Care and Outcomes of Asian-American Acute Myocardial Infarction Patients: Findings From the American Heart Association Get With The Guidelines-Coronary Artery Disease Program

Feng Qian, MD, PhD; Frederick S. Ling, MD; Prakash Deedwania, MD; Adrian F. Hernandez, MD, MHS; Gregg C. Fonarow, MD; Christopher P. Cannon, MD; Eric D. Peterson, MD, MPH; W. Frank Peacock, MD; Lisa A. Kaltenbach, MS; Warren K. Laskey, MD; Lee H. Schwamm, MD; Deepak L. Bhatt, MD, MPH; on behalf of the Get With The Guidelines Steering Committee and Investigators

Background—Asian-Americans represent an important United States minority population, yet there are limited data regarding the clinical care and outcomes of Asian-Americans following acute myocardial infarction (AMI). Using data from the American Heart Association Get With The Guidelines-Coronary Artery Disease (GWTG-CAD) program, we compared use of and trends in evidence-based care AMI processes and outcome in Asian-American versus white patients.

Methods and Results—We analyzed 107,403 AMI patients (4412 Asian-Americans, 4.1%) from 382 United States centers participating in the Get With The Guidelines-Coronary Artery Disease program between 2003 and 2008. Use of 6 AMI performance measures, composite “defect-free” care (proportion receiving all eligible performance measures), door-to-balloon time, and in-hospital mortality were examined. Trends in care over this time period were explored. Compared with whites, Asian-American AMI patients were significantly older, more likely to be covered by Medicaid and recruited in the west region, and had a higher prevalence of diabetes, hypertension, heart failure, and smoking. In-hospital unadjusted mortality was higher among Asian-American patients. Overall, Asian-Americans were comparable with whites regarding the baseline quality of care, except that Asian-Americans were less likely to get smoking cessation counseling (65.6% versus 81.5%). Asian-American AMI patients experienced improvement in the 6 individual measures ($P < 0.048$), defect-free care ($P < 0.001$), and door-to-balloon time ($P < 0.001$). The improvement rates were similar for both Asian-Americans and whites. Compared with whites, the adjusted in-hospital mortality rate was higher for Asian-Americans (adjusted relative risk: 1.16; 95% confidence interval: 1.00–1.35; $P < 0.04$).

Conclusions—Evidence-based care for AMI processes improved significantly over the period of 2003 to 2008 for Asian-American and white patients in the Get With The Guidelines-Coronary Artery Disease program. Differences in care between Asian-Americans and whites, when present, were reduced over time. (Circ Cardiovasc Qual Outcomes. 2012;5:126-133.)

Key Words: Asian-Americans • acute myocardial infarction • quality of care • outcomes

Racial and ethnic disparities in cardiovascular care have been documented well in the literature.1–7 Compared with white patients, minority patients are found to be treated at hospitals with lower adherence to composite quality measures, and thus are less likely to receive evidence-based care.8–10 It is suggested that quality improvement programs can enhance a hospital’s adherence to practice guidelines and patients’ outcomes. A recent study of white, black, and Hispanic patient populations demonstrated that evidence-based care for acute myocardial infarction (AMI) improved...
continuously for different racial and ethnic groups. However, little is known about the clinical experience and outcomes of Asian-American AMI patients, although Asian-Americans represent an important minority population and are one of the fastest growing racial/ethnic groups in the United States. Such gaps in the existing literature have resulted in the American Heart Association’s (AHA) call to action in August 2010 to address these areas of need. In addition, a national health agenda for Asian-Americans also was advocated strongly in the commentary of the September 22/29 2010 issue of Journal of the American Medical Association. In the present study, we sought to (1) evaluate the use of evidence-based care processes and outcomes in Asian-American compared with white AMI patients during the entire study period, and (2) examine temporal trends in the use of evidence-based care processes and outcomes in Asian-American compared with white AMI patients among hospitals participating in the AHA Get With The Guidelines-Coronary Artery Disease (GWTG-CAD) program from 2003 to 2008.

