Use of Cholesterol-lowering Therapy and Related Beliefs Among Middle-aged Adults after Myocardial Infarction

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OBJECTIVE: **To assess use of cholesterol-lowering therapy and related beliefs among middle-aged adults after myocardial infarction.**

DESIGN: **Telephone survey and administrative data.**

SETTING: **National managed-care company.**

PARTICIPANTS: **Six hundred ninety-six adults age 30 to 64 surveyed in 1999, approximately 1 to 2 years after a myocardial infarction.**

MEASUREMENTS: **Use of cholesterol-lowering drugs, beliefs about the importance of lowering cholesterol, and knowledge of personal cholesterol level, adjusting for demographic and clinical factors with logistic regression.**

MAIN RESULTS: **Among respondents, 62.5% reported they were taking a cholesterol-lowering drug. In adjusted analyses, these drugs were used significantly less often by African-American patients and those with congestive heart failure or peripheral vascular disease, and more often by college graduates, patients with hypertension, and those who had seen a cardiologist since their myocardial infarction. Lowering cholesterol was viewed as "very important" by 87.1% of patients, but significantly less often by smokers and more often by those who had undergone coronary angioplasty or bypass surgery. Only 42.5% of respondents knew their cholesterol level, and this knowledge was significantly less common among less-educated or less-affluent patients, African-American patients, and patients who smoked or had diabetes or peripheral vascular disease.**

CONCLUSIONS: **Although most patients recognized the importance of lowering cholesterol after myocardial infarction, several clinical and demographic subgroups were less likely to receive cholesterol-lowering therapy, and many patients were unaware of their cholesterol level. Health-care providers and managed-care plans can use these findings to promote cholesterol testing and treatment for patients with coronary heart disease who are most likely to benefit from these efforts.**

KEY WORDS: **myocardial infarction; coronary disease; hypercholesterolemia; hyperlipidemia; drug therapy; anticholesteremic agents; attitude toward health; knowledge, attitudes, practices; middle age.**
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Cholesterol-lowering therapy has been shown to reduce mortality and adverse cardiac events among people who have experienced an acute myocardial infarction in several landmark clinical trials.[1–3] As emphasized in widely disseminated guidelines from the National Cholesterol Education Program (NCEP),[4,5] these individuals should receive thorough education and vigorous treatment to reduce their low-density lipoprotein (LDL) levels if elevated.[6,7] Cholesterol-lowering drugs for patients with established coronary heart disease are also cost-effective.[8,9] Despite these benefits, several studies have suggested cholesterol-lowering therapy is underutilized among patients with coronary heart disease.[10–14] Prior surveys have assessed cholesterol awareness in the general population,[15–18] but relatively little is known about beliefs and experiences regarding cholesterol management among people with established coronary heart disease.

The importance of lowering cholesterol levels in patients with coronary heart disease has been underscored by the National Committee for Quality Assurance, which has added cholesterol management to its Health Plan Employer and Data Information Set (HEDIS) for evaluating quality of care in managed-care plans. Beginning in the year 2000, managed-care plans participating in HEDIS are required to estimate the proportion of their enrollees hospitalized for coronary heart disease who have achieved LDL levels <130 mg/dL within 1 year after discharge.[19]

Understanding the beliefs and experiences of people with coronary heart disease could help to promote effective cholesterol management in this high-risk population. Therefore, we surveyed middle-aged adults enrolled with a national managed-care company 1 to 2 years after they were hospitalized for an acute myocardial infarction. We assessed their use of cholesterol-lowering drugs, views about the importance of lowering cholesterol after myocardial infarction, and awareness of their cholesterol levels.

METHODS

Study Population

Using administrative data from a national managed-care company, we identified all enrollees age 30 to 64 hospitalized for 3 days or more between October 1, 1997

and September 30, 1998 with a principal diagnosis of acute myocardial infarction (all ICD-9-CM codes of 410.xx, except those with a fifth digit of "2" indicating a subsequent episode of care). From this cohort, we included individuals enrolled with the managed-care company in June, 1999 who had valid address and telephone information in the company's records. We randomly sampled no more than 1 enrollee from each capitated medical group designated as a primary care provider. The study protocol was approved by the Human Studies Committee of Harvard Medical School.

