ARIC Manuscript Proposal # 963

PC Reviewed: 09/10/03	**Status: A**	**Priority: 2**
SC Reviewed: 09/11/03	**Status: A**	**Priority: 2**

1.a. Full Title: Update in Trends of Severity of Hospitalized Myocardial Infarction: The ARIC Study, 1987-2000

b. Abbreviated Title (Length 26 characters): Trends in Severity of MI

2. Writing Group (list individual with lead responsibility first):

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Writing group members: W Rosamond (senior author), P Sorlie, DC Goff; other interested ARIC investigators

3. Timeline: Data Analyses: August-November 2003 (already in progress); writing: November 2003- March 2004

4. Rationale: Mortality rates for coronary artery disease (CAD) are declining (*AHA* 2003) however incidence rates have been relatively unchanged overall with rates for some groups such as African-American (AA) men increasing (*Rosamond,* preliminary analysis 2002). The reason for this seemingly contrary finding are unclear. Possible reasons include better hospital management, improvement in time to treatment, better primary prevention, and decreases in severity of the myocardial infarction (MI) of those hospitalized.

Recent years have brought marked changes in the care of acute MI patients and those with risk factors for CAD. This suggests a positive impact on the severity of disease and mortality rates. Examples of change are greater use of statin drugs, both inpatient and outpatient. Beta-blockers, anti-platelet agents, and ACE Inhibitors are now routinely prescribed to cardiac patients. Thrombolytics are widely used and procedures such as angioplasty and stent placement have become standard o f care.

While many reports have looked at changes in mortality; fewer have investigated or tried to explain changes in incidence. Many existing studies were based on earlier data before the advances noted above were part of routine care. Goff et al. (*Goff* 2000) looked at data in the ARIC study from 1987 to 1994. He found mixed support for a decrease in severity. Hemodynamic factors were stable, EKG indicators were worse, enzymatic indicators improved, and number of cases with cardiogenic shock declined.

While the ARIC study is a representative and high quality source of CHD surveillance data, there were inherent difficulties in assessing the severity of MI. The severity indicators included may not have accurately reflected the disease status. The investigators did not account for delay in time to treatment. Age was limited to 35 – 74 years. The authors did, however, control for use of thrombolytic therapy in examining trends.

Hellermann et al. looked at hospital admissions for MI from 1983 to 1994 in Olmstead Country, Minnesota (*Hellermann* 2002) These data support a decline in severity of MI. Hemodynamic status (using Killip class) improved as did EKG data and enzyme values. They also found that time from onset of symptoms to first EKG.

Less is known regarding gender and race issues. Goff (*Goff* 2000) found different trends for Whites in one community with regard to abnormal enzymes (increased prevalence), new major Q waves (increased prevalence), and meeting criteria for definite MI (decreased prevalence), but felt that these could reflect geographic differences as opposed to true racial differences. There was one interaction with gender; the decrease in meeting criteria for abnormal enzymes was not as great in women as in men. In the Hellermann paper, both men and women showed similar patterns in decline of indicators. Women represented 43% of the population studied (*Hellermann* 2002).

ARIC surveillance data has now been obtained through the year 2000. A preliminary analysis suggests a decline in severity (*Rosamond,* preliminary data, 2002). The change in biomarkers from CK and CK-MB to Troponin has been noted and adjusted for. Use of B-Blockers, anti-platelet agents, and ACE Inhibitors was also accounted for. Many more patients have undergone intervention such as angioplasty and stent placement for acute MI. This update of ARIC data will allow for a more complete examination of the changes in mortality and incidence of CAD.

5. Main Hypothesis/Study Questions:

1. MI severity is declining with time and this is associated with reduced case-fatality rate
2. The observed trends are similar in magnitude and direction in subgroups defined by community, sex and race

6. Data (variables, time window, source, inclusions/exclusions):

1. Community surveillance data on MI severity collected from 1994 to 2000 will be added to that collected from 1987 to 1994. Methods will be similar to that outlined in the paper by Goff (*Goff* 2002) and include men, women, Whites and AA; Ages 35 to 74.
2. Inclusions: Patients hospitalized that met criteria for definite or probable MI.
3. As in the Goff analysis, there will be information on the following indicators of severity: hemodynamics, EKG, enzymes, heart failure, and cardiogenic shock.
4. Severity will also be evaluated by a modification of the *PREDICT* score. The *PREDICT* system is based on information routinely gathered in hospitalized patients with MI or unstable angina. This score reflects severity of the event (*Jacobs* 1999, *Weintraub* 2002). Dr. Rosamond has adjusted this scoring system to better reflect the patients and data obtained in the ARIC population.

