A Community-Wide Survey of Physician Practices and Attitudes Toward Cholesterol Management in Patients With Recent Acute Myocardial Infarction

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Background: Physicians' current attitudes and practices toward the management of high cholesterol levels in patients with recent acute myocardial infarction are not well defined.

Objective: To examine threshold levels of serum cholesterol and other factors that influence physicians' decision to prescribe lipid-lowering drugs and initiate dietary therapy in patients with recent acute myocardial infarction.

Methods: Community-wide questionnaire survey of general internists, cardiologists, and family physicians practicing in the Worcester, Mass, metropolitan area.

Results: Among the 257 responding physicians, lipid-lowering drug therapy was more likely to be initiated in younger patients at lower total serum and low-density lipoprotein (LDL) cholesterol levels than in older patients (P = .03). Younger physicians were more likely to initiate dietary and lipid-lowering drug therapy at lower total and LDL cholesterol levels than their older counterparts. Younger physicians also considered LDL cholesterol level the most important factor in initiating lipid-lowering drug therapy in contrast to older physicians who favored total cholesterol level (P = .001). General practice physicians were more likely to initiate therapeutic dietary therapy at lower total cholesterol levels, but tended to initiate lipid-lowering drug therapy at higher total and LDL cholesterol levels compared with internists and cardiologists. Physicians reported that the most important factors that interfere with patients' use of lipid-lowering medication were concerns about medication costs, issues related to polypharmacy, and failure to recognize the importance of lipid-lowering drugs. Several physician-associated factors, including perceived importance of other cardiac drugs and provider responsibility, were associated with the nonuse of lipid-lowering medications.

Conclusion: Educational and practice-based efforts remain necessary to remove potential barriers to the implementation of effective long-term cholesterol management in patients with recent acute myocardial infarction.

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Evidence accrued from randomized trials has demonstrated that lowering elevated serum cholesterol levels significantly reduces the risk of nonfatal myocardial infarction (MI) and death attributed to coronary heart disease (CHD) in high-risk healthy individuals and those with established CHD.1,2 Hyperlipidemia thereby represents an important modifiable risk factor for the development and progression of CHD in many individuals.

These results and other accumulated evidence have led to a series of published guidelines by the National Cholesterol Education Program (NCEP) for the more effective management of persons with elevated serum lipid levels, including specific recommendations for aggressive lipid lowering in patients with CHD.3 The NCEP–Adult Treatment Panel (ATP) II guidelines emphasize that patients with any manifestation of cardiovascular disease should reduce their low-density lipoprotein (LDL) cholesterol levels below 100 mg/dL (<2.59 mmol/L).3 Accordingly, one of the performance measures of the National Committee for Quality Assurance (NCQA) will reflect the extent of effective cholesterol management in patients with CHD.4 Managed care organizations looking for NCQA accreditation must act in accordance with the latest Health Plan Employer Data and Information Set (HEDIS) mandate to assess and report the percentage of patients with a major CHD event in whom elevated serum LDL levels have been lowered within 1 year of hospitalization.4

Despite this background, physicians' adoption of and adherence to the NCEP-ATP II guidelines have been less than optimal, especially in patients with...
PATIENTS AND METHODS

STUDY SAMPLE

We invited all internal medicine, family practice, and cardiology physicians practicing in the Worcester (Mass) Standard Metropolitan Statistical Area (SMSA) (1990 census estimate was 437,000) to participate in a mailed questionnaire survey of their attitudes and practices toward the use of various lipid-lowering management strategies in patients with recent acute MI. Physicians practicing in the Worcester SMSA were identified through a medical directory and from hospital listings of physicians who had admitting privileges to greater Worcester hospitals. A total of 457 physicians were identified as either practicing in the Worcester SMSA and/or having admitting privileges at area hospitals. We excluded 32 physicians who had moved out of the area or died, 4 retired physicians, and 25 physicians who indicated that they were not actively treating patients with CHD at the time that the survey took place. The survey was mailed to 396 physicians in the fall of 1999. Two repeat mailings were sent to initial survey nonrespondents. A small monetary incentive ($10) was offered to physicians who completed the survey. This study was approved by the institutional review board from the University of Massachusetts Medical School, Worcester.