Data Collection

We designed a telephone survey to assess patients' use of cholesterol-lowering drugs and their beliefs about cholesterol management, including dietary changes and benefits and risks of drug therapy. Subjects were asked about their most recent cholesterol measurement ("When was your blood last tested for the following types of cholesterol, if you can recall?" and "What was the result of this blood test, if you can recall?"), information received from health care providers, racial and ethnic background, income, education, marital status, employment status, current smoking, and overall health.

The telephone survey was administered during July and August, 1999 by a professional survey firm working under a strict confidentiality agreement. Eligible subjects received an introductory letter from the managed-care company describing the voluntary nature of the study and confidentiality of individual responses. Subjects were invited to call a toll-free number to participate in the telephone interview. They were also asked to make a list of their medications in preparation for the interview. The survey firm made at least 5 attempts to contact nonrespondents by telephone over a 6-week period during daytime and evening hours, using phone numbers provided by patients when they enrolled in the managed-care plan.

Enrollment data from the managed-care company were used to determine patients' age, gender, and census region of residence (Northeast, South, Midwest, or West). Administrative data were used to identify patients who had undergone a coronary revascularization procedure (angioplasty, stenting, or bypass graft surgery) within 3 months of their myocardial infarction or had an ambulatory visit with a cardiologist within 6 months. To identify patients with key comorbid conditions, including diabetes mellitus, hypertension, congestive heart failure, peripheral vascular disease, cerebrovascular disease, and depression, we used administrative data containing primary care and specialist encounters, laboratory tests, and hospital and pharmacy claims.[20] To enhance the specificity of these designations, we required subjects to have evidence of a comorbid condition in at least 2 different types of data (e.g., hospital, laboratory, or ambulatory encounters) or 3 records within 1 type of data. The accuracy of these algorithms for identifying diagnoses is regularly validated by the managed-care company through chart abstractions of hospital and office records and feedback from physicians. Data on comorbid conditions were available only for patients enrolled in the health-maintenance organization or point-of-service plans offered by the managed-care company, representing about three quarters of the cohort, and not for patients in other types of insurance plans.

Data Analysis

Before data were sent from the managed-care company to Harvard Medical School for analysis, patient identifiers were removed to maintain confidentiality. From administrative data, we compared respondents and nonrespondents to the telephone survey by age, gender, region of residence, coronary revascularization within 3 months of discharge, ambulatory visit with a cardiologist within 6 months of discharge, eligibility for a prescription-drug benefit offered by the managed-care company, and presence of the 6 comorbid conditions listed above. We used the Pearson χ^2 test for these comparisons.

We categorized lipid-lowering drugs reported by survey respondents as HMG-CoA reductase inhibitors (statins) or other agents (bile acid sequestrants, clofibrates, niacin, or probucol) based on standard clinical classifications. Awareness of personal cholesterol levels was demonstrated by respondents who reported their cholesterol had been tested within the prior 2 years and they could recall the result.

Our analysis focused on 3 primary outcomes: 1) current use of a cholesterol-lowering drug; 2) belief that lowering cholesterol was "very important"; and 3) knowledge of personal cholesterol level. Using Pearson χ^2 tests, we assessed demographic and clinical factors and health beliefs associated with each of these outcomes. We also analyzed other beliefs and experiences reported by survey respondents, including dietary changes, knowledge of benefits and side effects of cholesterol-lowering drugs, and assessments of how well their physicians explained tests and drug treatments. We report 2-tailed *P* values for these descriptive analyses.

