Cholesterol Management in a Population of Managed Care Enrollees

Carolyn R. Harley, PhD, Setareh A. Williams, PhD, Kenneth L. McDonough, MD, and Michael A. Nelson, PharmD

Abstract

Objectives: To evaluate hyperlipidemia treatment and to assess the effectiveness of statins in patients with established coronary heart disease (CHD).

Design: Retrospective analysis of claims data from a large national managed care organization in the United States.

Setting and participants: Health insurance plan members at least 18 years of age who had CHD or atherosclerosis, had pharmacy benefits, and were continuously enrolled in the health plan from 1 January 1998 through 31 December 1999.

Measures: CHD comorbidities, utilization of statin therapy, compliance with statin therapy, and achievement of the National Cholesterol Education Program (NCEP) goal for low-density lipoprotein cholesterol (LDL-C ≤ 100 mg/dL) were assessed.

Results: Of 29,534 eligible patients, 43% (12,781) were receiving statin therapy; of these, 46% (5943) continued therapy through study end. Only 59% (17,402) had 1 or more cholesterol-monitoring tests during the 2-year study period. A subgroup of 641 patients with at least 1 coronary event in 1998 who had LDL-C data available for 1999 was analyzed; the NCEP goal for LDL-C was met in only 48% (308) of this group. This goal was more likely to be reached among patients who adhered to statin therapy (odds ratio [OR], 1.78 [95% confidence interval [CI], 1.23–2.56]), particularly those with a higher rate of compliance with therapy (OR, 2.09 [95% CI, 1.32–3.31]).

Conclusions: Hyperlipidemia management in CHD patients needs further improvement, especially in early identification and use of statin therapy in patients with difficult-to-control cholesterol levels. Compliance with statin therapy was the leading predictor of ability to reach the target cholesterol goal in the subgroup (n = 641) analysis.

Coronary heart disease (CHD) is the leading cause of mortality in the United States [1]. Evidence from epidemiologic studies has conclusively demonstrated that hyperlipidemia is a major risk factor for CHD [2,3]. Two meta-analyses of clinical trials have demonstrated that lowering total plasma cholesterol or low-density lipoprotein cholesterol (LDL-C) levels with statin therapy can reduce CHD risk and total mortality [4,5]. Recent randomized clinical trials have confirmed the clinical benefit of statins in primary and secondary prevention of CHD [6–10].

Treatment of hyperlipidemia in patients with a clinical history of atherosclerotic disease is important both from a societal and an economic perspective, as individuals with established CHD are more likely than those without CHD to experience a cardiovascular event (ie, coronary mortality, major coronary event, coronary artery procedure, or stroke). Guidelines issued by the National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III) underline the importance of hyperlipidemia treatment [11]. These guidelines recommend initiating lipid-lowering pharmacologic therapy in individuals with CHD or CHD risk equivalents when the LDL-C level is 130 mg/dL or greater. The NCEP LDL-C goal for individuals with CHD or CHD risk equivalents is below 100 mg/dL.

Although the use of statins for lipid-lowering therapy has improved the outcomes for patients with CHD, recent observational studies suggest that many patients who are prescribed statin therapy do not achieve the NCEP goal for LDL-C reduction [12–14]. These studies also indicate that patients with more severe disease have greater difficulty reaching that goal. Until recently, relatively little was known about management of hyperlipidemia in the medical practice setting and predictive factors for achieving the NCEP target LDL-C level [14,15].

To identify cholesterol management practices in a clinical practice setting, this study examined hyperlipidemia treatment in a sample of patients with established CHD or with indicators of atherosclerosis and at high risk for CHD. Secondary objectives were to assess the impact of pharmacologic therapy on achievement of the NCEP target cholesterol level (ie, LDL-C of 100 mg/dL or lower) and to identify predictors of successful treatment. We hypothesized that statin
therapy and compliance with statin therapy would be the primary determinants of treatment success, defined as reaching the NCEP target LDL-C level.