WHAT IS KNOWN
- Racial and ethnic disparities in cardiovascular care have been documented well in prior studies for African-American and Hispanic patients.
- The American Heart Association Get With The Guidelines-Coronary Artery Disease program has been suggested to improve evidence-based care for acute myocardial infarction for African-American and Hispanic patients.
- However, little is known about the clinical experience and outcomes of Asian-American acute myocardial infarction patients, although Asian-Americans represent an important minority population and are one of the fastest growing racial/ethnic groups in the United States.

WHAT THE STUDY ADDS
- The present study suggests that compared with whites, Asian-American AMI patients were significantly older and were more likely to have cardiovascular risk factors and comorbid conditions including diabetes, hypertension, heart failure, or smoking.
- Asian-American acute myocardial infarction patients had higher in-hospital mortality than whites, though after adjustment for measured risk factors this excess risk was attenuated.
- Evidence-based care for acute myocardial infarction improved substantially and equitably over the period of 2003 to 2008 for Asian-American and white patients in the Get With The Guidelines-Coronary Artery Disease Program.

Methods

Study Population
We used the AHA GWTG-CAD database, a national, prospective, observational registry and quality improvement initiative established by the AHA as a collaborative effort among researchers, professional organizations, and hospitals to provide feedback on performance and strategies to improve the care of patients with coronary artery disease (CAD). The details of the GWTG-CAD program have been described in previous publications. In brief, the GWTG-CAD program includes learning sessions, didactic sessions, best practice sharing, interactive workshops, and post meeting follow-up, and a web-based interactive Patient Management Tool (Outcome Sciences Inc, Cambridge, MA). This web-based tool provides the opportunity for concurrent data collection, ongoing real-time feedback of hospital data, and clinical decision support to enable rapid cycle improvement. As an incentive, GWTG-CAD rewards hospitals using a performance recognition program. The length of participation of each hospital depended on the time it entered the program. Because GWTG-CAD is a quality improvement program, hospitals are encouraged to enroll all eligible patients consecutively using case ascertainment techniques similar to the Joint Commission. Case finding was preferentially based on clinical identification of patients, but some hospitals used retrospective Joint Commission core measure identification with clinical verification. Teaching and nonteaching, rural and urban, large and small hospitals from all geographic areas of the United States are represented in the program. The population included patients admitted to participating hospitals who were entered into the web-based patient management tool with a discharge diagnosis of AMI. Data were collected concurrently or by chart review and included patient demographics, medical history, symptoms on arrival, in-hospital treatment and events, discharge treatment and counseling, and patient disposition.

Between January 1, 2003, and December 31, 2008, data on 256,934 patients treated for AMI, unstable angina, or CAD at 413 fully participating hospitals in the United States were available in the GWTG-CAD database. For the purpose of the present study, we excluded patients without confirmed AMI (106,539), race groups other than Asian-American or white (34,168), and patients’ admission year beyond 2008 (88,284). The final study cohort consisted of 107,403 patients enrolled at 382 sites.

Objectives and Outcome Measures
The major goals of this study were to compare use of evidence-based care processes and outcomes in Asian-American versus white AMI patients and to investigate temporal trends in the use of evidence-based care processes and outcomes in Asian-American versus white AMI patients based on the GWTG-CAD dataset (2003–2008). The 6 performance measures considered in the GWTG-CAD program were: (1) use of angiotensin-converting enzyme inhibitors or angiotensin receptor blockers in patients with documented left ventricular systolic dysfunction, (2) use of aspirin at discharge, (3) use of beta blockers at discharge, (4) smoking cessation counseling, (5) use of lipid-lowering therapy in patients with low density lipoprotein cholesterol >100 mg/dL, and (6) use of aspirin within 24 hours of admission. The composite performance measure of “defect-free care” was defined as the proportion of patients who received all 6 of the GWTG-CAD program’s performance measures for which they were eligible. According to the GWTG-CAD program, the 2 quality measures included (1) the proportion of door-to-balloon time ≤90 minutes, and (2) the proportion of door-to-thrombolysis time ≤30 minutes. The latter quality measure (ie, door-to-thrombolysis time) was not included in the present study because of very few eligible Asian-American patients. The outcome measure was inhospital mortality rate.