To assess adjusted predictors of the primary outcomes, we created 3 separate logistic regression models. In preliminary analyses, comorbid conditions were important predictors of the primary outcomes, and the three quarters of patients with comorbidity data did not differ substantially from the remaining patients without these data. Therefore, our main analyses focused on patients with comorbidity data. In secondary analyses, we tested whether the findings from logistic regression models were altered when all survey respondents were analyzed without using comorbidity data.

Each model included patient's age (50 to 54, 55 to 59, or 60 to 64 vs <50), gender, region of residence (South, Midwest, or West vs Northeast), race (African American or other vs white), self-reported total household income in 1998 (<$25,000 or $25,000–49,999 vs ≥$50,000 per year), highest grade of school completed (high-school graduate or less vs college graduate), employment status, marital status,

smoking status, 6 comorbid conditions, self-reported overall health (fair/poor vs good/very good/excellent), any coronary revascularization procedure within 3 months after myocardial infarction, and any ambulatory visit with a cardiologist within 6 months after myocardial infarction. Income data were missing for 18% of the sample. Because deleting these cases or using an indicator variable for missing income could introduce potential biases, we used NORM statistical software (version 2.02, available at www.stat.psu.edu/~jls/, accessed April 5, 2000) to obtain multiple imputed income values for respondents with missing income data.[21] We report adjusted odds ratios and 95 percent confidence intervals for all covariates in these logistic models.

Role of Funding Source

Staff of U.S. Quality Algorithms, Inc., a subsidiary of Aetna U.S. Healthcare, Inc., reviewed the survey instrument, contracted with the survey firm, identified and sent letters to eligible patients, provided de-identified data to Harvard Medical School for analysis, and reviewed a draft of the manuscript. The findings presented are solely the authors' responsibility and do not necessarily represent the official views of the funder or its affiliates.

RESULTS

Patient Characteristics

We identified 1,907 people hospitalized 3 days or longer with a principal diagnosis of acute myocardial infarction during the study period. Of these individuals, 313 did not have valid telephone numbers, 39 did not speak English or had a speech or hearing deficit that precluded telephone interviewing, 24 were deceased at the time of contact, and 11 reported they did not have cardiac disease. Of the remaining 1,520 individuals potentially eligible for our study, 941 (61.9%) completed the survey, 373 (24.5%) refused or discontinued it, and 206 (13.6%) could not be reached despite multiple attempts to contact them.

Comorbidity data were available for 696 respondents (74.0%) and 418 nonrespondents (72.2%), and characteristics of these 2 groups are shown in Table 1. Respondents were somewhat older than nonrespondents (mean age 54.1 vs 53.0 years, $P = .02$), more likely to be women ($P = .05$), and more likely to have undergone a coronary revascularization procedure ($P = .04$). The 2 groups did not differ by region ($P = .89$), the proportion participating in the managed-care company's prescription benefit program ($P = .69$), or the proportion who had an ambulatory visit with a cardiologist ($P = .10$). Respondents tended to have congestive heart failure more often than nonrespondents ($P = .06$), but the 2 groups were similarly likely to have diabetes mellitus, hypertension, peripheral vascular disease, cerebrovascular disease, and depression (all $P \geq .20$).

Demographic and clinical characteristics of the 696 respondents with comorbidity data are summarized in Table 1. Among these patients, 67.2% reported that they had been "diagnosed with high cholesterol" by a physician. Three quarters (75.7%) had changed their diet "some" or "a lot" to reduce their cholesterol, and 77.9% noted that they had reduced their total or saturated fat intake. Nearly three quarters of patients (72.1%) reported that the doctor mainly responsible for their cardiac care explained test indications and results "very well," and 57.6% reported that their