The questionnaire asked detailed questions about physicians’ routine practices toward the management of elevated cholesterol levels for the secondary prevention of CHD and the levels of total serum and LDL cholesterol at which they usually initiate dietary and lipid-lowering drug therapy in patients with evidence of recent acute MI. Separate questions were asked according to different patient age groups (30-64 years, 65-74 years, and ≥75 years). In the survey we did not specify the cholesterol cut points (eg, <200 mg/dL [<5.18 mmol/L], 200-239 mg/dL [5.18-6.19 mmol/L], and ≥240 mg/dL [6.22 mmol/L]) commonly used to denote gradation of CHD risk and to guide treatment strategies. Instead, we asked the physicians to indicate at what level of serum cholesterol and/or LDL cholesterol they usually initiate dietary or lipid-lowering drug therapy in previously described age groups. We asked physicians about the importance of different lipid fractions in making decisions about the initiation of lipid-lowering drug therapy and the relative importance of decreasing LDL levels compared with increasing high-density lipoprotein levels in the secondary prevention of CHD in patients with recent acute MI. We also asked physicians which type of lipid-lowering agent they would usually initially prescribe in patients with recent acute MI and elevated serum cholesterol levels according to different patient age groups. Surveyed individuals were then asked to rank the importance of a number of patient and physician-related factors in influencing treatment with lipid-lowering drug therapy.

Information about physician characteristics including age, sex, specialty, and type of practice was collected. Physicians in the specialties of general and family practice, internal medicine, and cardiology were considered to be the ones most likely to care for patients with recent acute MI and were the primary groups targeted for our survey. Because of study size limitations and possible differences in reported attitudes and practices toward the various factors under study, the study sample was categorized into the following 2 groups for purposes of analysis according to practice type: primary care and family practice physicians (30%) and internal medicine and cardiologists (70%).

DATA ANALYSIS

Differences in the distribution of physicians’ attitudes and practices toward cholesterol management in the treatment of patients with recent acute MI and high serum cholesterol levels according to specialty and age were examined with χ² tests of statistical significance for discrete variables. Analysis of variance and t tests were used for the analysis of between-group differences for continuous variables. The Mantel-Haenszel χ² test was used to assess the significance of between-group differences for trends in various lipid-related factors. A logistic regression analysis was used to examine the association of physician-related characteristics (age, sex, specialty, and affiliation with an health maintenance organization [HMO]) with patient and physician factors that may influence the use of lipid-lowering drug therapy while controlling for potentially confounding factors.

CHD.5,6 Several surveys indicate that fewer than half of patients with CHD have received active dietary or pharmacologic cholesterol-lowering interventions.5,7 In patients with recent acute MI, this issue is further complicated by the controversy surrounding the appropriate timing of cholesterol management as well as the cholesterol levels at which to begin dietary or medication therapy.8

Relatively little information is known about the reasons for patients not receiving therapy with cardiac medications in general and hypolipidemic agents in particular.9 In addition, limited information exists about patients’ and providers’ attitudes and beliefs toward the efficacy of lipid-lowering medications and dietary therapy for patients after recent acute MI. Information on current physician attitudes and practices toward lipid-lowering interventions is essential for identifying obstacles to optimal preventive and treatment strategies in these high-risk patients.

The purpose of our questionnaire survey in a community sample of physicians was to identify factors that influence treatment practices and providers’ attitudes toward cholesterol management in patients with recent acute MI. The results of this study provide insights to current physician practice patterns in the secondary prevention of CHD, particularly in regard to effective lipid management.

RESULTS

The present report is based on information provided by 257 physicians, which yielded an overall questionnaire response rate of 65%. The average age of the responding physicians was 49 years. No significant age differences were noted between responding physicians of different specialties or types of practice. Approximately three fourths (73%) of the sample were men; 9% were in general practice, 25% in family practice, 59% in internal medi-
cine, and 11% reported their specialty as cardiology. Of the study sample, 43% were in private practice, 16% were affiliated with an academic hospital, 20% were affiliated with a community hospital, and 21% practiced in an HMO; 72% of the sample were board certified. Because the survey was confidential and extremely limited information was available about the targeted physician sample, we were unable to compare the characteristics of responding physicians with those of nonrespondents.

