

Disparities in Lipid Management for African Americans and Caucasians with Coronary Artery Disease: A National Cross-Sectional Study

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Abstract

Background

Individuals with coronary disease (CAD) are at high risk for adverse health outcomes. This risk can be diminished by aggressive lipid management. But adherence to lipid management guidelines is far from ideal in the US population with CAD and substantial racial disparities in CAD-related care have been reported. Public health interventions intended to eliminate disparities in lipid management often focus on lipid testing as an indicator of lipid management. We describe the detection, treatment, and control of dyslipidemia for African Americans and Caucasians with CAD to evaluate whether public health programs focusing on lipid testing can eliminate racial disparities in lipid management.

Methods

Patients with CAD were identified within medical practices participating in the Quality Assurance Program (QAP) during the late 1990's. Physicians and medical practices throughout the United States with high numbers of prescriptions for medications used in the treatment of CAD were invited to participate in the QAP. The records of randomly selected patients within each participating practice were reviewed. Data related to the detection, treatment, and control of dyslipidemia were abstracted from the medical record and evaluated in cross-sectional stratified and logistic regression analyses.

Results

Data from the medical records of 1,046 African Americans and 22,077 Caucasians seen in outpatient medical practices in 23 states were analyzed. African-American patients, compared to Caucasians, were younger, more to be likely women, and were

more likely to have diabetes, heart failure, and hypertension. The low density lipoprotein cholesterol (LDL-C) testing rates for Caucasian men were over 1.4 times higher than those for African-American women and about 1.3 times higher than those of African-American men. Almost 60% of tested Caucasian men and less than half of tested African Americans were prescribed lipid-lowering drugs. Tested and treated Caucasian men had the highest LDL-C goal attainment (35%) and African-American men the lowest (21%).

Conclusion

African Americans may benefit more than Caucasians from interventions to improve lipid testing, but increased testing alone will not eliminate racial lipid management disparities. Public health policies and programs focusing on lipid testing alone will have limited benefit in reducing racial disparities in lipid management.

Background

Individuals with coronary disease (CAD) are at high risk for subsequent cardiovascular disease events and mortality.[1] Clinical trials have shown that this risk can be substantially reduced through the detection, treatment, and control of hyperlipidemia.[2,3] To that end, clinical guidelines have been established for the outpatient lipid management of CAD patients.[4,5] Adherence to these guidelines is far from ideal.[6,7] Substantial racial disparities in the diagnosis and management of hyperlipidemia have been reported in the general population and among CAD patients.[8,9]

Improved lipid management through the diagnosis of hyperlipidemia has been a focus of quality improvement programs in the outpatient fee-for-service setting such as Medicare's Health Care Quality Improvement Program.[10] Adherence to lipid management guidelines in this setting may be most easily measured using lipid testing rates because testing is a billable service identifiable in insurance claims data. In contrast, assessment of treatment and goal attainment in the fee-for-service setting requires resource-intensive medical record review which is generally not performed for large national patient populations.

This study describes outpatient lipid management for African Americans and Caucasians with coronary artery disease (CAD) seen in medical practices throughout the United States. Data from medical records were examined for indicators of lipid management including lipid testing, lipid-lowering drug prescription, and goal attainment. Our objectives were to characterize lipid management across race-sex groups and evaluate the extent of disparities at all levels of lipid management: detection, treatment, and control. We then discuss the implications of our findings

with respect to health policies for closing the gap in race-sex lipid management disparities.

Methods

Patients with CAD were identified within medical practices participating in the Quality Assurance Program (QAP). The QAP was a national program sponsored by Merck & Company conducted during the late 1990's to identify physician practice patterns and to promote evidence-based best practices for the medical management of patients with CAD seen in the outpatient setting. The QAP was conducted in two separate time periods and study populations nationwide and our analyses included only patients from the second period (QAP-II). Previous reports from the QAP have shown that high-risk CAD patients with diabetes mellitus, heart failure, or advanced age were less likely to receive effective lipid management compared to the lower-risk CAD patients without these conditions.[7,11,12] Physicians and medical practices throughout the United States with high numbers of prescriptions for medications used in the treatment of CAD were invited to participate in the QAP. The practice specialty of participating physicians included cardiology, internal medicine, family medicine, and endocrinology. The records of randomly selected patients within each participating medical practice were reviewed by Access Medical Ltd (Arlington, VA) using a standardized electronic abstraction tool developed specifically for QAP-II. Data obtained from the medical record, when documented, included race, sex, date of birth, medical history, and medical procedures. Also obtained were the most recent serum lipid testing results and the most recently recorded prescriptions for lipid-lowering drugs. The medical record of each patient was reviewed only once. Patients were not followed over time.

