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Gender Disparity in Cardiac Procedures and Medication Use for Acute Myocardial Infarction

John T. Nguyen, MD, Alan K. Berger, MD, Sue Duval, PhD, and Russell V. Luepker, MD
University of Minnesota, Cardiovascular Division (J.T.N., A.K.B., R.V.L.), Minneapolis, MN;
University of Minnesota, Division of Epidemiology and Community Health (A.K.B., S.D., R.V.L.),
Minneapolis, MN

Structured Abstract

Objective—Determine if gender bias is present in contemporary management of acute myocardial infarction (AMI).

Background—Despite major advances in medicine, disparities in healthcare still persist. Previous studies on gender bias in the diagnosis and treatment of AMI are inconsistent and may not represent more contemporary practice.

Methods and Results—Data were collected from the Minnesota Heart Survey, a population-based study of patients presenting with AMI in 2001-02. In-hospital diagnostic and therapeutic approaches were compared between women and men using logistic regression models. We identified 1242 women and 1378 men with an AMI defined by either positive cardiac biomarkers or ST-elevation on electrocardiogram. There were no differences in the prescription of aspirin, beta-blockers, ACE inhibitors or angiotensin receptor blockers. Women were 46% less likely than men to undergo investigative coronary angiography [OR=0.54 (0.45-0.64)]. After accounting for confounders, women remained less likely to be referred for angiography [OR=0.73 (0.57-0.94)]. Revascularization rates, were similar between women and men [OR=0.96 (0.72-1.28)]. However, women were more likely to undergo PCI [OR=1.41 (1.07-1.86)] whereas men were more likely to have coronary artery bypass grafting (CABG) [OR=0.57 (0.39-0.84)]. When severity of coronary artery disease (CAD) was incorporated into the model, gender no longer influenced the modality of coronary revascularization.

Conclusions—There is no evidence of gender bias in the pharmacologic treatment of AMI. Evidence of gender bias persists in the referral of patients for coronary angiography but not in the subsequent use of coronary revascularization.

Background

The recognition of gender disparity in cardiac diagnosis and treatment dates back to 1991 when Ayanian first observed women were less likely to undergo diagnostic coronary angiography and coronary revascularization than men for the treatment of heart disease.¹ This phenomenon, subsequently termed the “Yentl syndrome” by Healy, is well documented in subsequent studies.²⁻⁵ More recent studies suggest gender bias does not exist when underlying factors (i.e. differences in clinical presentation, severity of disease) are considered.⁶⁻⁸

For correspondence: Alan K. Berger, MD, Division of Epidemiology and Community Health, University of Minnesota, 1300 S. Second Street, Suite 300, Minneapolis, MN 55454, Email: E-mail: berger1217@aol.com, Phone: (612) 626-8592; Fax: (612) 624-0315.

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Several barriers – specifically research design issues – arise in the process of assessing gender bias. Randomized clinical trials, by definition, are designed to eliminate bias. Prospective study designs, in the absence of blinding, could heighten physician sensitivity and reduce the likelihood of identifying potential gender bias. Observational studies have been limited in size, restricted in scope, and have not examined the phenomenon at the level of the community.^{9, 10} Furthermore, these population studies have typically relied on limited administrative data due to the expense of medical record abstraction.^{1, 3, 6} Investigations of gender bias have to specifically consider co-morbidities, many of which may be imbalanced by gender.

We sought to address this knowledge deficit by exploring the role of gender bias in acute myocardial infarction (AMI) as it relates the diagnosis of the condition and the utilization of therapeutic strategies. Specifically, we hypothesized that among patients who were hospitalized with AMI, women were less likely than men to receive standard pharmacologic therapy. Second, we hypothesized women were less likely to undergo diagnostic coronary angiography, and consequently, coronary revascularization. We utilized the Minnesota Heart Survey (MHS) Acute Myocardial Infarction project to test these hypotheses.