Statistical Analyses
The descriptive analyses included comparisons between Asian-American and whites for demographics, comorbidities, baseline clinical characteristics, clinical performance measures, quality measure, invasive procedures, and in-hospital mortality. Categorical variables are presented as percentages and were compared with Pearson χ² tests. Continuous and ordinal variables are presented as medians with 25th and 75th percentiles and were compared using the Kruskal-Wallis test.
To examine the association between Asian-American versus whites and aforementioned measures, we estimated relative risks using multivariable Poisson regression with generalized estimating equations. Poisson regression may be used as an alternative to logistic regression to estimate relative risks when the event rate is not rare (\(>10\%\)). We used Poisson regression because we prefer reporting relative risks instead of odds ratios. The generalized estimating equations method also accounts for within-hospital clustering, because patients at the same hospital are more likely to have similar responses relative to patients in other hospitals. Regression models were adjusted for age, gender, insurance type, comorbidities (chronic obstructive pulmonary disease or asthma, diabetes, hyperlipidemia, hypertension, peripheral artery disease, cerebrovascular accident/transient ischemic attack, heart failure, and renal insufficiency), smoking status, region, hospital characteristics (teaching hospital status, number of beds), time (in calendar quarters), and time in program. In all models we tested for interactions between trends over time (in calendar quarters) and race and found none of the interactions to be significant (smallest probability value 0.328). Because we had no evidence to support differences in trends by race, we chose to present the models without interactions. We presented unadjusted proportions of the performance, quality, and outcome measures separately by race for the first and last years of our study period. We fit a Poisson regression model with generalized estimating equations stratified by race to test for trends over calendar time. \(P<0.05\) was considered statistically significant for all tests, and all tests were 2-sided. Outcome Science is the data collection and coordination center for AHA GWTG programs. Outcomes Sciences, Inc. serves as the data collection (through their Patient Management Tool) and coordination center for GWTG. The Duke Clinical Research Institute serves as the data analysis center and has an agreement to analyze the aggregate de-identified data for research purposes. All analyses were performed with SAS software (version 9.2, SAS Institute, Cary, NC).

**Results**
The study included 107,403 patients (4,412 Asian-Americans, 4.1%) enrolled at 382 fully participating sites between January 1, 2003 and December 31, 2008. Demographic, clinical, and geographic information by Asian-American versus white patients are shown in Tables 1 and 2. Compared with whites, Asian-American patients were older, had lower body mass index, were more likely to be covered by Medicaid, were more likely to be recruited in the west region, and were more likely to have a higher prevalence of diabetes (either insulin treated or noninsulin treated), hypertension, cerebrovascular accident/transient ischemic attack, heart failure, anemia, diabetes-insulin treated, renal insufficiency, and smoking. We found that Asian-American patients with no prior history of myocardial infarction (n=3740) had a median age of 71, while the median age of similar white patients (n=82,710) was 67 (\(P<0.0001\)). Compared with white patients, Asian-American patients sought care at smaller facilities that were more likely to be academic hospitals with lesser capabilities in providing interventional and surgical care. Asian-American patients also had faster heart rates, higher high-density lipoprotein, and lower low-density lipoprotein.