5. Data will be collected on:
    1. medication use including statins and other lipid-lowering medication, B-Blockers, anti-platelet agents, and ACE inhibitors.
    2. risk factors for CAD.
    3. use of thrombolytics, angioplasty/stent, and surgical procedures
6. Both CK/CK-MB and Troponin values will be recorded. A current ARIC paper has looked at the impact the change in biomarkers has had.
7. Time to treatment will be ascertained. This will include time from onset of symptoms to first EKG and to treatment.
8. Characteristics of out-of-hospital deaths will be noted.
9. Power to make comparisons and to address trends in data will be adequate based on numbers and analyses in the previous examination (*Goff* 2000). Analyses will include regression modeling of temporal trends to examine the following questions: are the trends linear, if not is there evidence for flattening; are there differences in trends between subgroups defined by community, sex, and race/ethnicity?
10. Limitations: Determination of severity may be limited by missing/inadequate data.

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 ICTDER02 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 ICTDER02 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 ICTDER02 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://bios.unc.edu/units/cscc/ARIC/stdy/studymem.html

___X___ Yes _____ No
This manuscript extends on the work of *Goff, et al.* 2000 with intended overlap. The manuscript proposals listed below have related material that will clarify information in this manuscript.

Manuscript proposal #725, *McNeill, et al 2000,* entitled "Prognosis of Hospitalized Myocardial Infarction According to the Degree of Myocardial Injury Assessed by Biochemical Markers and Other Risk Indicators, is looking more specifically at risk of mortality with MI severity. The overlap should be minimal.

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)?
85 *Medical Care and Survival,* Rosamond
#395 *Trends in Medication/procedure use,* Rosamond
#531 *Trends in Pre-hospital Delay Time,* McGinn
#713 *Troponin and Event Trends,* Rosamond
#892 *Methods for Adjusting Rates for Biomarkers,* Wang
#550 *Trends in Angiography*

11. **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.**
References:

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Goldberg RJ, Yarzebski J, Lessard D, et al. A Two-decades (1975-1995) long experience in the incidence, in-hospital and long-term case-fatality rates of acute myocardial infarction: a community-wide perspective. *J Am Coll Cardiol*1999;33:1533-1539

Goldberg RJ. Monitoring trends in severity of acute myocardial infarction: challenges for the next millennium. *Am Heart J* 2000;139:

Goff DC, Howard G, Wang, C-H. Trends in severity of hospitalized myocardial infarction: the Atherosclerosis Risk in Communities (ARIC) study, 1987-1994. *Am Heart J* 2000;139:874-880.

Hellermann JP, Reeder GS, Jacobsen SJ, et al. Longitudinal trends in the severity of acute myocardial infarction: a population study in Olmstead County, Minnesota. *Am J Epidemiol* 2002;156:246-253.

Jacobs DR, Kroenke C, Crow R, et al. PREDICT: A simple risk score for clinical severity and long-term prognosis after hospitalization for acute myocardial infarction or unstable angina: the Minnesota Heart Survey. *Criculation* 1999;100:599-607.

Rosamond, W. Preliminary data analysis, ARIC 1987-2000. Presented to the ARIC Policy Board, 2002.

Spencer FA, Meyer TE, Goldberg RJ, et al. Twenty year trends (1975-1995) in the incidence, in-hospital and long-term death rates associated with heart failure complicating acute myocardial infarction. *J Am Col Cardiol* 1999;34:1378-1387.

Weintraub WS. Prediction scores after myocardial infarction *Circulation* 2002;106:2292-2293.

Whittle J, Conigliaro J, Good BC, et al. Black-white differences in severity of coronary artery disease among individuals with acute coronary syndromes. *J Gen Intern Med* 2002;17:876-882.