Methods

Data Sources

The MHS is an ongoing cross-sectional study designed to describe population trends in cardiovascular diseases of patients age 30 and older residing in the Minneapolis-St. Paul metropolitan area (2000 Census: 2.6 million). Details of the methods are described in prior publications.¹¹ This analysis was based on the most recent survey, performed on patients discharged between July 1, 2001 and June 30, 2002, with a discharge diagnosis of AMI. Data abstraction from hospital medical records was performed by nurses with experience in medical record reviews and was supervised by physicians.

Study Sample

Subjects qualified for MHS abstraction if they were ≥ 30 years of age, had residence in one of the seven counties of the metropolitan Minneapolis-St. Paul area, and were treated for AMI (ICD-9 code 410) at one of the 21 metropolitan acute-care hospitals between July 2001 and June 2002. A differential random sampling method was utilized in order to over-sample female and elderly subjects. Sampling was performed as follows: 50% of males and 100% of females for ages 30-74, 50% males and 50% females for ages 75-84, and 100% for both genders aged 85 and older.

The diagnosis of AMI was validated using a combination of symptoms, ECG findings and serum biomarkers. The study population encompassed patients with either ST-elevation on an early ECG or positive serologic biomarkers. Repeat hospital admissions and in-hospital AMI were excluded.

Measured Endpoints

We assessed both pharmacologic therapies and cardiovascular procedures. Selection of pharmacologic therapies was based on nationally recognized indicators and included the in-hospital prescription of aspirin, beta-blockers, and ACE-I or ARBs.¹² Cardiovascular procedures included coronary angiography and revascularization.

Statistical Analysis

We initially performed a descriptive analysis to characterize the study population upon presentation. Categorical variables were compared using the χ^2 test. Continuous variables were presented as arithmetic means ($\pm$ SD) and compared using t-tests. Patients transferred from

another facility were excluded from the analysis of initial presentation because details from the referring hospital were not always available. The analysis of medical therapies included patients with a validated AMI, independent of whether they had been transferred in or out of the index hospital; patients with a history of drug allergy or other contraindications to the drug were excluded from the analysis. For aspirin, the sole contraindication was a reported allergic reaction. Subjects with an initial heart rate ≤ 60 beats per minute were excluded from analysis of beta-blockers. For ACE-I and ARBs, we excluded individuals with an initial serum creatinine ≥ 2.5 mg/dL. Age-adjusted odds ratios for the prescription of individual therapies are presented with 95% confidence intervals.

Hierarchical logistic models were developed to test the hypothesis that gender bias persists in the utilization of coronary angiography and coronary revascularization. These analyses were restricted to subjects treated at hospitals with catheterization labs. The unadjusted model used coronary angiography as the dependent variable and included gender as the sole predictor. The multivariable model incorporated age, race, hypertension, diabetes, hyperlipidemia, smoking status, family history of coronary artery disease (CAD), previous diagnosis of myocardial infarction or heart failure, prior percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG), symptoms of chest pain, dyspnea, neck pain, diaphoresis, nausea, weakness, abdominal pain, back pain, bradycardia, hypotension, renal insufficiency, anemia, elevated cardiac biomarkers, and ST-elevation on ECG. This adjusted model (Model 1) yielded similar estimates for gender when compared to non-parsimonious models and was retained as the preferred model.

Similar hierarchical models were employed to test the hypothesis that gender bias exists in regard to coronary revascularization among patients undergoing diagnostic coronary angiography. Patients without significant CAD were excluded. The proportion of men and women who underwent PCI, CABG, or neither procedure was reported. The unadjusted odds ratios for PCI and CABG were calculated with gender as the sole predictor. Model 1, as described above, assessed the role of gender after adjustment for demographic and clinical characteristics. To evaluate the impact of disease severity on the modality of revascularization, Model 1 was expanded. Dummy variables – indicating two-vessel, three-vessel, or left main disease (compared to single vessel CAD) – were added to the model (Model 2). A $\geq 50\%$ stenosis of the left main or $\geq 75\%$ stenosis in any other coronary artery (including bypass grafts) constituted a diseased vessel. Branches from a common coronary artery were aggregated to define a single vessel system. In order for the possibility of interaction with gender and renal function, additional analyses were performed modeling using the Modification of Diet and Renal Disease (MDRD) formula to estimate creatinine clearance (CrCl). All statistical analyses were performed using SAS v8.02 (SAS, Cary, NC).