**Performance, Quality, and Outcome Measures**
Performance, quality, and outcome measures for Asian-American and white patients are displayed in Table 3. Use of aspirin within 24 hours from admission, aspirin use at discharge, and the use of beta blockers at discharge exceeded 93% in both groups. Overall, defect-free care was 82.7% for Asian-American patients and 85.2% for whites. Compared with whites, Asian-Americans had lower use of aspirin at discharge (adjusted relative risk [ARR]: 0.97, 95% confidence interval [CI]: 0.95 to 0.99, \(P<0.001\)) and of smoking cessation counseling (ARR: 0.97, 95% CI: 0.94 to 1.00, \(P=0.04\)), whereas they had higher use of lipid-lowering therapies (ARR: 1.03, 95% CI: 1.00 to 1.06, \(P=0.05\)) after adjustment for patient level characteristics along with hospital characteristics. Overall, there was no difference in receiving defect-free care (ARR: 1.00, 95% CI: 0.99 to 1.01, \(P=0.94\)) between Asian-American and white patients. Further, there was no detectable difference in the quality measure (ie, door to percutaneous coronary intervention [PCI] within 90 minutes) between the 2 groups (ARR: 0.94, 95% CI: 0.86 to 1.03, \(P=0.19\)). Multivariate regression analysis suggested that Asian-American patients were more likely to suffer in-hospital death than whites (ARR: 1.16, 95% CI: 1.00 to 1.35, \(P=0.04\)).

We found that Asian-American patients were less likely to undergo PCI procedures (6.7% versus 13.6%, \(P<0.0001\)) and

<table>
<thead>
<tr>
<th>Variables</th>
<th>Asian-American ((n=4412))</th>
<th>White ((n=102,991))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td>72 (59, 81)</td>
<td>68 (56, 79)</td>
</tr>
<tr>
<td>Body mass index, kg/m²</td>
<td>25 (21, 28)</td>
<td>28 (24, 32)</td>
</tr>
<tr>
<td>Atrial flutter, %</td>
<td>0.8</td>
<td>0.3</td>
</tr>
<tr>
<td>Diabetes-insulin treated, %</td>
<td>5.3</td>
<td>4.5</td>
</tr>
<tr>
<td>Diabetes-non-insulin treated, %</td>
<td>11.3</td>
<td>8.0</td>
</tr>
<tr>
<td>Hypertension, %</td>
<td>72.8</td>
<td>66.5</td>
</tr>
<tr>
<td>CVA/TIA, %</td>
<td>12.1</td>
<td>8.4</td>
</tr>
<tr>
<td>Heart failure, %</td>
<td>20.7</td>
<td>15.1</td>
</tr>
<tr>
<td>Anemia, %</td>
<td>4.6</td>
<td>2.2</td>
</tr>
<tr>
<td>Dialysis (chronic), %</td>
<td>6.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Renal insufficiency, %</td>
<td>14.7</td>
<td>9.0</td>
</tr>
<tr>
<td>Smoking, %</td>
<td>0.8</td>
<td>0.7</td>
</tr>
<tr>
<td>Payment source, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>13.3</td>
<td>4.7</td>
</tr>
<tr>
<td>Medicare</td>
<td>45.8</td>
<td>44.8</td>
</tr>
<tr>
<td>Other</td>
<td>45.1</td>
<td>47.7</td>
</tr>
<tr>
<td>Uninsured</td>
<td>7.1</td>
<td>7.8</td>
</tr>
<tr>
<td>Region, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>West</td>
<td>77.4</td>
<td>16.2</td>
</tr>
<tr>
<td>South</td>
<td>7.9</td>
<td>34.0</td>
</tr>
<tr>
<td>Midwest</td>
<td>8.3</td>
<td>28.0</td>
</tr>
<tr>
<td>Northeast</td>
<td>6.4</td>
<td>21.9</td>
</tr>
</tbody>
</table>

Continuous variables are expressed as median (25th, 75th percentile).
All P values were <0.0001.
CVA indicates cerebrovascular accident; TIA, transient ischemic attack; PCI, percutaneous coronary intervention.
were improvements in all performance and quality measures for both Asian-Americans and whites. However, we did not detect significant improvement of in-hospital death for both racial groups. Defect-free care improvement by calendar time (calendar quarter) was also examined. As shown in Figure, there is a steady increase over time in the proportion of patients receiving defect-free care, but no differences between Asian-Americans and whites. To determine whether the slopes of improvement were equivalent, we tested for interaction between calendar year and Asian-Americans versus whites and did not detect differences of improvement for all the measures ($P > 0.3$ for all the interaction tests).