Methods

Study Population

The study used claims data (physician, facility, enrollment, and pharmacy claims) from 8 health plans located in the northeastern, southeastern, midwestern, and southern United States that were affiliated with a large national managed care organization (MCO). The health plans were discounted fee-for-service, independent practice associations providing coverage for inpatient care, ambulatory services, and prescription drugs. The study sample was selected from the population of commercially insured health plan members 18 years of age and older who had pharmacy benefits and who were continuously enrolled in the health plan between January 1998 and December 1999. Patients with established CHD or atherosclerotic disease were defined as those with at least 1 clinical indicator for disease during calendar year 1998; these were identified through a diagnostic code (International Classification of Diseases, 9th Revision, Clinical Modification [ICD-9-CM]), a procedural code (Current Procedural Terminology [CPT] 2000), or 2 filled prescriptions (at least 30 days apart) in medical and pharmacy claims (Table 1). Data from both 1998 and 1999 were used to characterize health status, health care utilization, and hyperlipidemia treatment patterns.

Measures

Data on variables related to CHD and its treatment were gathered from the medical claims database; these included demographic and biologic risk factors for disease and conditions that may influence health care resource utilization and hyperlipidemia treatment within the study population. Information on demographic variables, including gender and age, was obtained from enrollment files.

Comorbidities and CHD risk factors. Information regarding comorbid conditions present in 1998 and 1999 was obtained from the medical claims database using ICD-9-CM and CPT codes (Table 2). Drug names, dosage, drug strength, and prescription fill date were obtained from the pharmacy claims database using national drug codes. In addition to the presence of chronic comorbidities, the degree of disease severity as measured by polypharmacy was also considered. Severity of disease was captured through the use of a chronic disease score (CDS) [16,17]. The CDS is a reliable proxy for health status and is measured by the number of filled prescriptions for specific chronic conditions over a 6-month period. For each category of filled prescriptions, empirically derived weights were applied to predict values for health care utilization costs to estimate disease severity.

Statin therapy. Pharmacy claims data were used to determine patients’ use of statin drugs during the study period. Information was extracted regarding the number of days on statin therapy and whether the subject reached the maximum labeled dose of the statin drug. The specialty of the physician prescribing the first filled prescription for a statin drug was determined and categorized into 1 of 3 specialty groups: primary care (family medicine, general practice, or internal medicine), cardiology, and all others.

Treatment utilization patterns were determined for each subject who filled a prescription for a statin drug. A treatment period was defined as the fill date plus the number of days of drug supplied plus 45 days. On the basis of the treatment period, patients were classified into one of the following treatment pattern categories: continued therapy (no gap in therapy from the index statin prescription to the end of the study period); stopped therapy (no filled prescription for any statin after the treatment period of the last index statin prescription); and switched therapy (a new type of statin filled within the treatment period of the index statin). Patients were assigned to the first category for which they met the criteria

| CHOLESTEROL MANAGEMENT |

Table 1. Diagnostic Codes and Drugs Used to Define the Presence of Coronary Heart Disease and Atherosclerotic Disease

<table>
<thead>
<tr>
<th>Description</th>
<th>ICD-9-CM Codes</th>
<th>Prescription Drugs</th>
<th>CPT Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute myocardial infarction</td>
<td>410.xx</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Other acute and subacute forms of ischemic heart disease</td>
<td>411.xx</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Old myocardial infarction</td>
<td>412.xx</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Angina pectoris</td>
<td>413.xx</td>
<td>Nitrates</td>
<td>—</td>
</tr>
<tr>
<td>Other forms of chronic ischemic heart disease</td>
<td>414.xx</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Atherosclerosis</td>
<td>429.2, 440.xx ICD-9 Proc: 36.0x–36.3x</td>
<td>33510–33536, 33572, 92980–92982, 92984, 92995, 92996</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>433.xx–436.xx</td>
<td>Antiplatelets</td>
<td>—</td>
</tr>
<tr>
<td>Peripheral vascular disease</td>
<td>443.xx</td>
<td>Pentoxifylline</td>
<td>—</td>
</tr>
</tbody>
</table>

based on their prescription drug claims history during the study period.

Compliance with statin therapy in 1998 was based on the pattern of filled prescriptions. We calculated a possession ratio for each filled prescription by dividing the number of days of medication supplied for the filled prescription by the number of days between the fill date of the first prescription and the fill date of the next one. Compliance was defined as a possession ratio of at least 80% [18]. We also calculated the ratio of compliant days to total days of medication supplied.

