Journal of Clinical Lipidology (2013) 7, 43–47

Journal of Clinical Lipidology

Compliance with the Adult Treatment Panel III guidelines for hyperlipidemia in a resident-run ambulatory clinic: A retrospective data analysis

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KEYWORDS:
ATP-III;
Compliance;
Hyperlipidemia;
Low-density lipoprotein;
National Cholesterol Educational Program Adult Treatment Panel;
Non-high-density lipoprotein;
Target LDL level;
Target non-HDL level

BACKGROUND: One in every six adults (16.3% of the U.S. adult population) has high total cholesterol levels, and they are at double the risk of heart disease compared with people with optimal levels.

OBJECTIVE: To evaluate compliance of internal medicine residents with the latest National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III) guidelines in treating patients with hyperlipidemia.

DESIGN: Retrospective observational study.

SETTING: Ambulatory Clinic, Saint Vincent Hospital, Worcester, Massachusetts.

PATIENTS: Patients with a diagnosis of hyperlipidemia who attended the clinic during a 1-ear period, from December 2009 to November 2010.

MEASUREMENTS: A review of medical records was conducted to evaluate residents' compliance with the NCEP-ATP III guidelines for LDL cholesterol and non-HDL cholesterol management.

RESULTS: Seven hundred seventy charts were reviewed. Only 212 (27.5%) met the inclusion criteria. Analysis of data revealed better compliance with drug therapy (44%−77%) and therapeutic lifestyle changes (44%−83%) when compared with follow-up recommendations (22%−31%). An increase in compliance also was noted in all areas of intervention when patients had an abnormal lipid profile.

LIMITATIONS: Compliance was assessed on the basis of electronic medical record documentation alone and hence we may be underestimating compliance with therapeutic lifestyle changes and follow-up recommendations.

CONCLUSION: Compliance among internal medicine residents in the diagnosis, treatment and follow-up of patients with hyperlipidemia according to NCEP-ATP III guidelines was suboptimal and needs improvement.

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Hyperlipidemia has significant impact on the health of adult population of the world. In United States alone, approximately one sixth of the adult population (16.3%)

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Submitted January 29, 2012. Accepted for publication June 20, 2012.

1933-2874/$ - see front matter © 2013 National Lipid Association. All rights reserved.
http://dx.doi.org/10.1016/j.jacl.2012.06.004

suffers from high total cholesterol, which is defined as levels 240 mg/dL and greater. This population has a cardiac risk twice that of adults with optimal cholesterol levels. More women are affected than men.[1]

With progressing age, hypercholesterolemia worsens in male patients, with the age group 45−54 years being the worst affected (20.8%). In females, those in the age group 55−64 years are the worst affected (30.5%). Although the magnitude of the problem has decreased from 33% in 1960−1962 to 16.3% in 2003−2006, we are yet to achieve adequate control of this risk factor. In 2007, nearly one-fifth (21.5%) of Americans reported that their cholesterol levels had never been checked in the last 5 years. Of the patients who had their cholesterol levels checked, most were performed in a hospital setting. In 2006, 6.4 million office visits included a cholesterol test, which constituted only 7.1% of all visits in the ambulatory setting.[2]

The National Cholesterol Education Program Adult Treatment Panel (NCEP-ATP) III updated the existing ATP II guidelines in May 2001 by recommending more intensive low-density lipoprotein (LDL)-lowering therapy in certain groups of people, in accordance with evidence from clinical trials. The panel suggested risk stratifying the patients as high, moderate, and lower risk on the basis of five major risk factors and coronary heart disease (CHD) or CHD equivalents. The Framingham Risk Score was used when risk factors exceeded one and the panel suggested that patients be categorized as high risk if their scores were greater than 20%.[3] An update on the ATP III recommendations was published in July 2004, in which the authors emphasized the need for even more intensive LDL-lowering therapy in patients in certain risk categories.[4] Also, non−high-density lipoprotein (HDL) goals were considered as secondary targets in patients with high triglyceride levels (≥200 mg/dL). The goal for non-HDL cholesterol in persons with high serum triglycerides was to be set at 30 mg/dL greater than that for LDL cholesterol.[3] The purpose of this study was to evaluate the compliance of internal medicine residents in managing patients with hyperlipidemia according to the NCEP-ATP III guidelines.

Methods

Study design and population

We conducted a retrospective observational study spanning a period of 1 year from December 2009 to November 2010. Patients who attended the clinic during the period mentioned previously and who had the diagnosis of hyperlipidemia were included in our study. Hyperlipidemia was defined as abnormal lipid levels (*International Classification of Disease, Ninth Revision*, Clinical Modification [ICD-9-CM] diagnosis code 272.4) based on ATP III recommendations. The study was approved by the Institutional Review Board at Saint Vincent Hospital, Worcester, Massachusetts.