Results

During the study period, the MHS registry abstracted data on 3019 subjects treated for AMI. From this sample, 368 (12%) subjects developed an AMI while hospitalized for a non-cardiac cause and were excluded. An additional 31 (1%) subjects failed to meet validation criteria for AMI, leaving 2,620 subjects – 1242 women and 1378 men – in our study sample.

Baseline Characteristics

Baseline characteristics of subjects are shown in Table I. The mean age of the study sample was 70.8 ± 15 years and 47% of the sample was female. Women averaged 5.4 ± 14.8 years older than men. While hypertension and CHF were more prevalent in women, men were more likely to report hyperlipidemia and smoking. Women reported a lower prevalence of CAD than men. There were no differences in reported race, diabetes, or family history of CAD.

There were several differences in clinical presentation between men and women (Table II). Although the most common symptom was chest pain in both genders, it occurred less frequently in women (68.0% vs. 75.6%, $p<0.01$). Women were more likely to report atypical symptoms of AMI such as nausea, weakness, and back pain at the time of presentation. Among patients who did *not* present with chest pain, women reported dyspnea (56.5%), weakness (43.0%), and nausea (23.0%) in a similar proportion to men; women were more likely to report back pain (8.4% vs. 4.0%, $p=0.02$), whereas men were more likely to report abdominal pain (4.8% vs. 9.4%, $p=0.02$). Hemodynamic instability, as indicated by bradycardia or hypotension, occurred in a similar proportion of men and women. Renal insufficiency, defined by a serum Cr ≥ 2.5 mg/dl, was less common in women than men (7.2% vs. 10.7%, $p<0.01$). The proportion of cases with elevated cardiac biomarkers (troponin or CK-MB) and elevated ST-segments was similar between genders.

Pharmacologic Therapies

Prescription of standard medical therapies during hospitalization was similar for women and men. Overall, aspirin was provided to 94% of patients; women were as likely to receive aspirin as men [OR=0.90 (0.63-1.27)]. Beta-blockers were provided to 83% of patients; women were similar to men [OR=0.95 (0.75-1.21)]. ACE-I and ARBs were least likely to be prescribed (63%), but again indistinguishable between genders [OR=0.92 (0.77-1.09)]. There was no difference in the prescription of any of these medications by gender at the time of discharge.

Diagnostic Angiography and Severity of Coronary Artery Disease

Eleven of the 21 MHS hospitals had both diagnostic and interventional capacity at the time of the survey. A total of 2158 patients (1019 women and 1139 men) were admitted to these hospitals. There was no difference by gender in patients admitted to hospitals with angiography/PCI services ($p=0.68$). Women were 46% [OR=0.54 (0.45-0.64)] less likely to undergo diagnostic coronary angiography than men (Table III). After accounting for confounding variables (Model 1), women were still 27% [(OR=0.73 (0.57-0.94)] less likely to undergo angiography. Attempts to identify potential sources of gender bias focused on the severity of CAD (Table III). Women more often had non-obstructive CAD (17% vs. 5.4%, $p<0.01$) and were less likely to have either three-vessel disease (15% vs. 20%, $p=0.02$) or a significant LMCA stenosis (6.8% vs. 11%, $p<0.01$).

Coronary Revascularization

Coronary revascularization was assessed among patients identified with significant CAD. Whereas angiography was less commonly performed in women, there was no difference in the rates of revascularization after angiography [OR=0.96 (0.72-1.28)] (Table IV). However, the selection of revascularization technique did vary by gender. In the unadjusted analysis, women were more likely to be referred for percutaneous revascularization [OR=1.29 (1.01-1.65)] and were less likely to be treated surgically [OR=0.63 (0.44-0.89)]. After adjusting for demographic and clinical characteristics as well as presenting features (Model 1), the estimates were similar [OR=1.41 (1.07-1.86) for PCI, and OR=0.57 (0.39-0.84) for CABG]. When coronary anatomic characteristics were incorporated into the model (Model 2), the association between gender and modality of coronary revascularization was attenuated and no longer statistically significant. However, there was a strong trend favoring PCI [OR=1.27 (0.95-1.69)] and disfavoring CABG [OR=0.69 (0.45-1.05)] in women.