Cholesterol monitoring. Information on the number of cholesterol tests performed for each subject in each of the 2 years was also obtained. Cholesterol monitoring tests were identified by the CPT codes 80061, 82465, 83716, 83718, 83719, and 83721 on hospital and physician claims.

NCEP treatment goals. A Health Plan Employer Data and Information Set (HEDIS) database of LDL-C test results was used to identify predictors for reaching the NCEP goal of LDL-C 100 mg/dL or less in patients for which laboratory values were available in 1999. Because patients were treated prior to the release of NCEP ATP III guidelines, the ATP II LDL-C target level (≤100 mg/dL) was used. In most cases, cholesterol results were either transcribed directly from patient medical records by trained nurse abstractors or provided by the testing laboratory. Patients with qualifying events (ie, acute myocardial infarction, percutaneous transluminal coronary angioplasty, or coronary artery bypass graft) in 1998 were selected, and their 1999 laboratory LDL-C values, when available, were abstracted from the medical records.

Statistical Analysis
The mean number of tests and procedures for patients receiving statins were calculated. Descriptive, bivariate, and multivariate statistical techniques were employed to evaluate hyperlipidemia treatment in study patients. First, descriptive statistics were generated for each measure of interest and for the study outcome. Second, bivariate techniques were used to compare patients who received statin therapy and patients who did not receive statin therapy. Finally, to assess the impact of statin therapy on achieving NCEP goals, 2 multivariate models were developed using data from the subset of patients for whom 1999 lipid laboratory values were available. Logistic regression analysis was performed to determine the predictors for achieving the NCEP cholesterol goal with statin use in 1998 as the primary predictor variable. Covariates in the model included age, gender, presence of diabetes, occurrence of stroke, CDS, and the use of antilipemic agents other than statins (ie, niacin, colestipol) as measured in 1998. A second multivariate model was developed for the subset of patients receiving statin therapy who had laboratory values available in 1999 with compliance with statin therapy as the main predictor variable; in addition to the other covariates described earlier, we also analyzed the effect of the presence of a filled prescription for the maximum labeled dose of statin. Predictors for both models were selected based on information from the medical literature regarding risk factors associated with CHD (ie, age, gender, and presence of diabetes) and hypothesized relationships between the covariates (ie, CDS, antilipidemia drugs) and cholesterol levels [2,3,19].

Results
A total of 29,534 of the 2.3 million enrolled health plan members with drug benefits met the inclusion criteria. The majority of patients were male (60%), and the average age was 55 years (range, 18 to 99 years). Chronic ischemic heart disease was the most prevalent cardiovascular condition in 1998 (16,788 patients [57%]). Twenty percent of patients (5940) had a
Statin Therapy

Of the 29,534 patients studied, 43% (12,781) used a statin during part of the study period. Of the 16,261 patients diagnosed with CHD patients were hypertension (19,731 patients [67%]), hyperlipidemia (16,261 patients [55%]), depression and other affective disorders (7613 patients [26%]), and diabetes mellitus (6226 patients [21%]).

Table 3. Secondary Risk Factors for Coronary Heart Disease

<table>
<thead>
<tr>
<th>Secondary Risk Factors</th>
<th>Patients, n (%)</th>
<th>(Total n = 29,534)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute myocardial infarction</td>
<td>2309 (7.8)</td>
<td></td>
</tr>
<tr>
<td>Other acute and subacute ischemic heart disease</td>
<td>4651 (15.7)</td>
<td></td>
</tr>
<tr>
<td>Old myocardial infarction</td>
<td>2480 (8.4)</td>
<td></td>
</tr>
<tr>
<td>Angina pectoris</td>
<td>8061 (27.3)</td>
<td></td>
</tr>
<tr>
<td>Other chronic ischemic heart disease</td>
<td>16,788 (56.8)</td>
<td></td>
</tr>
<tr>
<td>Atherosclerosis</td>
<td>5886 (19.9)</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>5940 (20.1)</td>
<td></td>
</tr>
<tr>
<td>Peripheral vascular disease</td>
<td>4087 (13.8)</td>
<td></td>
</tr>
</tbody>
</table>

*Percentages do not total 100 because the categories are not mutually exclusive (ie, several conditions may exist in the same individual).

history of stroke or were receiving medication for stroke prevention (Table 3). The most frequent comorbid conditions among CHD patients were hypertension (19,731 patients [67%]), hyperlipidemia (16,261 patients [55%]), depression and other affective disorders (7613 patients [26%]), and diabetes mellitus (6226 patients [21%]).

