ARIC Manuscript Proposal # 3022

PC Reviewed: 7/11/17   **Status: _____**   **Priority: 2**
SC Reviewed: _____   **Status: _____**   **Priority: ____**

1.a. Full Title: Racial trends in the management of acute myocardial infarction: The Atherosclerosis Risk in Communities (ARIC) Surveillance Study

  b. Abbreviated Title (Length 26 characters): **Racial trends in AMI management**

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: We anticipate completing this project within 1 year of the proposal approval.

4.   Rationale:

Landmark studies in the 1980s and 1990s reported significant differences in the medical treatment of patients with coronary artery disease.[1-4] Disparities became very particularly evident in the use of cardiac catheterization, percutaneous coronary intervention and coronary artery bypass grafting.[3,5] Studies from the late 1990s and early 2000s continued to report persistent disparities between blacks and whites.[5-7] In response, several efforts to remedy racial disparities took effect.[8,9] In the last 2 decades, the American College of Cardiology/American Heart Association developed clinical practice guidelines for the management of acute coronary syndrome, with adherence to these guidelines tied to CMS reimbursements.[10,11] However, studies evaluating progress and mitigation of racial disparities in the management of acute coronary syndrome remains sparse. This is largely due to the lack of data surveying trends in management of patients with NSTEMI over the last 3-4 decades.

5.   Main Hypothesis/Study Questions:

Racial Disparities: Blacks vs. Whites
1. Among patients hospitalized with acute myocardial infarction (NSTEMI or STEMI), are there racial differences in cardiovascular risk factors (such as smoking, hypertension, diabetes, obesity, hyperlipidemia, age (>70), sex)? How have CVD risk factor trends changed over time?
2. Are there racial differences in medical therapy (aspirin, antiplatelets (including P2Y12 inhibitors), statins, beta blockers, ACEI, etc)? How have medical therapy trends changed over time? Are trends consistent after adjustment for potential confounders (comorbidities, TIMI risk score, age, sex, hospital, and geographic region)?
3. Are there racial differences in utilization of angiography and revascularization (PCI and CABG)? How have these trends changed over time? Are trends consistent after adjustment for potential confounders (comorbidities, TIMI risk score, age, sex, hospital, and geographic region)?
4. Are there racial differences in utilization of transthoracic echocardiography and stress testing? How have these trends changed over time? Are trends consistent after adjustment for potential confounders (comorbidities, TIMI risk score, age, sex, hospital, and geographic region)?
5. Are there racial differences in mortality? Do disparities in mortality persist after adjustment for angiography/revascularization? Do disparities persist after adjustment for confounders (age, race, sex, hospital, geographic location, insurance status, comorbid conditions, TIMI risk score, weekday vs. weekend admission, and presentation time to the hospital after event onset)? How have mortality trends changed 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).

This analysis will be based on hospitalized patients sampled by the ARIC Community Surveillance (1987-2013). Our study population will be limited to black and white patients classified with definite or probable NSTEMI or STEMI. All statistical analyses will be weighted by the inverse of the sampling probability.

1. The annual proportion of patients with each CVD risk factor of interest will be plotted, stratified by race. Changes in annual trends will be analyzed with Joinpoint, a free program available from NIH for the analysis of nonparametric trends. Annual, race-specific odds ratios of each CVD risk factor will be analyzed using SAS survey sample procedures, with black patients as the reference group. If annual odds ratios from 1987-2013 appear linear and monotonic, relative trends will be analyzed using Pearson correlation. If the reference group (black patients) has a large proportion of patients with the risk factor outcome of interest, then odds ratios will be converted to risk ratios (to better approximate relative risk).

2. The annual proportion of patients with each medical therapy of interest will be plotted, stratified by race. Changes in annual trends will be analyzed with Joinpoint. Annual, race-specific odds ratios of each medical therapy will be analyzed using SAS survey sample procedures, with black patients as the reference group and adjustment for potential confounders. If annual odds ratios from 1987-2013 appear linear and monotonic, relative trends will be analyzed using Pearson correlation. If the reference group (black patients) has a large proportion of patients with the medical therapy of interest, then odds ratios will be converted to risk ratios (to better approximate relative risk). Because medical therapy is not generally considered a "risk", risk ratios will be referred to as "relative probabilities".