Additional Analyses

As part of the investigation, we repeated the analysis in the subgroup of patients who presented with ST elevation (STEMI). We identified 916 STEMI patients; 456 (50%) were women. 753 of the STEMI patients were treated at facilities capable of performing diagnostic angiography

and PCI; 380 (50%) were women. Thrombolytics were administered to 101 (11%) of STEMI patients; women were less likely to receive thrombolytics than men [8.3% vs. 13.7%, OR=0.57 (0.37-0.87), $p=0.01$]. Coronary angiography was performed on 527 (70%) of these patients; women were less likely to be referred for coronary angiography [64% vs. 76%, OR=0.56 (0.41-0.76), $p=0.0003$]. After adjustment for confounders (Model 1), the difference was no longer statistically significant [OR=0.93 (0.58-1.50)]. 490 (93%) patients had significant disease in at least one coronary artery and 421 patients underwent either PCI or CABG; there was no difference by gender (88% vs. 85%, $p=NS$). Women were more likely to be treated with PCI [80% vs. 71%, OR=1.6 (1.07-2.49), $p=0.02$] and less likely to undergo CABG [8% vs. 15%, OR=0.48 (0.27-0.88), $p=0.01$]. After risk adjustment (Model 1), women tended to be more likely to undergo PCI [OR=1.57 (0.97-2.53)] and were significantly less likely to undergo CABG [OR=0.41 (0.21-0.81)]. After accounting for the severity of CAD (Model 2), women remained less likely to undergo CABG, although this estimate was no longer statistically significant [OR=0.49 (0.23-1.04)].

A post-hoc analysis was performed to ascertain whether other variables could explain our initial findings (Table V). Although women more likely to be identified as DNR/DNI, the odds ratios did not vary by catheterization use (p -value for heterogeneity=0.70). We also found no gender difference in post-discharge plans for cardiac catheterization (p -value for heterogeneity = 0.56). Among patients undergoing coronary angiography, men were less likely than women [OR=0.54 (0.35-0.84)] to have undergone stress testing. However, among those treated conservatively, there was no difference in the use of stress testing by gender [OR=1.17 (0.74-1.84), p -value for heterogeneity=0.02].

A search of the medical record was performed to identify less common comorbidities that could explain the gender bias in the use of diagnostic cardiac catheterization for AMI. Included among these conditions were atrial fibrillation, acquired immune deficiency syndrome, alcohol use, chronic obstructive pulmonary disease, connective tissue disorders, mental status changes, hepatic disease, leukemia, lymphoma, tumors, renal disease, peptic ulcer disease, acute bleeding, bleeding diathesis, and surgery/biopsy/trauma within two weeks. Women were still less likely to have angiography after these variables were considered in the model [OR=0.70 (0.54-0.91)].

Our final analysis assessed the possibility of an interaction between gender and renal function. We dichotomized the study population using a CrCl cutoff of ≥ 60 ml/min. Among MI patients with CrCl ≥ 60 ml/min ($n=1141$) treated at hospitals with catheterization labs, women remained less likely to undergo coronary angiography after adjusting for the variables in Model 1 [OR=0.58 (0.39-0.88)], $p=0.0094$. Among the cohort with CrCl < 60 ml/min ($n=1017$), gender was no longer a significant predictor of angiography [OR=0.99 (0.71-1.37)], $p=0.94$. In summary, women with preserved renal function remain less likely to have angiography than men.

Discussion

In an era of evidence-based guidelines and quality improvement initiatives, one might not expect gender to play a role in the assessment and management of cardiovascular disease. To the contrary, we observed evidence of gender bias in specific aspects of AMI care. While presenting symptoms varied by gender, there were no significant differences in either the ECGs or the proportion of positive cardiac biomarkers. Gender did not influence the pharmacologic therapy of AMI. The primary influence of gender was the decision to perform coronary angiography. Although gender did not influence the decision to proceed with coronary revascularization, it did impact on the modality of coronary revascularization. Our data suggest the differential use of PCI and CABG by gender was related to the association of gender on

the severity of CAD at the time of the AMI. There was a trend for percutaneous coronary revascularization among women, and conversely, a trend for surgical revascularization among men.