NCEP Treatment Goal

Analysis of lipid-lowering therapy outcome was limited to a subset of patients for whom LDL-C laboratory values were available. Of the 29,543 subjects, 641 (2%) had LDL-C laboratory values available. 1998 predictors were used with 1999 laboratory outcomes. Of these 641 patients, 73.2% (469 patients) were using statins in 1998. Overall, the NCEP goal for LDL-C (≤ 100 mg/dL) was met in only 48% (308) of 641 patients with at least 1 coronary event in 1998 who had LDL-C data available for 1999. Of the 469 patients with LDL-C laboratory values, most (90.5%) were treated below the maximum statin dose. Analysis of NCEP goal achievement and statin dose showed that 65.5% (40 of 61) of subjects who received the maximum statin dose did not achieve NCEP goal compared with 49.3% (286 of 580) who were treated below the maximum statin dose.

Compliance

Thirty-four percent (3687 patients) of those who received statin therapy in 1998 were compliant at least 80% of the time. Compliance of at least 50% occurred in 47% (5088 patients), and the remaining 53% of patients were compliant for less than 50% of the treatment days.

Utilization patterns

Forty-six percent of those who received statin therapy (5943 patients) continued treatment through the end of the study period; the mean length of treatment was 235 days in 1999 and 245 days in 1998. During the study, 37% of the patients (4704) stopped statin therapy. An additional 17% (2134 patients) switched to a different statin.
Table 4. Odds of Achieving NCEP LDL-C Goal of ≤ 100 mg/dL (n = 641)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.012</td>
<td>0.990–1.034</td>
</tr>
<tr>
<td>Male gender</td>
<td>1.165</td>
<td>0.766–1.748</td>
</tr>
<tr>
<td>Chronic disease score</td>
<td>0.956</td>
<td>0.878–1.041</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.385</td>
<td>0.965–1.987</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.798</td>
<td>0.534–1.192</td>
</tr>
<tr>
<td>Statin therapy</td>
<td>1.779*</td>
<td>1.234–2.566</td>
</tr>
<tr>
<td>Other antilipid therapy</td>
<td>0.837</td>
<td>0.418–1.676</td>
</tr>
</tbody>
</table>

CI = confidence interval; LDL-C = low-density lipoprotein cholesterol; NCEP = National Cholesterol Education Program.

Table 5. Odds of Achieving NCEP LDL-C Goal of ≤ 100 mg/dL: Statin Users (n = 469)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.014</td>
<td>0.988–1.041</td>
</tr>
<tr>
<td>Male</td>
<td>1.107</td>
<td>0.689–1.776</td>
</tr>
<tr>
<td>Chronic disease score</td>
<td>0.953</td>
<td>0.855–1.062</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.396</td>
<td>0.902–2.162</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.864</td>
<td>0.544–1.371</td>
</tr>
<tr>
<td>Other antilipid therapy</td>
<td>1.036</td>
<td>0.471–2.279</td>
</tr>
<tr>
<td>Maximum statin dose</td>
<td>0.441*</td>
<td>0.248–0.785</td>
</tr>
<tr>
<td>Compliance ratio</td>
<td>2.095*</td>
<td>1.326–3.310</td>
</tr>
</tbody>
</table>

CI = confidence interval; LDL-C = low-density lipoprotein cholesterol; NCEP = National Cholesterol Education Program.

Effect of compliance on achieving NCEP goal. The effect of compliance on the likelihood of reaching the NCEP goal was assessed for all patients with available laboratory data (n = 641) (Table 4) and for the 469 subjects who were receiving statin therapy in 1998 (Table 5). For subjects who received statins, a higher proportion of days compliant with statin therapy to total days receiving statin therapy improved the odds of meeting the goal by twofold (OR, 2.09; 95% CI, 1.33–3.31). Reaching the maximum labeled dose for any statin during 1998 had a negative effect on reaching the goal (OR, 0.44; 95% CI, 0.25–0.79). No other variable in the model was significantly associated with reaching the NCEP target for LDL-C (Table 5).