**INITIATION OF DIETARY AND LIPID-LOWERING DRUG THERAPY ACCORDING TO PHYSICIAN AGE AND SPECIALTY**

Responding physicians reported that lipid-lowering drug therapy was more frequently initiated at similar total (mean, 201 mg/dL [5.21 mmol/L]) and LDL (mean, 122 mg/dL [3.16 mmol/L]) cholesterol levels than dietary therapy (mean total cholesterol and LDL cholesterol levels, 200 and 122 mg/dL [5.18 and 3.16 mmol/L], respectively), regardless of physician age or patient age group targeted. Patient age modestly affected physicians’ threshold level for initiating dietary and lipid-lowering therapies; older patients were permitted higher total and LDL cholesterol levels prior to the initiation of treatment. However, the impact of physician age on these treatment practices was more striking. Physicians 55 years and older were much more liberal than their younger counterparts in their threshold levels for treatment, allowing significantly higher LDL levels prior to the initiation of dietary or lipid-lowering drug therapy (P = .02) (Figure 1).

About the influence of physician specialty on reported practice patterns, internists and cardiologists started dietary therapy at lower LDL levels and lipid-lowering drug therapy at lower total cholesterol and LDL levels compared with their colleagues in general or family practice (Figure 2). Because different cholesterol management practices may exist between internists and cardiologists, we carried out an additional subgroup analysis comparing these 2 physician groups. The results of this analysis showed that compared with internists, cardiologists started dietary therapy at slightly lower total cholesterol levels (204 mg/dL [5.28 mmol/L] vs 207 mg/dL [5.36 mmol/L]), but at higher LDL concentrations (121 mg/dL [3.13 mmol/L] vs 116 mg/dL [3.00 mmol/L]). Cardiologists started lipid-lowering drug therapy at higher total cholesterol levels than those used by internists (214 mg/dL [5.54 mmol/L] vs 204 mg/dL [5.28 mmol/L]), but each group initiated lipid-lowering drug therapy at the same LDL level (120 mg/dL [3.11 mmol/L]).

**IMPORTANCE OF LIPID FRACTIONS IN INITIATING TREATMENT**

Most physicians reported LDL cholesterol to be the most important lipid fraction they consider in initiating lipid-lowering drug therapy in patients with recent myocardial infarction, regardless of physician age or specialty.
acute MI. Almost 90% of internists and cardiologists and more than 95% of younger physicians (<45 years) identified LDL as the most important factor affecting their decision to proceed with lipid-lowering drug treatment. This observation is in contrast to older physicians (≥55 years) in whom a substantial proportion identified total cholesterol or high-density lipoprotein as more important lipid parameters used in their decision to start therapy (P = .001). Consistent with these results, in asking physicians about the relative importance of either decreasing LDL cholesterol levels, or increasing serum high-density lipoprotein cholesterol levels, two thirds reported that decreasing LDL levels was more important.

LIPID-LOWERING TREATMENT PREFERENCES

Most physicians (86%) reported that they would consider both dietary and drug therapy as the initial form of therapy to lower serum cholesterol levels in patients with recent acute MI. Fewer than 1% of physicians reported that they would initially treat these patients with only lipid-lowering drug therapy, while 13% would consider only dietary therapy as the initial form of treatment. Most responding physicians (97%) indicated that for both men and women with a recent acute MI and elevated cholesterol levels they would initially prescribe statins as the lipid-lowering medication of choice.