We conducted a cross-sectional secondary data analysis of the QAP-II. Patient and physician identifying information were not included in the QAP-II database to protect confidentiality. Patients were included in QAP-II if they had an office visit at one of the participating medical practices between January, 1995 and March, 1998 and saw the participating physician at least twice in two years. Only patients at least 21 years of age with documented CAD as determined from medical history, diagnosis codes, and cardiac procedures were included. For the purposes of these analyses, patients without medical record documentation of race were excluded and, when race was specified, only African-American and Caucasian patients were included. In addition, medical practices were excluded if they were located in states where fewer than 10 African-American patient participants were seen by all participating practices statewide. These medical practices were excluded to reduce the influence of between-state variation in lipid management on our observed racial disparities by excluding states with small African American patient populations.

Low density lipoprotein cholesterol (LDL-C) testing was measured as the percentage of patients with at least one serum LDL-C value documented in the medical record. The use of lipid-lowering drugs (i.e., “treated” patients) was defined as the percentage of patients with medical record documentation of at least one prescription for a statin (3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitor) or non-statin lipid drug (e.g., gemfibrozil). Goal attainment among those with documented lipid values was based on recommended guidelines for patients with coronary artery disease (LDL-C < 100 mg/dL).[5] Co-morbid conditions including diabetes mellitus, myocardial infarction, heart failure, and hypertension were identified from medical history and diagnosis codes.

Stratified analyses were performed by race and sex. Associations of race and sex with dichotomous lipid management measures were evaluated simultaneously controlling for a number of potential confounding and explanatory variables in logistic regression analyses. These covariates included age, co-morbid conditions, and geographic region of the medical practice. Additionally, logistic models predicting lipid-lowering drug prescriptions included a term for serum LDL-C concentration.

Results

Population Characteristics

A total of 23,123 CAD patients with documented race and sex seen by 1,171 physicians at 238 medical practices in 23 states were included in the study. Of these patients, 1,046 were African Americans and 22,077 were Caucasians. African-American patients were seen at 155 of these medical practices by 449 physicians and Caucasian patients were seen at 236 practices by 1,158 physicians.

African-American patients included more women (53.3%) compared to Caucasians (36.4%). The average age for the study population was 68.7 and ranged from 22 to 97 years. Within each race group, women were older than men on average and within each sex group Caucasians were older than African Americans (Table 1). The prevalence of co-morbid conditions was high for all groups. Despite their younger ages, African Americans were more likely than Caucasians to have diabetes, heart failure, and hypertension. Almost half of African-American women and a third of African-American men had diabetes compare to about a quarter of the Caucasian population. About half of African-American men had heart failure and over three quarters of African-American women had hypertension. Consistent with the

geographic distribution of race-specific populations, African-American patients were more likely seen in southern medical practices than elsewhere.

Lipid Testing Rates

Within sex strata, the percent of patients with LDL-C tests was lower for African-Americans compared to Caucasians (Figure). Within race strata the percent of patients with LDL-C tests was lower for women than for men. The LDL-C testing rates for Caucasian men were over 1.4 times higher than those for African-American women and about 1.3 times higher than those of African-American men.

Lipid Treatment Rates

Almost 60% of tested Caucasian men were prescribed lipid drugs (Figure). The crude proportion of tested Caucasian women receiving drugs was similar to, but slightly lower than that for Caucasian men. Less than half of tested African-American men and women were prescribed lipid drugs.

Goal Attainment

The mean serum LDL-C concentration for Caucasian men was lower than that for Caucasian women and African-Americans (Table 1) and mean LDL-C concentrations were similar for African-American men and women. Including those prescribed and not prescribed lipid-lowering drugs (not shown in table), a quarter or fewer of African Americans and of Caucasian women had achieved the recommended LDL-C goal but a higher proportion ($\geq 30\%$) of Caucasian men achieved goal.

Among patients tested and treated with lipid-lowering drugs at least two-thirds failed to achieve goal (Figure). Tested and treated Caucasian men had the best goal attainment rates (35%). Tested and treated Caucasian women had lower levels of goal attainment than Caucasian men. Goal attainment for Caucasian men and for women

of either race exceeded that of African-American men. Only about 1 of 5 African-American men prescribed lipid-lowering drugs achieved LDL-C goal.

Logistic Regression

Logistic regression results controlling for age, co-morbid conditions, and geographic region (Table 2) were generally consistent with results from the stratified analyses described above. Relative to Caucasians, African-American men and women were under-tested, under-treated, and less likely to be at goal. Relative to men, regardless of race, women were less likely to be tested. But if tested, women were at least as likely as men to receive prescriptions for lipid drugs. Among the four race-sex groups, African-American women were the least likely to be tested, and if tested, African-American men were the least likely to be prescribed lipid drugs. Among those tested and treated, African-American men were least likely to be at goal.