Table 1. Characteristics of Survey Respondents and Nonrespondents*

Characteristics	Respondents (n = 696), % (n)	Nonrespondents (n = 418), % (n)
Age, y		
<50	26.3 (183)	27.5 (115)
50–54	22.0 (153)	27.3 (114)
55–59	23.1 (161)	24.4 (102)
60–64	28.6 (199)	20.8 (87)‡
Male gender	70.7 (492)	76.1 (318)‡
Region of residence		
Northeast	74.3 (517)	74.9 (313)
South	16.1 (112)	16.8 (170)
Midwest	4.7 (33)	3.8 (16)
West	4.9 (34)	4.6 (19)
Race/ethnicity		NA
White	80.3 (559)	
African American	7.8 (54)	
Other†	11.9 (83)	
Total 1998 household income		NA
<$25,000	17.8 (124)	
$25,000–$49,999	29.6 (206)	
≥$50,000	33.9 (236)	
Missing	18.7 (130)	
Education		NA
Not a high school graduate	11.2 (78)	
High school graduate	63.9 (445)	
College graduate	24.3 (169)	
Missing	0.6 (4)	
Married	78.6 (547)	NA
Employed full- or part-time	62.8 (437)	NA
Current smoker	16.7 (116)	NA
Fair or poor overall health	28.4 (198)	NA
Coronary revascularization procedure within 3 mo after myocardial infarction	47.3 (329)	40.9 (171)‡
Ambulatory cardiology visit within 6 mo after myocardial infarction	77.7 (541)	72.5 (303)
Prescription benefit from managed-care company	78.3 (545)	77.3 (323)
Comorbid conditions		
Diabetes mellitus	25.6 (178)	15.1 (63)
Hypertension	31.3 (218)	33.3 (139)
Congestive heart failure	23.3 (162)	18.4 (77)
Peripheral vascular disease	9.2 (64)	7.7 (32)
Cerebrovascular disease	8.3 (58)	6.2 (26)
Depression	17.8 (124)	15.1 (63)

* *Based on the 696 respondents and 418 nonrespondents for whom comorbidity data were available. Variables available only from survey data are denoted NA (not available) for nonrespondents.*
† *Includes Hispanics, Asians, and "other" self-reported categories.*
‡ $P \leq .05$.

doctor was similarly effective in explaining benefits and side effects of drugs. Three quarters of patients (78.3%) participated in a pharmaceutical benefit plan offered by the managed-care company to provide full or partial coverage for prescription drugs. Many of the remaining individuals may have participated in similar pharmaceutical plans arranged separately by their employers.

Use of Cholesterol-lowering Drugs

Among respondents with comorbidity data, 62.5% were using cholesterol-lowering drugs at the time of the survey, including 81.4% of those who reported a diagnosis of elevated cholesterol and 23.7% of those who did not report this diagnosis. Of the 435 patients who reported taking a cholesterol-lowering drug, 90.8% were taking a statin agent, 7.4% were taking a nonstatin agent, and 1.8% were taking both a statin and nonstatin. In this group on drug therapy, 51.7% reported that their cardiologist was "mainly responsible for treating their cholesterol," 45.1% reported that their primary care physician fulfilled this role, 2.3% said another specialist treated their cholesterol, and 0.8% were unsure who was treating their cholesterol.

To validate patients' reports of cholesterol drug therapy, we analyzed prescription claims of the 347 patients taking a cholesterol-lowering drug who also had a prescription drug benefit through the managed-care company. For 327 of these patients (94.2%), a prescription had been filled for a cholesterol-lowering drug during the year after their myocardial infarction, indicating a high degree of concordance between our survey and prescription claims data. The remaining 20 patients may have filled their prescriptions through a spouse's benefit plan, been taking over-the-counter niacin, or incorrectly reported their drug use.

Patients who believed lowering cholesterol was very important for patients after myocardial infarction in general were more likely to be taking a cholesterol-lowering drug (64.7% vs 47.8%, $P < .01$). Patients on cholesterol-lowering drugs were more likely than other patients to believe drug therapy reduced the risk of a recurrent heart attack (51.5% vs 37.2%, $P < .001$), but few patients in either group believed drug therapy reduced the risk of death (17.6% vs 16.6%, $P = .72$). Among patients taking cholesterol-lowering drugs, only 34.3% were aware of the risk of liver dysfunction, and only 4.6% perceived a risk of muscle damage.