Discussion

The study presented here examined the use of statin therapy for control of cholesterol levels in a sample of managed care health plan enrollees with established CHD or atherosclerotic disease, and explored factors that might contribute to effective cholesterol management. In this population, only one third of patients who appeared eligible for pharmacologic therapy to reduce cholesterol levels were actually receiving treatment. Furthermore, an analysis of a subsample of the population with at least 1 coronary event in 1998 and for whom 1999 LDL-C laboratory data were available (n = 641) indicated that only 48% (308 subjects) met the NCEP target LDL-C level.

The important findings from this study must be considered within the study limitations. First, the study results may not be generalizable to the entire U.S. population, as the data source consisted of employer-based managed care enrollees. However, the results can be generalized to other employer-based health plans with enrollees of similar age range and diagnosis. In addition, the subset of patients identified with cholesterol laboratory values may not be representative of the general population, as laboratory data were collected based on HEDIS criteria, which required an actual CHD-related event in 1998. Thus, the population of patients in this study who had a severe coronary event may be more likely to receive lipid-lowering therapy or may be more compliant with therapy than individuals in the general secondary risk population. Second, the impact of statin therapy on resource utilization could not be determined because of the short follow-up period. The absence of baseline cholesterol data (or of multiple cholesterol laboratory values obtained throughout the follow-up period) did not allow for a complete evaluation of treatment outcome. Study patients may have decreased their cholesterol levels substantially without meeting goal levels during the time interval when laboratory data were collected; however, the absence of baseline cholesterol values made it appear that they were not successfully managing their elevated cholesterol. Third, the results of the study must also be considered within the limits of administrative claims data, which may contain inaccuracies as a result of coding errors, missing claims, and coding of diagnoses rather than actual disease. Fourth, the current study was conducted prior to the release of ATP III guidelines, and therefore not all patients with CHD risk equivalents (ie, diabetes) were included. Consequently, these findings are likely to underestimate the rate of undertreatment, as the new guidelines require more aggressive treatment of high-risk individuals. Last, possession ratio was used as a proxy for compliance. Possession ratio may significantly underestimate compliance due to a variety of factors that may prolong the supply of medication; these include but are not limited to changes in prescription by a physician, hospitalization, and/or provision of medication samples.

Despite the limitations of retrospective claims data, the current study allowed for evaluation of the effect of lipid-lowering
therapy on outcomes in a “real life” setting. Clinical trials of statin therapy often exclude patients with comorbidities and generally are not representative of all patients who subsequently receive treatment. The data for the present study came from 4 diverse regions of the country and thus may be considered representative of current patterns of care. Finally, the results from this study are consistent with findings from other studies that have examined the relationship between statin therapy and achievement of NCEP treatment goals [12,14,20].

Despite national efforts by the NCEP to promote reduction of cholesterol levels, the majority of patients who receive statin therapy do not achieve the NCEP target LDL-C level. In 1996, Marcelino and colleagues reported that only 30 of 90 patients (33%) at the Veterans Affairs Medical Center achieved the target level [13]. More recently, a multicenter survey of 4888 patients in the Lipid Treatment and Assessment Project revealed that only 40% of patients who received statins as their only drug therapy achieved LDL-C target levels; success rates were lowest among high-risk patients and those with CHD [14]. In that study, patients treated with statin therapy were more likely to achieve the NCEP target than those treated with other lipid-lowering drugs [14].

Similar results have been observed within MCOs [12,21,22]. In a retrospective study of hyperlipidemia management with statins conducted among 27 U.S. managed health care plans, less than one third (1072 of 7619 patients) of those at high risk for CHD achieved the NCEP LDL-C target [12]. Gray and colleagues also studied the effect of statin therapy on cholesterol levels and ability to achieve NCEP goals in 22,000 members of a MCO who had established CHD [22]. In that study, the NCEP goal was achieved by only 40% of patients. In the present study, 48% (308 subjects) met the NCEP target LDL-C level. However, this may not be reflective of the study population as a whole because the analysis was performed on those patients in the study population who had a severe coronary event in 1998 and had a LDL-C values available in 1999. It could be hypothesized that these patients may be more motivated to reach the NCEP goal after having a severe coronary event than those in the general study population, and thus the percentage of patients who achieved the NCEP goal may be smaller.