Discussion

Our findings demonstrate that outpatient lipid management for CAD patients in the late 1990's had much room for improvement and that substantial race-sex disparities existed. African Americans with CAD experienced markedly lower levels of LDL-C testing than Caucasians. Among those tested, African Americans were less likely to be treated and, if treated, they were less likely to be at goal. Our findings suggest that the elimination of racial disparities in testing alone will not eliminate disparities in lipid management. Among tested patients prescribed lipid-lowering medications, the odds for goal attainment for a Caucasian man were more than twice the odds for an African-American man.

A recent report concerning patients with CAD and/or diabetes seen at a Veterans Affairs Medical Center found that African Americans were less likely to

achieve lipid goal than Caucasians even when prescribed identical doses of the same lipid-lowering drug.[13] It is notable that the African Americans in this Veterans Affairs study experienced a larger percent reduction in LDL-C with treatment than did Caucasians. This suggests that racial disparities in goal attainment may be due to differences in lipid management rather than differences in pharmacologic effectiveness of lipid-lowering medications. The lower goal attainment among African Americans in QAP may be explained, at least in part, by their greater prevalence of diabetes compared to Caucasians. We have previously shown that patients with diabetes compared to those without diabetes receive poorer lipid management and were less likely to be at goal.[14] African Americans in QAP were more likely to suffer from multiple co-morbid conditions, including heart failure and hypertension, potentially influencing lipid management.

Additional evidence[15,16] suggests that disparities in lipid management may be the result of a number of factors that limit patient-physician encounters and continuity of care. However, even among patients receiving frequent and routine care continuously from one primary care provider, African Americans were less likely than Caucasians to receive lipid testing.[17] Physician oversight has been reported to be a common reason for failure to adhere to lipid testing guidelines.[18] Whether oversight contributes to lipid management disparities is not known.

Clearly, a multi-pronged approach focusing on all three elements of the process of care (i.e., detection, treatment, and control) is needed to improve lipid management for all race-sex groups, and particularly for African Americans. Although beyond the scope of this report, the application of conceptual models to the process of care may be useful in understanding how racial disparities arise at each step of the process. Furthermore, policies addressing health promotion and non-

medical determinants of health such as socioeconomic status, community environment, and lifestyle choices need also be considered in addressing these disparities.[19,20]

Successful lipid management likely depends on a variety of processes that determine the provision of medical services including their availability, accessibility, and acceptability. Findings of substantial racial disparities in lipid management among patients in contact with medical providers suggest that the effectiveness of medical services and patient-related factors also play a prominent role. Policies promoting appropriate delivery of care through system change as well as those ensuring equal access to care are required to eliminate lipid management disparities in the population of high-risk CAD patients.[21,22]

Conclusions

Our results suggest that policies and programs focusing solely on the elimination of lipid testing disparities can only have limited benefit in reducing the major disparity in lipid management. The elimination of lipid management disparities will require policies that view untested, untreated, and under-treated individuals as separate populations with unique challenges and solutions.

Disparities in testing are just one element in explaining overall disparities in lipid management and ultimately, in cardiovascular outcomes. Future research should address patient, physician, and health system factors that lead to lower rates of testing, treatment and goal attainment for African Americans. Disparities in treatment and goal attainment must be better understood and reflected in policy in order to improve the health of underserved populations through optimal lipid management.

List of abbreviations

CAD	Coronary Artery Disease
LDL-C	Low-density lipoprotein cholesterol
QAP	Quality Assurance Program

Competing interests

Analyses were funded by an unrestricted grant from Merck & Co., Inc. No other competing interests are declared.

Authors' contributions

MM conceived of the study, provided analytic and statistical support, and was the leading contributing author. KF participated in the design of the study and provided analytic support and interpretation of findings. LCE provided critical technical review and major contributions to the discussion section. CS provided conceptual guidance, assistance with QAP project database, and interpretation of analytic findings. CA provided critical review, QAP project experience, and contributions to the presentation and interpretation of findings. RS provided critical review, QAP project experience, and contributions to discussion and interpretation of findings. All authors read and approved the final manuscript.