In unadjusted analyses (Table 2), cholesterol-lowering drugs were used less commonly by patients who were African American, less educated, or had congestive heart failure or peripheral vascular disease, and these drugs were used more often by patients who had an ambulatory visit with a cardiologist after their MI. All of these differences remained significant in the adjusted analysis except for a trend of borderline significance among patients who were not high school graduates, and treatment rates were also higher for patients with hypertension (Table 3). Patients age 50 and older tended to receive cholesterol-lowering drugs less often than younger patients. This difference was statistically significant among those age 55 and 59 and of borderline significance for those age 50 to 54 and 60 to 64. When we analyzed the full cohort of 941 survey respondents without controlling for comorbid conditions, differences by race and contact with a cardiologist remained statistically significant, and patients age 55 and older were significantly less likely than patients under age 50 to be taking cholesterol-lowering drugs (data not shown).

Beliefs about Lowering Cholesterol

Among respondents, 87.1% believed that lowering cholesterol was "very important" to help individuals who have had a myocardial infarction reduce their chance of a recurrent infarction. This belief was more common among those who had undergone a coronary revascularization procedure in unadjusted (Table 2) and adjusted analyses (Table 3) and less common among smokers in the adjusted analysis. No other demographic or clinical factors were significantly associated with this belief in adjusted analyses, but differences of borderline significance ($.05 < P \leq .10$) were evident for patients who resided in the South relative to those in the Northeast, were not college graduates, had congestive heart failure, or had seen a cardiologist after their myocardial infarction. When we analyzed all 941 survey respondents without controlling for comorbid conditions, cholesterol lowering was more often viewed as very important by patients who were not college graduates and those who had seen a cardiologist and less often perceived as very important by smokers (data not shown).

Awareness of Personal Cholesterol Levels

Fewer than half (42.5%) of respondents were aware of their own cholesterol level within the prior 2 years. In unadjusted analyses (Table 2), this awareness was less common among patients who were African American, less educated, less affluent, not employed, or currently smoking. Awareness of personal cholesterol levels was also less common among patients with diabetes mellitus, hypertension, congestive heart failure, cerebrovascular disease, and peripheral vascular disease. In adjusted analyses (Table 3), these differences remained significant for patients who were African American, less educated or affluent, currently smoking, diabetic, or had peripheral vascular disease, and were of borderline significance for those with cerebrovascular disease. The differences by race, education, income, and smoking status remained significant when all 941 survey respondents were examined without adjusting for comorbid conditions (data not shown).

DISCUSSION

In this national study of middle-aged adults who had survived a myocardial infarction, over 60% of respondents reported taking a cholesterol-lowering drug, but relatively few patients were aware of the specific benefits and risks of