PATIENT FACTORS THAT MAY PREVENT THE USE OF LIPID-LOWERING DRUG THERAPY

In asking physicians about a variety of patient-related factors that may interfere with the successful implementation of lipid-lowering drug therapy in patients with recent acute MI and elevated serum cholesterol levels, the most important factor influencing whether lipid-lowering drug therapy was begun was patients' concerns about the costs of medication (Figure 3). Pa-
patients believing that they could lower their cholesterol levels without drugs, believing that they were already taking too many other drugs, and not understanding the importance of lipid-lowering drugs were also noted as important contributory factors. Of lesser importance were troublesome adverse effects, the belief that other cardiac drugs were more important, and patient compliance.

PHYSICIAN FACTORS THAT MAY PREVENT THE USE OF LIPID-LOWERING DRUG THERAPY

In asking the surveyed sample to indicate which physician-related factors influence the prescribing of lipid-lowering medication, the most influential factor reported was the belief that physicians do not adequately inform their patients about the use of these medications or encourage their use (Figure 4). Other contributory factors included the belief that other drugs used in the management of CHD were more important and confusion over which provider was responsible for the patient's lipid management. Of lesser importance was the belief that cholesterol management was unchallenging or unexciting. Although the least influential factor measured, nearly 50% of physicians surveyed felt that nonprescription of therapy was affected by the fact that physicians were not convinced of the benefits of lipid-lowering agents.

PHYSICIAN CHARACTERISTICS ASSOCIATED WITH THE USE OF LIPID-LOWERING DRUG THERAPY

We also examined the association of several physician characteristics, including age, sex, specialty, and HMO affiliation, with previously described factors (Figures 3 and 4) that could influence the use of lipid-lowering drug therapy. We carried out a logistic regression analysis in which we examined the association of these physician characteristics with selected outcomes while controlling for the effect of each other factor. The following physician characteristics were significantly related to beliefs about the use of lipid-lowering drug therapy: older physicians were less likely than younger physicians to be concerned if patients think that other cardiac medications are more important (odds ratio [OR], 0.29; 95% confidence interval [CI], 0.13-0.65). Men were more likely than women to think that patients believe that they can lower their cholesterol levels without drugs (OR, 2.22; 95% CI, 1.2-4.3). Internists and cardiologists were significantly less likely to believe that physicians are not convinced of the benefits of lipid-lowering drug therapy for patients with CHD (OR, 0.41; 95% CI, 0.18-0.94). Physicians affiliated with HMOs were more likely to believe that physicians do not adequately inform their patients about the use of lipid-lowering drugs or encourage them to take these medications (OR, 2.0; 95% CI, 1.0-4.0).

COMMENT

To our knowledge, no previously published study has systematically examined physicians' attitudes and practices toward the use of dietary and lipid-lowering drug therapy in patients after hospital discharge for recent acute MI, particularly from the more generalizable perspective of community-based providers. The results of our community survey of physicians suggest that older physicians were less likely to implement recommended guidelines for the treatment of high cholesterol levels in patients with recent acute MI. Surveyed physicians also reported that they would treat younger patients with recent acute MI more aggressively with both dietary changes and lipid-lowering drug therapies than older patients. In addition, internal medicine and cardiology physicians reported being more aggressive with the use of lipid-lowering drug therapy (ie, initiating treatment at both lower total serum and LDL cholesterol levels) than other physician specialties. Across all physician and patient age groups, treatments to lower serum cholesterol were in the range of what may be conventionally considered to be desirable or borderline desirable levels of total and LDL serum cholesterol. We also found that the 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitors (statins) were the overwhelming drug of choice for the management of hyperlipidemia. A number of patient and provider factors were reported to be associated with the use (or nonuse) of lipid-lowering medications.

Hyperlipidemia represents an important modifiable risk factor in the development and progression of CHD. During the past decade, particularly with the development and application of new lipid-lowering regimens, treatment of dyslipidemia has emerged as a powerful approach for the prevention of initial and recurrent CHD events. Several large-scale randomized clinical trials have demonstrated the merits of intensive lipid-lowering drug therapy in the secondary prevention of CHD with reductions in associated morbidity and mortality approaching upwards of 50%. Patients with established CHD and lipid abnormalities represent an important high-risk subgroup because their risk of dying is significantly greater than that of patients with comparable risk factors but without a known history of CHD.