3. The annual proportion of patients undergoing angiography or revascularization (PCI / CABG) will be plotted, stratified by race. Changes in annual trends will be analyzed with Joinpoint. Annual, race-specific odds ratios of angiography or revascularization will be analyzed using SAS survey sample procedures, with black patients as the reference group and adjustment for potential confounders. If annual odds ratios from 1987-2013 appear linear and monotonic, relative trends will be analyzed using Pearson correlation. If the reference group (black patients) has a large proportion of patients undergoing angiography or revascularization, then odds ratios will be converted to risk ratios (to better approximate relative risk). Because angiography / revascularization is not generally considered a "risk", risk ratios will be referred to as "relative probabilities".

4. The annual proportion of patients undergoing echocardiography or stress testing will be plotted, stratified by race. Changes in annual trends will be analyzed with Joinpoint. Annual, race-specific odds ratios of echocardiography or stress testing will be analyzed using SAS survey sample procedures, with black patients as the reference group and adjustment for potential confounders. If annual odds ratios from 1987-2013 appear linear and monotonic, relative trends will be analyzed using Pearson correlation. If the reference group (black patients) has a large proportion of patients undergoing echocardiography / stress testing, then odds ratios will be converted to risk ratios (to better approximate relative risk). Because echocardiography / stress testing are not generally considered a "risks", risk ratios will be referred to as "relative probabilities".

5. The annual proportion of patients dying within 28-days of hospitalization will be plotted, stratified by race. Changes in annual trends will be analyzed with Joinpoint. Annual, race-specific odds ratios of death will be analyzed using SAS survey sample procedures, with black patients as the reference group and adjustment for potential confounders. If annual odds ratios from 1987-2013 appear linear and monotonic, relative trends will be analyzed using Pearson correlation. If the reference group (black patients) has a large

proportion of patients dying, then odds ratios will be converted to risk ratios (to better approximate relative risk).

Limitations and challenges:
Data are observational and limited to availability in the medical record. For example, statins and antiplatelets weren't abstracted from the medical record until 1998. Half of the abstracted records are missing insurance status and creatinine.
The statistical tests and regression models assume independent observations, but some patients may have presented with STEMI or NSTEMI multiple times. Although the sampling design would minimize capturing the same patients multiple times, this is not something we can verify or rule out.
There is also a possibility that disparities in medical management of blacks and whites reflect disparities in regional hospital quality. The largest proportion of black patients were sampled from Jackson, Mississippi, an economically depressed region which may not have adequate facilities for coronary catheterization and revascularization. We will attempt to address this by accounting for ARIC region and possibly the hospital where care was administered.

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 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

MP2714: Prehospital delay trends and association with survival in ARIC community surveillance.

MP2935: Fifteen year trends and outcomes of early vs. late NSTEMI revasculariztion

*this manuscript proposal is from our group. With this new proposal, we will be extending the scope of Aim 1 from MP2935.

Manuscripts:

Zhang ZM, Rautaharju PM, Prineas RJ, Rodriguez CJ, Loehr L, Rosamond WD, Kitzman D, Couper D and Soliman EZ. Race and Sex Differences in the Incidence and Prognostic Significance of Silent Myocardial Infarction in the Atherosclerosis Risk in Communities (ARIC) Study. *Circulation*. 2016;133:2141-8.

*This manuscript is from the cohort population and does not address NSTEMI or STEMI specifically.

O'Brien EC, Rose KM, Suchindran CM, Sturmer T, Chang PP, Alonso A, Baggett CD and Rosamond WD. Temporal trends in medical therapies for ST- and non-ST elevation myocardial infarction: (from the Atherosclerosis Risk in Communities [ARIC] Surveillance Study). *Am J Cardiol*. 2013;111:305-11.

*This manuscript does not address temporal trends in racial disparities.

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.

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3. Wenneker MB, Epstein AM. Racial inequalities in the use of procedures for patients with ischemic heart disease in Massachusetts. JAMA 1989;261:253-257
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8. Smedley BD, Stith AY, Nelson AR, eds. Unequal treatment: confronting racial and ethnic disparities in health care. Washington, D.C.: National Academy Press, 2003.
9. Department of Health and Human Services. Healthy People 2010: understanding and improving health. 2nd ed. Washington, D.C.: Government Printing Office, 2000.
10. Bradley EH , Nallamothu BK , Herrin J , et al. National efforts to Improve door-to-balloon time: results from the Door-to-Balloon Alliance. *J Am Coll Cardiol*. 2009;**54**:2423–2429.
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