Table 2. Patients' Experiences and Beliefs Regarding Cholesterol Management

Characteristic	Taking Cholesterol-lowering Drug, %	View Cholesterol Lowering as "Very Important," %	Aware of Personal Cholesterol Level, %
All patients	62.5	87.1	42.5
Age, y			
<50	69.4	88.0	45.4
50–54	61.4	89.5	41.8
55–59	57.8	83.2	39.1
60–64	60.8	87.4	43.2
Gender			
Male	62.8	86.8	44.7
Female	61.8	87.8	37.3
Region of residence			
Northeast	62.7	88.0	43.3
South	63.4	83.9	39.3
Midwest	60.6	90.9	42.4
West	58.8	79.4	41.2
Race/ethnicity	*		‡
White	64.4	87.1	44.9
African American	46.3	88.9	18.5
Other	60.2	85.5	42.2
Household income			‡
<$25,000	58.9	82.3	26.6
$25,000–$49,999	62.6	86.9	43.7
≥$50,000	69.1	89.4	56.8
Missing	53.9	87.7	30.0
Education	†		‡
Not high school gradute	55.1	88.5	25.6
High school gradute	60.2	87.6	39.5
College graduate	71.6	85.8	58.6
Marital status			*
Married	62.9	87.8	44.8
Not married	61.1	84.6	34.2
Employment status			†
Employed	64.3	89.0	46.7
Not employed	59.5	84.1	35.4
Current smoker			†
Yes	60.3	81.9	29.3
No	62.9	88.1	45.2
Overall health			
Excellent/very good	64.6	90.9	47.4
Good	63.3	85.1	43.6
Fair or poor	59.1	85.9	35.9
Coronary revascularization procedure within 3 mo after MI		†	
Yes	66.0	90.9	41.0
No	59.4	83.7	43.9
Ambulatory cardiology visit within 6 mo after MI	†	*	
Yes	66.0	88.9	44.0
No	50.3	80.6	37.4
Comorbid conditions			
Diabetes mellitus			‡
Present	63.5	83.2	30.3
Absent	62.2	88.4	46.7
Hypertension			†
Present	63.8	86.2	34.9
Absent	61.9	87.5	46.0
Congestive heart failure	*	*	*
Present	54.3	81.5	34.6
Absent	65.0	88.8	44.9
Peripheral vascular disease	*		‡
Present	48.4	85.9	20.3
Absent	63.9	87.2	44.8
Cerebrovascular disease			‡
Present	60.3	87.9	20.7
Absent	62.7	87.0	44.5
Depression			
Present	54.8	86.3	36.3
Absent	64.2	87.2	43.9

* $P \leq .05$.
† $P \leq .01$.
‡ $P \leq .001$.
MI, myocardial infarction.

this therapy. Most patients were not aware that cholesterol-lowering drugs reduce the risk of recurrent myocardial infarction, and very few patients recognized that these drugs reduce the risk of death. Only about one third of patients taking cholesterol-lowering drugs were aware of potential hepatic side effects, and hardly any of them recognized potential risks of muscle damage. Consistent with these data, only about half of patients reported that their doctor explained drug benefits and risks very well.

The 62.5% of patients using cholesterol-lowering drug therapy in this study was substantially higher than the 29% of elderly patients whom we found were taking these drugs after myocardial infarction during 1996 in a prior study.[14] At least three quarters of the patients in our current study—and presumably many more—had a pharmaceutical benefit to help pay for prescription drugs, so drug costs were probably less prohibitive than for older Medicare beneficiaries without such coverage.[22] Use of cholesterol-lowering drugs may also have been higher because of growing awareness of patients and physicians about their value, as suggested by a corresponding increase in use of these drugs after myocardial infarction in 9 European countries from 31% in 1995–1996 to 64% in 1999–2000.[23] Approximately 55% of U.S. men and women age 55 to 64 with known coronary heart disease have LDL cholesterol levels greater than 130 mg/dL.[24] Thus, the rate of drug use in our study appeared consistent with U.S. national guidelines recommending drug therapy for patients with coronary heart disease and serum cholesterol levels above this threshold.[4,5]

Patients who were African American or less educated were less likely to be receiving cholesterol-lowering therapy after a myocardial infarction, despite most having insurance that covers this therapy. Similar differences have been demonstrated for other effective cardiac drugs and procedures,[25–28] underscoring the ongoing need to monitor and evaluate racial and socioeconomic differences in cardiovascular care and eliminate disparities in the use of effective therapies for appropriate patients. Higher rates of treatment in patients under age 50 than in older patients may reflect a more aggressive approach to secondary prevention or higher cholesterol levels in younger patients. In contrast, use of cholesterol-lowering drugs did not differ significantly by patients' gender or region of residence.

The benefits of cholesterol-lowering therapy have been demonstrated in patients with coronary heart disease and other related conditions such as smoking, diabetes, or impaired ventricular function.[2,3] In our analysis, however, patients with congestive heart failure or peripheral vascular disease were less likely to be taking cholesterol-lowering drugs. Patients who smoked or had congestive heart failure were less likely than other patients to view cholesterol lowering as "very important," and those who smoked or had diabetes mellitus or peripheral vascular disease were less aware of their cholesterol level. Future research should assess why such differences arise and determine how patients with these conditions can be educated and treated more consistently with cholesterol-lowering drugs when clinically indicated.