Coronary angiography

The decision to perform coronary angiography is complex and involves a multitude of factors. While both genders reported chest pain as the most frequent complaint, women more often added atypical symptoms. These vague complaints may have led clinicians to broaden the differential diagnosis and include non-cardiac diseases. Women reported a history of CAD less frequently than men. After accounting for these variables, women were still less likely to undergo diagnostic angiography than men. The post-hoc analysis incorporating a wide array of variables failed to eliminate gender bias. Alternative explanations, such as the potential use of in-hospital non-invasive testing, also failed to explain the disparity of diagnostic angiography referral. To the contrary, we found women more often underwent stress testing prior to angiography than men. Our findings were further validated in a subgroup analysis focused on ST elevation AMI patients.

Revascularization and pharmacologic therapies

While the decision for investigative angiography was influenced by gender, we found no evidence to suggest the decision to proceed with coronary revascularization was modified by gender. Once significant CAD was elucidated, women and men were equally referred for revascularization procedures.

The method used for coronary revascularization was determined, in part, by gender. There was a trend for women to be treated with PCI and men to be treated with CABG. This was consistent with the results ascertained from coronary angiography. Women were one-third as likely to have a significant lesion identified on angiography. Women were also less likely to have either three-vessel or LMCA disease. The difference in CAD severity may effectively explain why women are more often – and appropriately – treated percutaneously. In the only other gender bias study that accounted for disease severity, Krumholz et al. also found men were more often treated surgically.¹³ This may reflect the increased difficulty of performing surgical coronary revascularization on women with smaller caliber vessels.¹⁴

The ACC/AHA guidelines emphasize women derive the same treatment benefit as men from ASA, beta blockers and ACE inhibitors.¹⁵ We found no evidence of gender bias regarding pharmacologic therapy. This is interesting in light of the gender bias observed in the use of diagnostic coronary angiography. If the question of AMI was in doubt among women, one might have expected a lower use of standard medical therapies. This finding may reflect a reduced concern regarding risk of pharmacologic therapy versus an invasive procedure such as a cardiac catheterization.

Prior studies

Our findings of gender bias in the treatment of AMI add knowledge to the existing literature. Ayanian reported an increase use of coronary angiography and coronary revascularization in male AMI patients.¹ Chiriboga found men were nearly 2.5 times more likely to have PCI, but observed no difference in the use of surgical revascularization.⁵ A more contemporary longitudinal report by Vaccarino found disparities in rates of angiography and reperfusion therapy by gender and race, unchanging over time.³ Rathore stratified patients by indication for angiography and found gender impacted decision-making only in those with “equivocal indications” (systolic dysfunction, prior revascularization, non-Q-wave MI's, CHF/pulmonary edema).⁶

Other explanations, highlighted in the recently published ACC/AHA Guidelines¹⁵, may explain why diagnostic angiography may be underutilized in women. One possibility stems from the assertion that women less often have CAD amenable to revascularization. Similar to other studies, we found women had greater prevalence of non-obstructive CAD.^{13,16} We believe this presumption should have impacted the decision to perform subsequent coronary revascularization but should not have influenced the decision to perform coronary angiography. Another postulated explanation is higher rates of complications with angiography and revascularization in women.¹⁷⁻²⁰ However, these differences are not consistently observed.^{5, 21-25} It is possible that women are less likely to accept the decision to undergo cardiac catheterization than men. To the contrary, Saha reported women were more inclined to accept a physician's recommendation for coronary catheterization, and had a similar inclination for angioplasty and CABG.²⁶

Finally, the less invasive approach in women may stem from the conflicting results in clinical trials. A meta-analysis of trials in the era of stents and GP IIb IIIa inhibitors failed to show a survival benefit of a direct invasive strategy in women at 6 or 12 months (OR for women 1.07, 95% CI 0.82 to 1.41; OR for men 0.68, 95% CI 0.57 to 0.81)

