Preinfarct Health Status and the Use of Early Invasive Versus Ischemia-Guided Management in Non–ST-Elevation Acute Coronary Syndrome

Mohammed Qintar, MD[a,b,*], Kim G. Smolderen, PhD[a,b,c], Paul S. Chan, MD[a,b], Kensey L. Gosch, MS[a], Philip G. Jones, PhD[a,b], Donna M. Buchanan, PhD[a,b], Saket Girotra, MD[d], and John A. Spertus, MD, MPH[a,b]

Early invasive management improves outcomes in non–ST-elevation myocardial infarction (NSTEMI). The association between preinfarct health status and the selecting patients for early invasive management is unknown. The Prospective Registry Evaluating outcomes after Myocardial Infarctions: Events and Recovery and Translational Research Investigating Underlying disparities in acute Myocardial infarction Patients' Health status are consecutive US multicenter registries, in which the associations between preinfarct angina frequency and quality of life (both assessed by the Seattle Angina Questionnaire on admission) and the Global Registry of Acute Coronary Events (GRACE) risk score and referral to early invasive management (coronary angiography within 48 hours) were evaluated using Poisson regression, after adjusting for site, demographics, and clinical and psychosocial variables. Of 3,768 patients with NSTEMI, 2,182 (57.9%) patients were referred for early invasive treatment. Patients with excellent, good, or very good baseline angina-specific quality of life, respectively, were more likely to receive early angiography, even after adjustment, as compared with patients reporting poor baseline quality of life because of angina (62.1.0%, 60.9%, 59.6%, vs 51.2%; adjusted relative risk [RR] = 1.09, 95% confidence interval [CI] 1.04 to 1.16; RR = 1.13, 95% CI 1.01 to 1.27; RR 1.14, 95% CI 0.99 to 1.31, respectively). Finally, patients with a GRACE score in the highest risk decile (199.5 to <321.4) had significantly lower rates of early invasive treatment (42.7%) than patients in the lowest decile of risk (67.6%; adjusted RR for continuous GRACE score per SD [1 SD = 40 points], 0.96, 95% CI 0.92 to 0.99, p = 0.019). In conclusion, in this real-world NSTEMI cohort, patients with the highest mortality risk and worst health status were less likely to be referred for early invasive management. Further work is needed to understand the role of preinfarct health status and in-hospital treatment strategy. **(Am J Cardiol 2017;120:1062–1069)**

Despite evidence that patients with non–ST-elevation myocardial infarction (NSTEMI) with the greatest mortality risk benefit most from an invasive strategy,[1] many studies have documented that higher risk patients are less often managed invasively.[2–5] Given that patients with significant angina before an NSTEMI also have more angina afterward,[6] it would be clinically logical to pursue a more aggressive treatment strategy in those with worse preinfarct angina (PIA) and angina-related quality of life. In fact, PIA, that is, angina episodes preceding the onset of acute myocardial infarction (AMI), occurs in almost half of patients presenting with NSTEMI,[7,8] and a previous study has suggested that it is associated with higher rates of significant coronary artery disease.[8] Moreover, recent data suggest that an invasive strategy for NSTEMI was associated with significantly better 30-day health status in patients with PIA.[9] However, no data currently exist to describe the patterns of selecting patients for an invasive treatment strategy in the setting of NSTEMI as a function of their preinfarct health status. To address this gap in knowledge, we leveraged 2 sequential, prospective, multicenter, post-AMI registries in the United States to examine the association of PIA, quality of life, and mortality risk with treatment strategy for patients presenting with NSTEMI.

Methods

We leveraged 2 consecutive, multicenter, prospective AMI registries in the United States— Prospective Registry Evaluating outcomes after Myocardial Infarctions: Events and Recovery (PREMIER) and Translational Research Investigating Underlying disparities in acute Myocardial infarction Patients' Health status (TRIUMPH)—that consecutively enrolled patients between 2003 and 2008 from 32 academic and nonacademic centers (Figure 1 and Appendix S1 for List of Sites). The design of both studies has been previously described.[10,11] In both registries, patients were enrolled if they were aged 18 years or older, had biomarker evidence of myocardial injury, and presented with supporting evidence of an

[a]Saint Luke's Mid America Heart Institute, Kansas City, Missouri; [b]University of Missouri—Kansas City, Kansas City, Missouri; [c]Ghent University, Ghent, Belgium; and [d]University of Iowa, Iowa City, Iowa. Manuscript received April 4, 2017; revised manuscript received and accepted June 15, 2017.

See page 1068 for disclosure information.

*Corresponding author: Tel: +1 (816) 932 8270; fax: +1 (816) 932 5613.
E-mail address: qintarm@umkc.edu (M. Qintar).