Nearly 90% of participants believed lowering cholesterol was very important for people who have had a myocardial infarction to reduce their risk of recurrent infarction. However, many patients were not aware of their own cholesterol level. The NCEP has strongly encouraged Americans to "know your cholesterol numbers."[17] Individuals' awareness of their personal cholesterol levels may facilitate their compliance with dietary changes to reduce their cholesterol, especially when individuals accept their diagnosis of hypercholesterolemia.[29]

Patients who had at least 1 ambulatory visit with a cardiologist during the 6 months after their myocardial infarction were more likely to be taking a cholesterol-lowering drug, consistent with some prior studies.[30,31] Patients who had seen a cardiologist also tended more often to view cholesterol lowering as "very important." These differences may have resulted from prescribing decisions and educational efforts of cardiologists, comparable actions by primary-care physicians who collaborate with cardiologists, or unmeasured characteristics of patients who seek specialty care.

Strengths of our study included the representative sample of patients from a national managed-care company, pharmacy claims to validate reports of drug use, and comprehensive administrative data to identify comorbid conditions, coronary revascularization procedures, and ambulatory visits with cardiologists. We imputed missing income data to avoid mishandling patients who did not report income. Our study also had some limitations. Because of incomplete claims data regarding laboratory tests, we were unable to confirm whether patients' cholesterol levels had been tested, and we did not have the actual test results. Thus, we could not assess the effectiveness of patients' cholesterol-lowering therapy to determine whether they had achieved LDL cholesterol levels less than 100 or 130 mg/dL, consistent with NCEP or HEDIS standards, respectively.[4,5,19] Other studies have found that many patients receiving cholesterol-lowering drugs may not be achieving these targets.[32–34] Although most patients could not recall their personal cholesterol level, some may have known whether it was elevated or not and incorporated this perception in their decisions about cholesterol-lowering diets and drugs. Because nonrespondents may have been less interested in cholesterol management than respondents, our estimates of cholesterol drug use and awareness might have been somewhat lower if the nonrespondents had also participated in our survey. We studied enrollees of 1 managed-care company who resided predominantly in the Northeast, so our findings should be confirmed in other settings. For example, in a recent study of elderly patients who had survived a myocardial infarction, we found that use of cholesterol-lowering drugs was greater in California than in Massachusetts, New York, and Pennsylvania.[14]

In conclusion, our study demonstrated that almost all middle-aged adults enrolled with a large managed-

Table 3. Adjusted Predictors of Patients' Experiences and Beliefs Regarding Cholesterol Management*