In response to compelling evidence for the benefits of cholesterol-lowering therapy, considerable efforts have been made in developing and promoting clinical
guidelines for the screening and treatment of lipid abnormalities. Specific guidelines for cholesterol testing, dietary counseling, and pharmacologic treatment have been provided by the NCEP-ATP I (1988) and NCEP-ATP II (1993). The NCEP-ATP II guidelines placed particular strong emphasis on the secondary prevention of CHD as well as on LDL cholesterol as the primary lipid treatment target. The recently released third report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III) continues to emphasize that intensive lipid-lowering treatment should be maintained in the management of patients with CHD.

At the time that we conducted our physician survey, the NCEP guidelines for patients with CHD recommended obtaining a fasting lipid profile. If LDL cholesterol level was above 100 mg/dL (2.59 mmol/L), then initiation of dietary therapy was recommended; if the LDL cholesterol level remained above 130 mg/dL (3.37 mmol/L) after 6 to 12 weeks of dietary therapy, initiation of drug therapy was recommended. Dietary therapy and lifestyle changes should be considered in patients with an LDL cholesterol level between 100 and 129 mg/dL (2.59-3.34 mmol/L); the decision to initiate lipid-lowering drug therapy was left up to the physician’s discretion according to his or her clinical judgment. The most recent ATP III recommendations emphasize again that the goal of lipid-lowering drug therapy in patients with CHD should be to achieve an LDL cholesterol level lower than 100 mg/dL (2.59 mmol/L). An important recommendation in ATP III is that men and women should be treated similarly.

The results of the present study suggest different views and possible interpretations of these recommendations by our community physicians. Surveyed physicians reported initiating dietary therapy at lower average total and LDL cholesterol levels than published recommendations. These physicians also tolerated higher levels of these serum lipids with advancing patient age.

Despite the publication and widespread dissemination of the NCEP guidelines, the secondary prevention of CHD through screening and treatment of hyperlipidemia continues to be an underused clinical approach. Several studies suggest inadequate adherence of US physicians to existing guidelines and that the management of high blood cholesterol levels is suboptimal for both primary care physicians and cardiologists.

Prior studies have shown several factors other than patients’ clinical condition to exert significant influences on cholesterol management. These factors include physicians’ specialty and age, geographic region of practice, payment source, and patients’ age, sex, and race. Each of these factors represents potentially modifiable barriers to increased awareness and more appropriate practice patterns. The results of our study also suggest potential differences in knowledge and prescribing practices of generalists compared with specialists in regard to cholesterol management in patients with recent acute MI and differential use of various therapeutic strategies. We found internal medicine and cardiology physicians to be more likely to initiate treatment at lower total cholesterol and LDL cholesterol levels. Other authors also have found provider specialty to be an important factor influencing cholesterol management. A retrospective study of patients with CHD found that cardiologists documented and treated elevated LDL cholesterol levels more frequently than primary care physicians. On the other hand, in the Stanford Lipid Research Clinic survey, similar cholesterol-lowering treatment patterns were found among different medical specialties.

Physician age was related to the use of different treatment approaches and threshold for intervention. Younger physicians were more likely to report initiating lipid-lowering drug therapy in younger patients and in patients with lower total cholesterol and LDL cholesterol levels. On the other hand, older physicians reported tolerating significantly higher total and LDL cholesterol levels before initiating dietary or lipid-lowering drug therapy. Similar findings were observed in the Stanford Lipid Research Clinic survey, suggesting that younger physicians are more likely to adhere to recommended national guidelines or are more aggressive in their management of patients with coronary disease.

In addition, younger patients were more likely to be treated aggressively with both dietary and lipid-lowering drug therapy than older patients. Lipid-lowering drug therapy was more likely to be initiated at significantly lower total serum and LDL cholesterol levels for younger patients, regardless of physician age. These findings are different from the National Ambulatory Medical Care Survey results in which younger patients with hyperlipidemia were more likely to be counseled but less likely to receive lipid-lowering medications than older patients. On the other hand, many studies have found older age to be associated with a lower likelihood of cholesterol treatment. Recent findings from a large national registry of patients hospitalized with acute MI in the late 1990s indicated that lipid-lowering medications were prescribed at discharge in fewer than one third of all patients and in fewer than half of high-risk patients and those with a history of hyperlipidemia. In this study, older patients (65-74 years) were significantly less likely to receive lipid-lowering drug therapy than younger patients.