Discussion
Asian-Americans are one of the fastest growing ethnic groups in the United States and they comprised 4.8% of the total population according to 2010 Census. Compared with other racial and ethnic populations, Asian-Americans are reported to have a higher prevalence of diabetes, hepatitis B, liver cancer, tuberculosis, and lung cancer, among other conditions. However, a national health agenda specific to Asian-Americans is lacking. There are limited data regarding the clinical care and outcomes of Asian-Americans following AMI. The present study of contemporary AMI care at 382 GWTG-participating hospitals suggests that compared with whites, Asian-American AMI patients were significantly older and were more likely to have cardiovascular risk factors and comorbid conditions, including diabetes, hypertension, heart failure, and smoking. Overall, there was a modestly lower rate for the defect-free care measure among Asian-American AMI patients, but after adjustment for patient and hospital characteristics, quality of care by this measure was similar. Asian-Americans had higher in-hospital mortality than whites, though after adjustment for measured risk factors this excess risk was attenuated. This study also demonstrates that evidence-based care for AMI processes

### Table 2. Hospital Presentation and Laboratory Data

<table>
<thead>
<tr>
<th>Variables</th>
<th>Asian-American (n=4412)</th>
<th>White (n=102 991)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate, bpm</td>
<td>82 (69, 97) (n = 1638)</td>
<td>79 (67, 94) (n = 37 149)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Systolic BP, mm Hg</td>
<td>135 (116, 155) (n = 1756)</td>
<td>134 (116, 154) (n = 38 443)</td>
<td>0.54</td>
</tr>
<tr>
<td>Diastolic BP, mm Hg</td>
<td>75 (63, 87) (n = 1756)</td>
<td>75 (64, 87) (n = 38 421)</td>
<td>0.15</td>
</tr>
<tr>
<td>Total cholesterol, mg/dL</td>
<td>168 (137, 198) (n = 2304)</td>
<td>166 (137, 198) (n = 70 875)</td>
<td>0.61</td>
</tr>
<tr>
<td>HDL cholesterol, mg/dL</td>
<td>39 (33, 49) (n = 2270)</td>
<td>36 (30, 45) (n = 69 711)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>LDL cholesterol, mg/dL</td>
<td>98 (72, 124) (n = 2204)</td>
<td>99 (76, 126) (n = 68 720)</td>
<td>0.002</td>
</tr>
<tr>
<td>Triglycerides, mg/dL</td>
<td>123 (85, 182) (n = 2277)</td>
<td>124 (85, 184) (n = 69 889)</td>
<td>0.46</td>
</tr>
<tr>
<td>Hba1c, %</td>
<td>7.2 (6.4, 8.9) (n = 195)</td>
<td>7.2 (6.4, 8.5) (n = 3884)</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Continuous variables are expressed as median (25th, 75th percentile). bpm indicates beats per minute; BP, blood pressure; HDL, high density lipoprotein; LDL, low-density lipoprotein; Hba1c, hemoglobin.

To get PCI with stent (25.1% versus 44.5%, $P < 0.0001$), whereas no difference was detected for coronary artery bypass graft surgery (8.2% versus 10.0%, $P = 0.72$). The median (25th, 75th percentile) door-to-balloon time was 81 (56 120) minutes for Asian-Americans, and 84 (60 119) minutes for whites ($P = 0.39$). Almost the same proportion of patients (52.8% versus 52.0%) had a door-to-balloon time of $\leq 90$ minutes for Asian-Americans and whites ($P = 0.75$). Both groups had a 4 day median length of stay.