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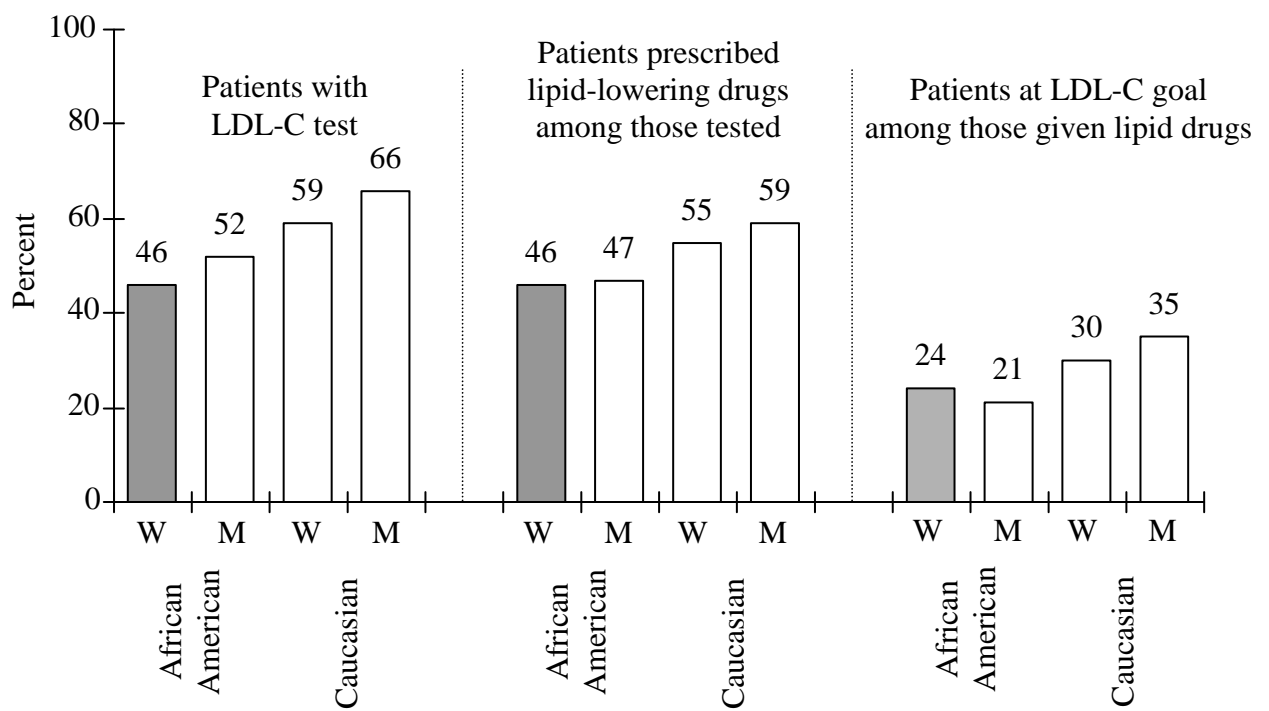
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Figures

Figure - Lipid Management among CAD patients.

Lipid testing, treatment, and goal attainment rates for African-American and Caucasian women (W) and men (M).



Tables

Table 1 - Characteristics of patients by race and sex.*

Characteristic	African Americans		Caucasians	
	Women	Men	Women	Men
	(n=558)	(n=488)	(n=8,038)	(n=14,039)
Age (mean±SEM)	66.8±0.5	62.7±0.6	72.1±0.1	67.1±0.1
Medical History				
Diabetes Mellitus	43	33	25	21
Myocardial Infarction	38	47	40	48
Heart Failure	42	48	39	34
Hypertension	78	70	63	52
Region				
Northeast	27	25	34	31
Midwest	24	30	31	33
South	42	36	22	23
West	8	8	13	13
Serum Lipid Levels				
LDL-C (mean±SEM mg/dl) [†]	131.3±2.5	133.0±2.5	124.8±0.6	117.2±0.3
LDL-C at goal (%) [†]	19	18	25	31

*Percent of race-specific total unless otherwise specified.

[†]For patients with documented tests having valid values

Table 2 Logistic Regression Results

Lipid testing, pharmacologic treatment, and goal attainment among African American men and women and Caucasian women relative to Caucasian men from logistic regression analyses.*

	African Americans		Caucasian
	Women	Men	Women
	Odds Ratio	Odds Ratio	Odds Ratio
	(95% CI)*	(95% CI)*	(95% CI)*
LDL-C tested	0.49	0.60	0.80
(n=23,104)	(0.41,0.58)	(0.50,0.73)	(0.75,0.85)
Lipid drug prescribed	0.68	0.66	1.10
(n=14,499) [†]	(0.52,0.88)	(0.51,0.86)	(1.02,1.18)
LDL-C goal attainment	0.55	0.47	0.76
(n=8,336) [‡]	(0.36,0.84)	(0.30,0.73)	(0.69,0.85)

*Odds ratio and 95% confidence intervals (95% CI) from logistic regression models controlling for race, sex, age, medical history (diabetes mellitus, myocardial infarction, heart failure, hypertension), and geographic region of medical practice.

[†]Regression model includes serum LDL-C concentration.

[‡]LDL-C goal attainment (<100mg/dL) among those with documented LDL-C values and treated with lipid-lowering drugs.