0002-9149/
http://dx.doi.org/10.1016/j.amjcard.2017.06.045

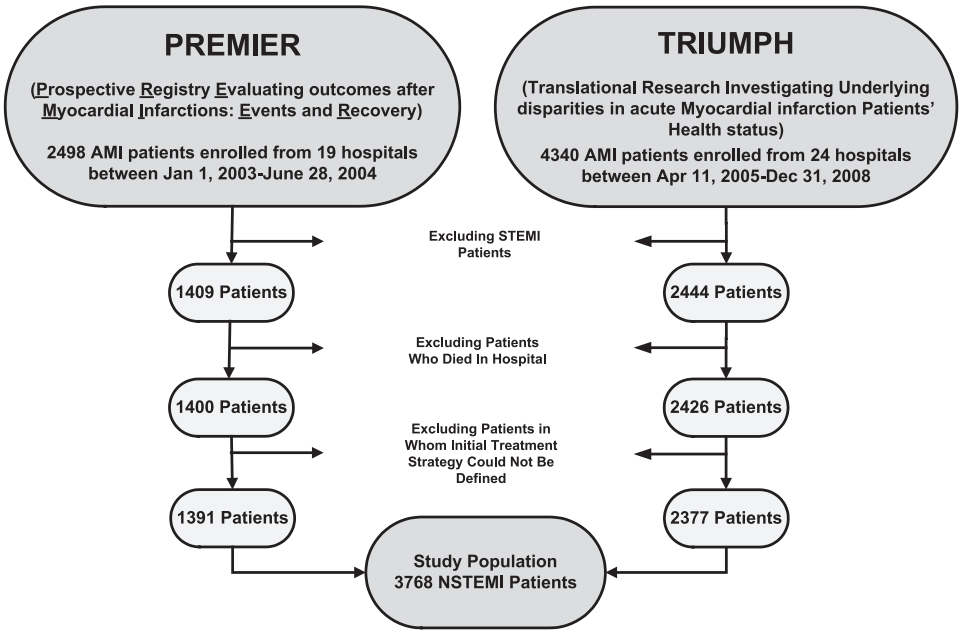

Figure 1. Flowchart of the study population consisting of patients with NSTEMIs enrolled from the observational, multicenter, prospective PREMIER and TRIUMPH registries. NSTEMI = non–ST-elevation myocardial infarction; PREMIER = Prospective Registry Evaluating outcomes after Myocardial Infarctions: Events and Recovery; STEMI = ST-elevation myocardial infarction; TRIUMPH = Translational Research Investigating Underlying disparities in acute Myocardial infarction Patients' Health status.

AMI, including prolonged ischemic symptoms or electrocardiographic ST changes. Patients who were incarcerated, who refused participation, were unable to provide informed consent, did not speak English or Spanish, and those who expired during hospitalization before they could consent to participate in the study were excluded. All participants provided written informed consent, and the study protocols were approved by the institutional review board at each enrolling center.

A total of 3,853 patients with NSTEMI (1,409 from PREMIER, 2,444 from TRIUMPH) were identified; patients who died in hospital were excluded (Figure 1), leaving a final study cohort of 3,819 patients.

In both the PREMIER and the TRIUMPH studies, patients' medical history, clinical characteristics of their index AMI admission, in-hospital treatment, laboratory results, use and timing of catheterization, and discharge diagnoses were collected through chart abstraction by trained study coordinators. Patient-centered information (demographics, tobacco use, socioeconomic factors, health status, and psychosocial factors) was obtained through standardized in-depth interviews performed by trained research staff within 24 to 72 hours of admission. Patient data included demographics (age, sex, race [black race, other race vs white race]), socioeconomic factors (marital status [married vs not], education [completed high school education or higher vs not], employment status [working part- or full-time vs not], health insurance information [insurance vs no insurance], avoidance of care because of cost),[12] medical history (hypercholesterolemia, hypertension, peripheral arterial disease, diabetes mellitus, previous AMI, percutaneous coronary interventions [PCI], coronary artery bypass grafting [CABG], stroke, chronic kidney disease, chronic lung disease, chronic heart failure, current smoking, body mass index [defined as weight in kilogram/squared height in meter], cancer, family history of coronary artery disease), and clinical characteristics of AMI admission (left ventricular function [mild, moderate, severe left ventricular dysfunction vs normal left ventricular function], Killip's classifiation, acute heart rate [beats/min], acute systolic and diastolic blood pressure [mm Hg], initial hematocrit [%], platelet count [$\times 10^3/\mu l$], creatinine [mg/dl], maximum troponin [μg/L], the presence of an ST segment depression as obtained from the initial electrocardiogram). Additionally, information on whether the patient was transferred to the enrolling facility or not, the presence of a cardiac arrest within the past 6 hours of admission or other concomitant acute noncardiac conditions warranting admission (i.e., gastrointestinal bleeding or pneumonia),[13] and whether the patient presented at the hospital during a weeknight or weekend as opposed to a weekday (off-hours presentation) were collected.

The primary outcome was whether patients were referred to an early invasive management strategy. This was defined as referral for coronary angiography followed by revascularization, if possible, within ≤48 hours following index AMI admission without having had a previous stress test. The reference group of ischemia-guided strategy (conservatively managed) was defined by those patients who were initially treated with pharmacologic therapy, and angiography or revascularization was used only for those with recurrent symptoms or evidence of inducible ischemia on noninvasive testing (>48 hours following admission). If patients had a noninvasive stress test before their angiogram, even if catheterization was performed within 48 hours, patients were also categorized as ischemia-guided strategy. The treating physician made decisions regarding the referral for invasive management or not.