Strengths

There are several strengths to our observational study. Our study sample used both cardiac biomarkers and electrocardiographic criteria to identify AMI patients, and excluded patients with unstable angina and noncardiac chest pain. We believed this higher risk group of patients would potentially receive the most benefit from coronary revascularization. Indeed, the AHA/ACC guidelines recommend an early invasive strategy in these subjects (Class IA).¹⁵ Second, the wealth of data in the MHS survey, including detailed coronary angiographic features, permitted a thorough analysis of gender bias. Finally, our findings extend a greater degree of generalizability because the results are based on population surveillance across the age spectrum, not on an industry-sponsored registry or protocol-driven clinical trial – both of which have inherent selection biases.

Limitations

While we were able to establish the presence of gender differences, there are unmeasured variables that could explain our findings. Differential utilization rates of diagnostic and therapeutic procedures may result from either patient preference or health care provider preference. In the absence of clear dialog, it is difficult to discriminate between these two possibilities. DNR status was highly correlated with the decision to perform coronary angiography and while it may have served as a surrogate of patient preference, it did not adequately explain gender differences in angiography. Our study could not definitively address concomitant co-morbidities in which the risks might outweigh the benefits of angiography and revascularization. However, we believe our findings to be robust and supported by the additional models and post-hoc analyses. Our study did not explore indication bias. It is possible that gender bias may have been limited to a single indication (primary PCI, post-MI angina, or subsequent high-risk stress test). Although this study provides insight from a prospective community experience, we acknowledge this reflects physician practice in the Minneapolis-St. Paul metropolitan area and may not reflect national patterns of AMI care. Finally, the effect of gender on clinical practice may have changed over the past several years.

Conclusions

While we found no evidence of a gender bias in pharmacologic therapy or revascularization, our study revealed gender bias was present in the use of diagnostic cardiac angiography. Gender also influenced coronary reperfusion modality – favoring PCI for women and CABG for men.

However, this differential utilization in revascularization therapies reflected, in part, the more severe CAD pattern observed in men. When disease severity was considered, the disparity in care strategy was no longer statistically significant.

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Table I
Demographic, Risk Factor, and Medical Characteristics of Men and Women with Acute Myocardial Infarction

	Women (N=1242)	Men (N=1378)	P-value
Age [mean (SD)]	73.6 (14.8)	68.3 (14.8)	<0.01
Race			
Caucasian	87.0	86.5	0.69
African-American	3.1	2.8	0.65
Other	9.9	10.7	0.48
Hypertension	71.3	62.5	<0.01
Diabetes mellitus	26.1	25.5	0.75
Hyperlipidemia	41.8	46.5	0.02
Smoking			
Current	19.9	24.5	<0.01
Prior	44.2	64.7	<0.01
Family history of CAD	29.3	32.5	0.08
Prior Myocardial infarction	24.6	30.6	<0.01
Prior CHF	22.4	17.9	<0.01
Prior PCI	13.1	18.4	<0.01
Prior CABG	9.9	16.6	<0.01

Values represent percentages unless otherwise specified.

CAD: Coronary artery disease; PCI: Percutaneous coronary intervention; CABG: Coronary artery bypass grafting

Table II
Initial Presentation of Those with Acute Myocardial Infarction by Gender

	Women (N = 1112) (%)	Men (N = 1136) (%)	P-value
Chest pain	68.0	75.6	<0.01
Dyspnea	56.1	56.8	0.75
Neck pain	16.7	14.6	0.17
Diaphoresis	29.5	33.0	0.07
Nausea	31.7	25.5	<0.01
Weakness	27.2	23.2	0.03
Abdominal pain	4.4	5.4	0.29
Back pain	16.0	9.2	<0.01
Bradycardia (HR < 60 bpm)	10.1	13.2	0.02
Hypotension (SBP < 90 mm Hg)	6.3	5.2	0.26
Renal insufficiency (Cr ≥ 2.5 mg/dL)	7.2	10.7	<0.01
Anemia (Serum Hct < 27%)	5.6	5.8	0.81
Elevated biomarkers	98.5	98.1	0.46
ST Elevation	41.0	40.5	0.80