Underdiagnosis and undertreatment of hyperlipidemia in individuals with CHD by primary care physicians is a contributing factor in the failure to meet NCEP treatment goals [23–25]. Previous studies have shown that 33% to 44% of patients at risk for advanced CHD do not receive adequate LDL-C screening and management as recommended by the NCEP [21,24,26]. These studies also suggest that a significant treatment gap exists between patients who are eligible for statin therapy and those who actually receive such therapy. Undertreatment of patients with CHD was demonstrated in a survey of outpatient records from 140 cardiology practices in the United States [27]. Of the 48,586 patients with a diagnosis of coronary artery disease identified from medical claims data, only 39% were receiving lipid-lowering therapy. Undertreatment of hyperlipidemia was also reported in an analysis of treatment patterns and LDL-C levels in 7681 respondents to the phase 2 study of the third National Health and Nutrition Examination Survey [21]. Only 4.2% of the respondents who were eligible for intervention based on ATP III guidelines received dietary advice or drug therapy, and among eligible adults with CHD, only 0.7% received drug therapy [21].

Compliance with statin therapy is also a principal factor in achievement of NCEP target LDL-C levels [23,26,28]. In the present study, compliance with statin therapy was a significant predictor for meeting the NCEP goal. Noncompliance and an inability to achieve the goal may be attributed to a lack of adherence to NCEP guidelines [26]; insufficient patient follow-up and monitoring [23,27,29,30]; and a lack of patient awareness of his or her risk status, his or her cholesterol level, and the NCEP target goal [26,31]. Timely treatment of at-risk patients may be an important predictor of successful outcomes. Recent evidence suggests that compliance with statin therapy may be higher among patients who receive a predischarge prescription for statins [32]. Muhlstein and colleagues reported that long-term compliance with statin therapy was higher among patients initially discharged with a statin prescription than among those who were not (77% versus 40%; \( P < 0.001 \)) [28]. Patients discharged with a statin prescription had a significantly reduced mortality rate at long-term follow-up (5.7% versus 11.7%; \( P = 0.05 \)). Consequently, ATP III guidelines recommend that lipid-lowering drug therapy be initiated at the time of hospital discharge [11].

Insufficient dose titration of currently prescribed statins is another barrier to achieving the NCEP target LDL-C level. Typically, more than half of patients prescribed a statin require dose titration to reach the NCEP goal; most statins have a 3-step titration profile with which to achieve that goal. In a survey of outpatient data in the United States, Sueta and colleagues (1999) reported that 65% of the patients with CHD who were prescribed a statin did not receive dose titration to a level associated with reduced morbidity and mortality in clinical trials [29]. Only 25% of patients achieved the target LDL-C level recommended by the NCEP. Similar findings have been reported in surveys of general practice in Norway and South Wales [30,33]. Current NCEP guidelines recommend that physicians establish a predischarge plan that includes maximal dosing to achieve target goals and working with the patient’s primary care provider to maintain these
goals over the long term. However, in the present study, a maximal statin dose was associated with an approximately 50% reduction in the odds of meeting the NCEP target LDL-C level. Maximal dose prescription for a statin would be expected to increase the odds of successfully meeting cholesterol reduction goals; the results of this study may indicate that a higher proportion of patients on maximum dose had difficulty reaching goals compared to those on lower doses. It is likely that this group of individuals may need a different treatment strategy including, but not limited to, closer follow-up monitoring, reminders to increase compliance (if in fact they are less likely to be compliant), and combination therapy. However, since the majority of these patients were on a less efficacious statin, it is also plausible that they could benefit from treatment with a more efficacious lipid-lowering therapy.

These results highlight the importance of providing patients with support in their cholesterol management, which should include not only alterations in diet and increased physical activity, but also regular refilling of prescriptions. More diligent patient follow-up and monitoring, as well as improved patient awareness of LDL-C test results, may improve long-term patient compliance and patients’ ability to meet NCEP guidelines. The inability to achieve the NCEP target goal in more than half of the study population for whom test results were available suggests that there is room for improvement in current therapies, either through dose escalation or the use of a more efficacious statin that allows for improvement in current therapies, either through dose escalation or the use of a more efficacious statin.

The inability to achieve the NCEP target goal in more than half of the study population for whom test results were available suggests that there is room for improvement in current therapies, either through dose escalation or the use of a more efficacious statin that allows LDL-C goals to be achieved at the starting dose.

**References**


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