ARIC Manuscript Proposal #1901

PC Reviewed: 2/14/12  Status: A  Priority: 2
SC Reviewed: _________  Status: _____  Priority: ____

1.a. Full Title: Care Transitions and Early Follow-up After Myocardial Infarction

b. Abbreviated Title (Length 26 characters): Outcomes Research in ARIC

2. Writing Group: Writing group members:

Sally Stearns
Jeff Federspiel
Mark Holmes
Patricia Chang
Anna Kucharska-Newton

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

First author: Sally Stearns
Professor, Department of Health Policy and Management
1104C McGavran-Greenberg, CB #7411
The University of North Carolina at Chapel Hill
Chapel Hill, NC 27599-7411

Best e-mail: sally_stearns@unc.edu
Phone: (919) 843-2590
Fax: (919) 966-6961

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).

Name: Mark Holmes
Address: 1104B McGavran-Greenburg
        Campus Box 7411
        Chapel Hill, NC 27599-7411

Phone: (919) 966-0202        Fax: (919) 966-6961
E-mail: mark_holmes@unc.edu

3. Timeline: One year. May submit to:
4. Rationale:

Transitions from hospital to home have been perceived as a time of high vulnerability for Medicare beneficiaries with acute or chronic illnesses. Hospital readmissions after acute myocardial infarction (AMI) are considered by the Medicare program to be an important quality measure, and much research has been undertaken to explain the large facility-level variation in AMI readmission rates seen in the United States.\textsuperscript{1-3} Recent efforts, such as the “The Hospital to Home” initiative,\textsuperscript{4} have been established to try to improve the transition to ambulatory care for individuals hospitalized with cardiovascular disease.

Objective evidence about the effect of early ambulatory follow-up on patient outcomes for patients admitted for AMI is limited. Several studies have looked at the effects of follow-up care received by elderly adults following hospitalization for AMI. Ayanian and colleagues used Medicare claims combined with inpatient medical record data to assess the association between seeing a cardiologist, a generalist, or both within three months after discharge myocardial infarction and mortality within two years among elderly patients.\textsuperscript{5} This study showed decreased mortality for persons seeing a cardiologist, and a further reduction in mortality for persons who saw a generalist as well as a cardiologist. Daugherty and colleagues used data on 1,516 patients to assess the relationship between early follow-up (defined as seeing a cardiologist or primary care physician within one month) and medication use at six months after discharge from AMI.\textsuperscript{6} This study found no effect of early follow-up on medication use; although precision could be an issue given the small sample, Ayanian and colleagues also assessed medication use at 18 months as an outcome and found no effect of physician follow-up within three months.

One issue that may affect the likelihood, type, and value of early follow-up pertains to continuity of care. Being discharged from a hospital is a challenging transition for many elderly patients. The rate at which hospitalized Medicare beneficiaries saw the same physician during an inpatient stay and the year prior to the stay decreased significantly from 1996 to 2006,\textsuperscript{7} most likely due to increased use of hospitalists. While hospitalists may decrease continuity of care for some patients, patients admitted for AMI may often see a cardiology hospitalist and experience improved outcomes, at least during the hospital stay. An analysis of the effect of hospitalist versus non-hospitalist care showed improvements in hospital quality indicators for patients with AMI and pneumonia as well as dimensions of treatment, diagnosis, counseling and prevention, though improvements in quality were not found for patients with heart failure.\textsuperscript{8}
These prior studies provide important evidence but also have limitations, most of which are acknowledged by the authors. First and foremost is the issue that estimates from studies of patient outcomes may be biased by treatment selection on unobserved variables. Ayanian and colleagues used a propensity score approach and tested for (and found no evidence of) effects of unobserved variables, but they caution their results still should be interpreted as associations. Furthermore, while Ayanian and colleagues allowed for heterogeneity of treatment effect and found that the absolute reduction in mortality was greatest for persons with the lowest propensity to see a cardiologist, these estimates still only controlled for observed variables.