Temporal trends for these measures for Asian-American and white patients were examined separately (Table 4). There

### Table 3. Performance, Quality, and Outcome Measures in Eligible Patients

<table>
<thead>
<tr>
<th>Variables</th>
<th>Asian-American (n=4412)</th>
<th>White (n=102 991)</th>
<th>Unadjusted RR (95% CI)</th>
<th>Adjusted RR (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspirin within 24 hours, n (%)</td>
<td>2964 (93.5)</td>
<td>63 741 (93.7)</td>
<td>1.00 (0.97, 1.03)</td>
<td>1.00 (0.96, 1.04)</td>
<td>0.92</td>
</tr>
<tr>
<td>Aspirin at discharge, n (%)</td>
<td>2720 (93.9)</td>
<td>78 546 (96.9)</td>
<td>0.97 (0.95, 0.99)</td>
<td>0.97 (0.95, 0.99)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ACE inhibitor or ARB at discharge, n (%)</td>
<td>471 (79.7)</td>
<td>14 063 (83.5)</td>
<td>0.95 (0.91, 1.00)</td>
<td>0.95 (0.90, 1.00)</td>
<td>0.03</td>
</tr>
<tr>
<td>Beta blockers at discharge, n (%)</td>
<td>2741 (93.5)</td>
<td>76 117 (95.8)</td>
<td>1.00 (0.99, 1.01)</td>
<td>0.99 (0.98, 1.00)</td>
<td>0.18</td>
</tr>
<tr>
<td>Smoking cessation counseling, n (%)</td>
<td>534 (83.1)</td>
<td>25 994 (93.1)</td>
<td>0.96 (0.93, 0.99)</td>
<td>0.97 (0.94, 1.00)</td>
<td>0.04</td>
</tr>
<tr>
<td>Lipid-lowering therapy, n (%)</td>
<td>650 (90.5)</td>
<td>21 130 (89.3)</td>
<td>1.04 (1.01, 1.06)</td>
<td>1.03 (1.00, 1.06)</td>
<td>0.05</td>
</tr>
<tr>
<td>Defect-free care, n (%)</td>
<td>3299 (82.7)</td>
<td>81 704 (85.2)</td>
<td>1.00 (0.99, 1.02)</td>
<td>1.00 (0.99, 1.01)</td>
<td>0.94</td>
</tr>
<tr>
<td><strong>Quality measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door-to-balloon time $\leq$90 min, n (%)</td>
<td>197 (52.8)</td>
<td>6461 (52.0)</td>
<td>0.99 (0.90, 1.09)</td>
<td>0.94 (0.86, 1.03)</td>
<td>0.19</td>
</tr>
<tr>
<td><strong>Outcome measure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-hospital death, n (%)</td>
<td>438 (11.5)</td>
<td>5445 (5.8)</td>
<td>1.17 (1.00, 1.38)</td>
<td>1.16 (1.00, 1.35)</td>
<td>0.04</td>
</tr>
</tbody>
</table>

$^a$ Values were for the adjusted model.

Adjusted RRs were derived from multivariable Poisson regression models with generalized estimating equations controlling for patient age, gender, insurance status, chronic obstructive pulmonary disease or asthma, diabetes, hyperlipidemia, hypertension, peripheral vascular disease, cerebrovascular accident/transient ischemic attack, renal insufficiency, smoker, hospital region, hospital teaching status, hospital beds, calendar time, and time in program. $P$ values were for the adjusted model.

RR indicates relative risk; CI, confidence interval; ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker.
improved similarly over the period of 2003 to 2008 for Asian-American and white patients.