Characteristic	Taking Cholesterol-lowering Drug	View Cholesterol Lowering as "Very Important"	Aware of Personal Cholesterol Level
Age (vs <50 years), y			
50–54	0.6 (0.4 to 1.0)†	1.1 (0.5 to 2.3)	1.0 (0.6 to 1.6)
55–59	0.5 (0.3 to 0.8)‡	0.7 (0.3 to 1.3)	0.9 (0.6 to 1.5)
60–64	0.6 (0.4 to 1.0)†	1.0 (0.5 to 2.1)	1.3 (0.8 to 2.1)
Female (vs male)	1.2 (0.8 to 1.8)	1.3 (0.7 to 2.2)	1.0 (0.7 to 1.4)
Region of residence (vs Northeast)			
South	0.9 (0.6 to 1.4)	0.6 (0.3 to 1.1)†	0.7 (0.4 to 1.1)
Midwest	0.9 (0.4 to 2.0)	1.3 (0.4 to 4.6)	1.2 (0.5 to 2.6)
West	1.0 (0.5 to 2.1)	0.6 (0.2 to 1.5)	0.7 (0.3 to 1.6)
Race/ethnicity (vs white)			
Black	0.4 (0.2 to 0.8)‡	1.7 (0.6 to 4.4)	0.4 (0.2 to 0.8)‡
Other	0.7 (0.4 to 1.2)	1.2 (0.6 to 2.5)	1.0 (0.6 to 1.6)
Household income (vs ≥$50,000)			
<$25,000	1.0 (0.6 to 1.7)	0.7 (0.4 to 1.4)	0.5 (0.3 to 0.9)§
$25,000–$49,999	0.8 (0.6 to 1.3)	0.7 (0.4 to 1.4)	0.8 (0.5 to 1.2)
Education (vs college graduate)			
Not high school graduate	0.6 (0.3 to 1.0)†	2.2 (0.9 to 5.7)†	0.4 (0.2 to 0.7)‡
High school graduate	0.6 (0.4 to 0.9)‡	1.6 (0.9 to 2.9)†	0.6 (0.4 to 0.8)‡
Married (vs not married)	0.9 (0.6 to 1.4)	1.0 (0.6 to 1.9)	1.1 (0.7 to 1.7)
Employed (vs not employed)	0.9 (0.6 to 1.4)	1.4 (0.8 to 2.4)	1.0 (0.6 to 1.5)
Current smoker (vs former or nonsmoker)	1.0 (0.6 to 1.5)	0.5 (0.3 to 0.9)§	0.5 (0.3 to 0.9)‡
Fair or poor health (vs excellent, very good, or good)	1.0 (0.7 to 1.4)	1.2 (0.7 to 2.1)	1.1 (0.7 to 1.6)
Coronary revascularization procedure within 3 mo of MI (vs no procedure)	1.2 (0.8 to 1.6)	1.9 (1.2 to 3.2)‡	0.8 (0.6 to 1.1)
Ambulatory cardiology visit within 6 mo after MI (vs no visit)	1.8 (1.2 to 2.6)‡	1.7 (1.0 to 2.9)†	1.1 (0.8 to 1.7)
Comorbid conditions (present vs not present)			
Diabetes mellitus	1.4 (0.9 to 2.1)	0.7 (0.4 to 1.1)	0.6 (0.4 to 0.9)§
Hypertension	1.5 (1.0 to 2.2)§	0.9 (0.5 to 1.6)	0.8 (0.6 to 1.2)
Congestive heart failure	0.7 (0.4 to 1.0)§	0.6 (0.3 to 1.0)†	1.0 (0.7 to 1.5)
Peripheral vascular disease	0.5 (0.3 to 1.0)§	1.1 (0.5 to 2.5)	0.4 (0.2 to 0.8)§
Cerebrovascular disease	1.2 (0.7 to 2.3)	1.2 (0.5 to 3.1)	0.5 (0.3 to 1.1)†
Depression	0.7 (0.4 to 1.0)†	1.3 (0.7 to 2.4)	0.9 (0.6 to 1.5)

* *Using three separate logistic regression models to simultaneously adjust for all listed variables in predicting the dependent variable specified at the top of each column. Adjusted odds ratios and 95 percent confidence intervals are shown for each variable.*

† $P \leq .10$.

‡ $P \leq .01$.

§ $P \leq .05$.

MI, myocardial infarction.

care company in 1999 who had survived an acute myocardial infarction recognized the importance of cholesterol-lowering therapy, and an appropriate proportion appeared to be taking cholesterol-lowering drugs. However, African-American patients, less-educated patients, and those with common comorbid conditions were less likely to have received this therapy, and many patients were not aware of their personal cholesterol levels or the benefits and risks of cholesterol-lowering drugs. These findings indicate important opportunities to educate patients about cholesterol management and thus improve their quality of care. Such efforts may also help managed-care plans and health care providers satisfy the recently announced HEDIS performance measure to achieve acceptable levels of LDL cholesterol among their patients with coronary heart disease.

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