ARIC Manuscript Proposal # 3063

PC Reviewed: 11/14/2017   **Status: _____**   **Priority: 2**
SC Reviewed: _____   **Status: _____**   **Priority: ____**

1.a. Full Title: Management and outcomes of acute myocardial infarction with inpatient vs. outpatient onset

  b. Abbreviated Title (Length 26 characters): MI with Inpatient vs. Outpatient Onset

2.   Writing Group:
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I, the first author, confirm that all the coauthors have given their approval for this manuscript proposal. __SA__ **[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: An initial analysis will be prepared for either the American Heart Association QCOR conference (January 5th abstract deadline), or the Society for Cardiac Angiography and Interventions (SCAI) conference. Following that, a more extensive analysis and manuscript will be drafted. We anticipate completing this project within 1 year of the proposal approval.

4. Rationale:

Patients experiencing onset of ST-elevation myocardial infarction (STEMI) when hospitalized for a condition other than acute coronary syndrome are less likely to undergo invasive testing or intervention and have a higher mortality rate, compared with those with onset of STEMI prior to hospitalization.[1] Although numerous quality improvement projects have been proposed for patients with an initial presentation of MI, inpatient MI has gathered attention recently due to its high mortality.[2-4] Mortality trends for patients with acute MI have been evaluated in detail, showing gradual improvement over the years which are largely attributed to standardization and improvement in revascularization techniques and medical management.[5] However, the "real world" management, revascularization, and mortality trends for patients with inpatient MI are unknown. The ARIC Community Surveillance Study is well suited to analyze this.

5. Main Hypothesis/Study Questions:

Inpatient onset MI vs. Outpatient onset MI
1. Do patients with inpatient vs. outpatient MI differ in demographics or clinical characteristics? Potential variables of interest may include age, race, sex, geographic location, insurance status, year of hospitalization, weekday vs. weekend admission, comorbid conditions, and hospital laboratory values.
2. Does medical management (beta blockers, statins, aspirin, antiplatelets) differ between the 2 groups? What are the annual trends in these guideline-directed therapies for the 2 groups?
3. Do angiography and revascularization differ between the 2 groups? What are the annual trends in angiography and revascularization for patients with inpatient vs. outpatient onset MI?
4. Does mortality (in-hospital, 28-day, and 1-year) differ for inpatient vs. outpatient onset MI? Does mortality differ between the 2 groups among the subset undergoing revascularization? What are the annual mortality trends?

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 Population
This analysis will be based on hospitalized patients with definite/probable MI sampled by the ARIC Community Surveillance. Inpatient MI will be considered MI with symptoms that initiated after hospitalization, and will be defined by variable HRAA24A. Patients missing HRAA24A will be excluded.

Analytical Plan

-All statistical analyses will be carried out using SAS Survey Procedures, and will be weighted by the inverse of the sampling probability.

-Patients will be stratified into Inpatient vs. Outpatient onset MI. Categorical variables will be compared using Rao-Scott χ^2 tests. Continuous variables will be compared by the difference in least squares means from weighted linear regression.

-Annual trends in the proportion of patients experiencing outcomes of interest will be plotted and visually assessed. If linear and monotonic, trends over time will be analyzed with Pearson correlation.

-Multivariable logistic regression models will be used to compare mortality and management outcomes, with adjustment for potential confounders.

Limitations and challenges:

-Data are limited to availability in the medical record and the abstraction priority.

-We will not be able to use the HRAA24A variable (What was the primary diagnosis or reason for admission to this hospital?), because the vast majority of patients are missing this variable. Instead, we will rely on HRAA23A (Did acute cardiac symptoms begin prior to arrival at this hospital?)

-We will not be able to conduct a propensity score matched analysis between inpatient vs. outpatient onset MI, because there is no valid way to incorporate the sampling weights into the analysis.

-We will not be able to analyze hazard ratios of mortality, because the date of death was not abstracted for the vast majority of patients. Instead, we will rely on logistic regression, with death recorded as a yes/no variable for in-hospital, 28-day, and 1-year mortality.

-We will not be able to compare length of stay between the 2 groups, because date of discharge is missing for the vast majority of patients.

-Odds ratios will overestimate relative risk for common outcomes. Because outcomes such as aspirin, beta blocker, antiplatelet, and statin use are expected to be common, the odds ratios will be converted to risk ratios.

-We will not know which type of "non-aspirin antiplatelet" was administered, nor will we know if "lipid lowering medication" denotes statins, or some other medication such as fibrates or niacin.

7.a. Will the data be used for non-CVD analysis in this manuscript? _x___ 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 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 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)?

MP085: Differences in outcomes for myocardial infarction in relation to differences in hospital medical care.
MP971: Use of invasive and noninvasive cardiac diagnostic procedures for hospitalized myocardial infarction; disparities, trends, and outcomes. The Atherosclerosis Risk in Communities Study
MP983: Impact of Insurance Status and Types on Inequities in Hospital Care of
Acute Coronary Syndrome
MP1103: Socioeconomic Characteristics and Variation in Rates and Temporal Trends in the Use of Invasive Coronary Procedures in ARIC Community Surveillance
MP999: Differences in Case Fatality Rates Following ST-elevation MI, Non-ST-
elevation MI, and Unstable Angina, 1987-2000
MP2153: Trends in incidence of hospitalized STEMI and NSTEMI and CHD mortality among 35-84 year olds in ARIC Community Surveillance 2005-2010
MP2336: Trends in Atypical Presentation of Myocardial Infarction: Atherosclerosis Risk in Communities (ARIC) Surveillance, 1987-2010

The first 4 proposals are at least 10 years old. Importantly, none of these proposals is related to out-of-hospital vs. inpatient onset MI

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/

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.

13. Per Data Use Agreement Addendum, approved manuscripts using CMS data shall be submitted by the Coordinating Center to CMS for informational purposes prior to publication. Approved manuscripts should be sent to Pingping Wu at CC, at pingping_wu@unc.edu. I will be using CMS data in my manuscript ____ Yes __x__ No.

Bibliography

1. Kaul P, Federspiel JJ, Dai X, Stearns SC, Smith SC, Jr., Yeung M, Beyhaghi H, Zhou L and Stouffer GA. Association of inpatient vs outpatient onset of ST-elevation myocardial infarction with treatment and clinical outcomes. *JAMA*. 2014;312:1999-2007.
2. Dai X, Meredith D, Sawey E, Kaul P, Smith SC, Jr. and Stouffer GA. A Quality Improvement Program for Recognition and Treatment of Inpatient ST-Segment Elevation Myocardial Infarctions. *JAMA Cardiol*. 2016;1:1077-1079.
3. Dai X, Kaul P, Smith SC Jr, Stouffer GA. Predictors, treatment, and outcomes of STEMI occurring in hospitalized patients. *Nat Rev Cardiol*. 2016;13(3):148-154.
4. Dai X, Bumgarner J, Spangler A, Meredith D, Smith SC, Stouffer GA. Acute ST-elevation myocardial infarction in patients hospitalized for noncardiac conditions. *J Am Heart Assoc*. 2013;2(2):e000004.
5. Movahed MR, John J, Hashemzadeh M and Hashemzadeh M. Mortality trends for non-ST-segment elevation myocardial infarction (NSTEMI) in the United States from 1988 to 2004. *Clin Cardiol*. 2011;34:689-92.