The performance measures used in this study are based on strong evidence and clear consensus among experts. They have been developed by professional associations to improve AMI care delivery. Although Asian-American patients have been under-represented in randomized clinical trials, guidelines recommend that therapies be applied similarly to all race/ethnic groups of AMI patients. The GWTG-CAD program provides physicians and hospitals with the tools of these performance measures in order to identify opportunities for quality improvement. Prior studies suggest that the use of performance measures for public reporting, hospital comparison, and pay-for-performance programs can drive quality improvement.27,28 The findings from the present study reveal that AMI care measures at the first year of the study period were suboptimal, and there were small but statistically significant differences in performance measures (eg, aspirin at discharge, smoking cessation counseling, and lipid-lowering therapy) between Asian-American and white patients. Compared with whites, Asian-Americans were less likely to get aspirin and smoking cessation counseling at discharge, whereas Asian-Americans were more likely to get lipid-lowering therapy. Although the exact reasons for such differences are unknown, it is suggested that language barriers, culture of seeking care, and medication adherence behavior might play an important role.30

The present study extends previous work in this field by displaying the temporal trend toward improved guideline adherence and defect-free AMI care in Asian-Americans, complementing the previously published observations in whites, blacks, and Hispanics. It is suggested that among participating hospitals in the GWTG program, equitable quality care for many performance measures can be attained across racial and ethnic groups, including Asian-Americans. It is also found that the longer the duration in the GWTG program, the better the performance in defect-free AMI care. This suggests that sustainable benefits accrue among patients of diverse race/ethnic categories when hospitals participate in a national quality improvement program.

Despite improvements, there were small differences detected in AMI care between Asian-American and white patients, which included less frequent use of aspirin at discharge, and less frequent provision of smoking cessation advice. These results mirrored the findings for blacks (not Hispanics) in Cohen et al’s analysis from the GWTG database. Because Asian-Americans were found to have a higher prevalence of smoking in the GWTG program, this indicates an important opportunity for targeted quality improvement for Asian-Americans by focusing more on the adherence to these 2 measures: use of aspirin at discharge and smoking cessation. Also, we found that more lipid-lowering therapy was used for Asian-American patients.

In terms of use and timeliness of reperfusion strategies, Asian-American patients were less likely to receive PCI or PCI with stents compared with whites. For Asian-American patients, door-to-balloon time improved over the study period. Similar findings were reported for blacks in previous studies.1,31-32 The exact reasons for the differential treatment regimens by race/ethnicity are very complicated and might depend on factors that were not accounted for in the multivariable regression models.
We detected a significant difference in in-hospital mortality between Asian-American and white patients, but after adjustment for patient and hospital characteristics these differences were attenuated. Long-term follow up data are needed to explore the post-discharge mortality rates, rehospitalization rates, and quality of life in Asian-American patients. Prior studies suggest that patients treated at hospitals with increased adherence to the evidenced based guideline-recommended therapies had significantly better in-hospital outcomes. These studies used datasets from the Thrombolysis In Myocardial Infarction (TIMI) III and Global Unstable Angina Registry and Treatment Evaluation (GURANTEED) registries, single-center Cardiac Hospitalization Atherosclerosis Management Program (CHAMP), Can Rapid Risk Stratification of Unstable Angina Patients Suppress Outcomes with Early Implementation of the ACC/AHA Guidelines (CRUSADE) Quality Improvement Initiative, and the global Reduction of Atherothrombosis for Continued Health (REACH) Registry. The findings from the present study show that there were continuous improvements for both Asian-American and white patients in the performance and quality measures over time. More importantly, longer participation in the GWTG program was associated with better defect-free care.