Instrumental variables (IV) can provide an alternative approach to estimating the effect of early ambulatory follow-up for MI, one that is robust to the presence of unmeasured factors that confound the relationship between treatment choice and outcome. Historically, IV analyses have been limited to estimating a local average treatment effect, which is the effect of the treatment on an unidentifiable “marginal” population of patients. If the treatment effect differs among patients (i.e., if treatment effects are heterogeneous), the local average treatment effect may not be a particularly useful parameter. To address treatment selection and treatment heterogeneity, we propose to use the method of local instrumental variables (LIV), a novel econometric technique that allows for the estimation of useful parameters (such as the average treatment effect and effects of treatment on the treated and untreated populations) while using IV.9-11

5. Main Hypothesis/Study Questions:

Descriptive assessment: Patterns of physician care and follow-up:

1. To what extent do patients hospitalized for AMI see the same physicians before (year prior), during and after (within one month of) hospitalization?
2. What percent of patients see a cardiologist, generalist, or both within one month of discharge?
3. What patient, provider and area characteristics are associated with a patient seeing a cardiologist within 1 month of discharge?

Outcomes assessment: Controlling for physician use prior to and during hospitalization, what is the effect of early follow-up within one month by a cardiologist on:

4. Medication use (beta-blockers, statins, and ACE/ARB) at 6 months?
5. Mortality at 6 months and 2 years following discharge?
6. 6 month and 2 year rates of hospital readmission for AMI?
7. Secondary outcomes: ED Visits for angina, use of noninvasive testing (echo, stress testing)
The above analyses will all control for treatments received during the index hospitalization (e.g., revascularization).

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).

Design: Observational cohort study, with one observation constructed per ARIC Cohort members hospitalized for onset AMI, 2006-2009.

- Use hospitalization data prior to 2006 to ensure onset AMI
- Medication assessment must be limited to persons on Part D, though all patients will be included in the assessment of other outcomes (readmissions and mortality)

Instrumental variables: The percentage of all AMI patients discharged from either a particular facility or, preferably, under a particular supervising physician who received early follow-up (visits within 30 days of AMI discharge). Only patients who survived 30 days post-discharge will count in the calculation. This variable will be calculated using the Medicare claims obtained for the full ARIC communities rather than just the cohort Medicare claims so that we are characterizing as much of the provider’s experience as possible. (Data for non-Medicare patients will not be available.) We anticipate calculating this variable over the full time period (2006-2009) for each physician, though if AMI admission frequency is sufficient in the sample, we can calculate the variable at more disaggregated time intervals (e.g., annually). At a minimum, we will do split sample validation by comparing the rates for 2006-2007 versus 2008-2009.

The local instrumental variables (LIV) approach will be implemented by estimating two equations:

- A propensity score equation, where the dependent variable is a dichotomous indicator of whether a patient received early follow-up by a cardiologist. This choice is modeled as a function of observed patient and facility characteristics as well as rate at which all patients under the care of a particular physician during the hospital stay receive early follow-up. (This variable is hypothesized to affect the likelihood that a particular patient will get early follow-up but not to affect the subsequent health service use and outcome measures.)

- An outcome equation estimated using the method of LIV to control for treatment selection and identify treatment heterogeneity. (Identification is achieved by the exclusion of the supervising hospital physician-specific rate of early follow-up from the outcome equation.)
Tentatively, the estimation will use hospital fixed effects to control for all observed and unobserved hospital characteristics in both equations. The estimation is contingent on having sufficient between-physician variation (for the supervising hospital physicians in a particular hospital) in rates of early follow-up for AMI patients. Should the variation in the rate of between-physician early follow-up be insufficient but the total number of hospitals be deemed sufficient, we will explore the use of hospital-specific rates of early follow-up instead. The main idea is to use provider (supervising inpatient physician or hospital) variation in follow-up to identify the effect of early follow-up for a particular patient.

In total, this analysis is intended to provide an improved assessment of the effect of early follow-up by a cardiologist for elderly persons hospitalized for onset AMI. The analysis will also provide a descriptive assessment of the use of physician care prior to, during and after hospitalization for onset AMI.

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.cscc.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)?
No ARIC manuscript proposals use the local instrumental variables, which is a major focus of this manuscript proposal. There is some overlap with other work on continuity of care, as indicated below.

Manuscript #1799, 1826 (Lead Author: Anna Kucharska-Newton; Continuity of Care – ARIC cohort or surveillance) and MS #1844 (Lead Author: Anna Kucharska-Newton; Collaborative Care). These manuscripts study heart failure patients, not AMI. Anna also recently submitted an ancillary study proposal (AS 2012.07) to address continuity of care among AMI patients, and the development of physician visit measures for the currently proposed manuscript (which involves Anna as a co-author) should support that work if funded.

11. a. Is this manuscript proposal associated with any ARIC ancillary studies or use any ancillary study data?   ___ Yes   ___ 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.


