE, Jr., et al. ACC/AHA Clinical Performance Measures for Adults with Chronic Heart Failure: a report of the American College of Cardiology/American Heart Association Task Force on Performance Measures (Writing Committee to Develop Heart Failure Clinical Performance Measures): endorsed by the Heart Failure Society of America. *Circulation.* Sep 20 2005;112(12):1853-1887.
3. Hernandez AF, Fonarow GC, Liang L, et al. Sex and racial differences in the use of implantable cardioverter-defibrillators among patients hospitalized with heart failure. *JAMA.* Oct 3 2007;298(13):1525-1532.
4. Fonarow GC, Abraham WT, Albert NM, et al. Organized Program to Initiate Lifesaving Treatment in Hospitalized Patients with Heart Failure (OPTIMIZE-HF): rationale and design. *Am Heart J.* Jul 2004;148(1):43-51.
5. Adams KF, Jr., Fonarow GC, Emerman CL, et al. Characteristics and outcomes of patients hospitalized for heart failure in the United States: rationale, design, and preliminary observations from the first 100,000 cases in the Acute Decompensated Heart Failure National Registry (ADHERE). *Am Heart J.* Feb 2005;149(2):209-216.
6. Dunlay SM, Redfield MM, Weston SA, et al. Hospitalizations after heart failure diagnosis a community perspective. *J Am Coll Cardiol.* Oct 27 2009;54(18):1695-1702.
7. Blecker S, Matsushita K, Fox E, et al. Left ventricular dysfunction as a risk factor for cardiovascular and noncardiovascular hospitalizations in African Americans. *Am Heart J.* Sep 2010;160(3):488-495.
8. Fang J, Mensah GA, Croft JB, Keenan NL. Heart failure-related hospitalization in the U.S., 1979 to 2004. *J Am Coll Cardiol.* Aug 5 2008;52(6):428-434.