There are several limitations to this study. First, participation in the GWTG-CAD program was voluntary and may not reflect actual national AMI care patterns. Hospitals that participate in the GWTG-CAD program are larger, urban, more likely to be teaching hospitals, and their process measures are better compared with other United States hospitals. Second, there is vast diversity within the category of Asian-Americans, which included Asian-Indian, Chinese, Filipino, Korean, Japanese, Vietnamese, and other Asian-Americans. A few previous studies examining the subgroups of Asian-Americans separately in cardiovascular risks showed higher rates of CAD in Asian-Indians, higher rates of hemorrhagic stroke among Japanese- and Chinese-Americans, more intracerebral hemorrhage in Filipino-Americans, and lower rates of CAD and peripheral arterial disease in Chinese-Americans. Unfortunately, information on subgroups of Asian-Americans was not available in the GWTG-CAD dataset. As Ghosh commented, this information unavailability has prevented the establishment of goals specific to subgroups of Asian-Americans, and it is imperative to have a national health agenda for Asian-Americans. Third, race and ethnicity were recorded by hospital staff and may not accurately reflect the patients’ self-identified race/ethnicity. Residual measures and unmeasured confounding variables may account for some of these findings. Fourth, there was no such information regarding patient’s English-speaking proficiency in the GWTG-CAD dataset. It is possible that a language barrier might explain differences between Asian-American and white patients in terms of the quality of clinical care. Fifth, because there were few Asian-American AMI patients for some measures, this study may have the limited power to detect differential improvements in evidence-based care between the 2 groups (Asian-American versus whites). However, the very narrow confidence intervals from the multivariable regression analysis (see Table 3) suggested that we had sufficient power to detect small differences. Sixth, there were substantial missing data in presenting patients’ hospital presentation and laboratory information as well as differences in the amount of data missing by race (Table 2). This might impact the validity of these descriptive results. Finally, the GWTG-CAD dataset only provided in-hospital information regarding AMI care. It is important to address the question whether post-discharge quality of care and outcomes are similar between Asian-American and white patients.

In conclusion, Asian-American AMI patients were older, more likely to be covered by Medicaid and recruited in the west region, and had a higher prevalence of diabetes, hypertension, heart failure, and smoking. Overall, Asian-Americans were comparable with whites regarding the baseline quality of care, except that Asian-Americans were less likely to get aspirin and smoking cessation counseling at discharge. Evidence-based care for AMI processes improved significantly over the period of 2003 to 2008 for Asian-American and white patients. Moreover, the present study suggests targeting the specific small remaining gaps in AMI care for Asian-American patients. Of note, in-hospital mortality was significantly higher among Asian-Americans compared with whites, even after adjustment for the measured risk factors. Future research needs to address whether there are disparities of AMI care among subgroups of Asian-Americans and whether long-term outcomes are similar between Asian-American and white patients.

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Dr Cannon receives research grants/support from Accumetrics, AstraZeneca, GlaxoSmithKline, Intekrin Therapeutics, Merck, and Takeda, and is on the advisory board (but funds donated to charity) for Bristol-Myers Squibb/Sanofi, Novartis, and Alnylam. He also receives an honorarium for development of independent educational symposia for Pfizer and AstraZeneca, and is clinical advisor for Automedics Medical Systems.

Dr Peterson is the principal investigator of the AHA data coordinating center.

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Dr Schwamm is Chair of the AHA GWTG national steering committee (unpaid) and a consultant to the Massachusetts Department of Public Health on Stroke systems of care.

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All participating institutions were required to comply with local regulatory and privacy guidelines and, if required, to secure institutional review board approval. Because data were used primarily at the local site for quality improvement, sites were granted a waiver of informed consent under the common rule. Outcome Sciences, Inc. (Cambridge, MA) served as the registry coordinating center. The Duke Clinical Research Institute (Durham, NC) served as the data analysis center, and institutional review board approval was granted to analyze aggregate de-identified data for research purposes.
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Feng Qian, Frederick S. Ling, Prakash Deedwania, Adrian F. Hernandez, Gregg C. Fonarow, Christopher P. Cannon, Eric D. Peterson, W. Frank Peacock, Lisa A. Kaltenbach, Warren K. Laskey, Lee H. Schwamm, Deepak L. Bhatt and on behalf of the Get With The Guidelines Steering Committee and Investigators

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