HR: Heart rate

SBP: Systolic blood pressure

Cr: Creatinine

Table III

Use of Diagnostic Coronary Angiography and Severity of Coronary Artery Disease Among Those Treated for AMI at Hospitals with Cardiac Catheterization Laboratories

	Women (N=1019)	Men (N=1139)	P	Unadjusted OR	Model 1 OR
	n (%)	n (%)			
Coronary angiography performed	599 (59)	828 (73)	<0.01	0.54 (0.45-0.64)	0.73 (0.57-0.94)
No significant stenosis	99 (17)	45 (5.4)	<0.01		
Single vessel CAD	229 (38)	314 (38)	0.91		
Two vessel CAD	140 (23)	210 (25)	0.39		
Three vessel CAD	90 (15)	164 (20)	0.02		
LMCA disease	41 (6.8)	95 (11)	<0.01		
Three vessel CAD or LMCA	131 (22)	259 (31)	<0.01		

CAD: Coronary artery disease

LMCA: Left main coronary artery

Table IV
Modalities of Revascularization Among Those With Significant Coronary Artery Disease

Procedure	Women (N=500)		Men (N=783)		Unadjusted OR	Model 1 OR	Model 2 OR
	n (%)	n (%)	n (%)	n (%)			
PCI							
Single vessel CAD	362 (72)	525 (67)	1.29 (1.01-1.65)	1.41 (1.07-1.86)	1.27 (0.95-1.69)		
Two vessel CAD	187 (82)	264 (84)	0.84 (0.54-1.32)				
Three vessel CAD	110 (79)	152 (72)	1.40 (0.85-2.31)				
LMCA disease	49 (54)	82 (50)	1.20 (0.71-2.00)				
CABG							
Single vessel CAD	16 (39)	27 (28)	1.61 (0.75-3.48)	0.57 (0.39-0.84)	0.69 (0.45-1.05)		
Two vessel CAD	50 (10)	118 (15)	0.63 (0.44-0.89)				
Three vessel CAD	5 (2)	11 (4)	0.62 (0.21-1.80)				
LMCA disease	15 (11)	25 (12)	0.89 (0.45-1.75)				
No revascularization							
Single vessel CAD	18 (20)	40 (24)	0.78 (0.41-1.45)				
Two vessel CAD	12 (29)	42 (44)	0.52 (0.24-1.15)				
LMCA disease	88 (18)	140 (18)	0.96 (0.72-1.28)				

PCI: Percutaneous coronary intervention

CABG: Coronary artery bypass grafting

Resuscitation Status, Stress Testing, and Planned Angiography Among Subjects Treated at Hospitals with Catheterization Laboratories by Angiography Status and Gender

Table V

	Coronary Angiogram Performed				Coronary Angiogram Not Performed				P*
	Women N=599	Men N=828	OR(95% CI)		Women N=420	Men N=311	OR(95% CI)		
DNI/DNR [†]	56 (9.4)	48 (5.8)	1.68 (1.12-2.50)		215 (51)	127 (41)	1.52 (1.13-2.04)		0.70
Stress test performed									
Exercise	12 (2.0)	19 (2.3)	0.87 (0.42-1.81)		3 (1.0)	4 (1.0)	0.99 (0.22-4.44)		0.88
Pharmacologic	37 (6.2)	22 (2.7)	2.41 (1.41-4.13)		44 (11)	37 (12)	0.87 (0.54-1.38)		<0.01
Any [‡]	49 (8.2)	38 (4.6)	1.85 (1.20-2.87)		46 (11)	39 (13)	0.86 (0.54-1.35)		0.02
Future study planned									
Angiography	8 (1.3)	6 (0.7)	1.85 (0.64-5.37)		11 (2.6)	13 (4.2)	0.62 (0.27-1.40)		0.10
Stress test	73 (12)	124 (15)	0.79 (0.58-1.07)		19 (4.5)	16 (5.1)	0.87 (0.44-1.73)		0.79

* P-values were determined using the Breslow-Day test for heterogeneity of OR between groups by angiogram status.

[†] DNI=do not intubate, DNR=do not resuscitate.

[‡] Some subjects were allocated to both exercise and pharmacologic stress testing.