The fact that physicians have different thresholds in treating their patients despite guidelines and/or evidence-based medicine has been recently described in a random sample of US physicians. In this study, older hypertensive patients were treated less aggressively by primary care physicians and/or their treatment was less likely to be intensified even if they exhibited a persistently elevated blood pressure than younger patients with elevated blood pressure levels. Somewhat analogous to the findings in our study, the less aggressive management of elderly patients after acute MI may partially be because the benefits of lipid-lowering drug therapy in elderly patients with established CHD have not been clearly demonstrated. However, the NCEP guidelines clearly recommend that age alone should not be a reason to treat hypercholesterolemia less aggressively.

The present study results indicate that the 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitors were
overwhelmingly the drug of choice for the management of elevated serum cholesterol levels (regardless of patient or physician age or physician specialty). These patterns of medication use likely reflect physicians’ prescribing behavior and are concordant with the results from several recent studies. A shift in physicians’ prescribing patterns toward the statin class of lipid-lowering drugs has been reported by the most recent Cholesterol Awareness Survey. The National Heart, Lung, and Blood Institute (NHLBI) sponsored several national telephone surveys of practicing physicians and the general public in 1983, 1986, and 1990. The most recent survey (1995) noted more aggressive treatment for patients with CHD consistent with ATP II recommendations as well as a shift in focus on LDL cholesterol for treatment decisions. These results are consistent with our study findings in which most of surveyed physicians considered LDL cholesterol as the most important lipid-related factor to influence management decisions.

Results of the 1995 NHLBI Cholesterol Awareness Survey indicated that LDL cholesterol treatment goals were acceptably lower for patients with CHD. The physicians interviewed in our study indicated that they would initiate lipid-lowering treatment in patients with recent acute MI at levels of total and LDL serum cholesterol that may be conventionally considered in the desirable or borderline desirable range. Their pattern of practice may reflect a more aggressive attempt to lower elevated total and LDL levels in patients with recent acute MI. These levels are lower than those reported in the Health Education and Research Trial (HEART) study in which physicians indicated that they may not have been aware of or agreed with the specific LDL cholesterol goal levels for patients with cardiovascular disease. This observation emphasizes the importance of physician education in the effective management of patients with CHD as well as the importance of the dissemination of national guidelines and study results within the medical community.

The main strength of our study is the inclusion of a large number of community physicians who were actively treating patients with CHD. By including physicians from a defined geographic setting, we reduced the likelihood of selection biases that may be operative in analyzing results from more select provider populations or from self-selected populations of physicians. Prior reports from the Worcester Heart Attack Study have reinforced the similarity of the prescribing practices of physicians in the Worcester SMSA with those seen in other geographic settings. In addition, findings from this population-based study have suggested that physicians practicing in the greater Worcester SMSA are sensitive to the results of published clinical trials and that patients hospitalized with acute MI are more likely to be treated according to established practice guidelines reflecting an evidence-based patient management approach. However, our study has several limitations. Despite a relatively high response rate to our mailed questionnaire, we were unfortunately unable to characterize the sociodemographic characteristics of nonresponding physicians. Responding physicians may have differed in regard to their attitudes and practices toward lipid management compared with nonresponding physicians. Another limitation of our questionnaire survey is that the results reflect self-reported practices of physicians, and particular caution must therefore be exercised in extrapolating to actual prescribing behavior.

In conclusion, more emphasis needs to be placed on the active dissemination of national guidelines for cholesterol management and recent results of carefully conducted randomized trials to community-based physicians. Barriers to the acceptance of new lipid-lowering treatment strategies that have been shown to be beneficial in the management of patients with CHD need to be identified and overcome to enhance the effects of secondary prevention of CHD.

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