Inclusion criteria were 1) a diagnosis of hyperlipidemia, 2) age 18 and older, and (3) the availability of fasting lipid profile results. Exclusion criteria included 1) treatment refusal by patients, 2) side effects from a lipid-lowering agent causing inability to take the medication (any adverse effects documented in the medical records or as mentioned by the patient), 3) patients who came in for sick visits only, and 4) lack of documentation about the patient's lipid profile or interventions, if any, during the patient visit. Of 750 patient encounters analyzed, 212 met criteria for inclusion in the study.

Information extracted from medical records included age, gender, diagnosis, total cholesterol, HDL, triglycerides, LDL, Framingham risk score, major risk score, CHD and CHD-equivalent status. Also data were collected regarding the therapeutic lifestyle changes (TLC), drug therapy, and follow-up recommendations made during each patient visit. The TLC features include TLC diet (saturated fat <7% of calories, cholesterol <200 mg/day, increased soluble fiber [10−25 g/day] and plant sterols/stanols [2 g/day]), weight management and increased physical activity. The drug therapy was as per the ATP III guidelines.[3] The initial drug of choice is a statin/bile acid sequestrant/nicotinic acid. If the goal LDL was not achieved via the use of a lipid-lowering drug, we considered going up on the dose if it was the first follow-up visit. If the follow-up visit was the second and the LDL goal still was not achieved, we intensified the drug therapy or referred the patient to a lipid specialist. The patients were categorized as high risk, moderately high risk, moderate risk, and lower risk as determined by the presence of CHD, CHD equivalents, Framingham risk score, and major risk factors.[3]

Medical records were reviewed by four trained reviewers: three internal medicine residents and one faculty member physician. All the data were carefully reviewed (and cross reviewed) to identify the appropriate management recommendations in terms of TLC, drug therapy, and follow-up. The resident physician was deemed to be compliant with the ATP III guidelines if appropriate intervention was advised during the patient visit. Because the purpose of the study was to identify the compliance of the medical residents with ATP III recommendations, we did not focus on patient compliance or achievement of target cholesterol goals as a part of compliance. The compliance was checked for the original (2001) ATP III recommendations standard as well as updated 2004 recommendations. We also analyzed with the optional recommendations in both the original and updated guidelines (Table 1).[3,4]

Ambulatory clinic

The ambulatory clinic at Saint Vincent Hospital, Worcester, Massachusetts, is affiliated with the Internal Medicine Residency Program, which trains 72 residents. Residents are assigned to continuity clinics on a weekly basis as part of their longitudinal experience. The clinic has more than 2400 patient visits annually.

Table 1 ATP III guidelines (original 2001 and updated 2004 recommendations [optional recommendations are given in italics])[3,4]

Risk category	LDL goal, mg/dL	Initiate TLC	Consider drug therapy
ATP III original recommendations[3]			
High risk: CHD or CHD risk equivalents (10-year risk > 20%)	<100	≥100	≥130 (100–129: consider drug options)
Moderately high risk: 2+ risk factors (10-year risk 10% to 20%)	<130	≥130	≥130
Moderate risk: 2+ risk factors (10-year risk < 10%)	<130	≥130	≥160
Lower risk: 0–1 risk factor	<160	≥160	≥190 (160–189: LDL-lowering drug optional)
ATP III updated recommendations[4]			
High risk: CHD or CHD risk equivalents (10-year risk > 20%)	100 (optional goal: <70)	≥100	≥100 (<100: consider drug options)
Moderately high risk: 2+ risk factors (10-year risk 10% to 20%)	<130	≥130	≥130 (100–129: consider drug options)
Moderate risk: 2+ risk factors (10-year risk <10%)	<130	≥130	≥160
Lower risk: 0–1 risk factor	<160	≥160	≥190 (160–189: LDL-lowering drug optional)

ATP, Adult Treatment Panel; CHD, coronary heart disease; LDL, low-density lipoprotein.

Statistical analysis

Internal medicine residents' compliance with different methods of intervention was compared between various groups and subgroups. On the basis of LDL values, patients were stratified into high risk, moderately high risk, moderate risk, and lower risk groups (group analysis). Further, each of these groups was substratified into those with normal or abnormal values who needed intervention (subgroup analysis). We also compared compliance with the original recommendations, as also with the optional recommendations in all risk categories. All statistical analyses were conducted with the use of SPSS® Software version 16 (SPSS Inc., Chicago, IL). Tests for statistical significance were performed with the use of the chi-square test (2-tailed with Yates correction), and P values of less than .05 were considered to be statistically significant.

Results

We analyzed 148 patients and 212 patient visits in our study. The mean follow-up visits was 1.4 (SD 0.7). The mean (median, range) age of patients in high risk, moderately high risk, moderate risk, and lower risk were 56 years (55, 25−91), 55 years (54, 35−76), 53 years (52, 34−75), and 46 years (48, 25−68) respectively, with a male:female ratio of 1.3:1, 1.6:1, 1.3:1, and 0.9:1, respectively, in each group.

The average compliance in all groups for the 2001 standard guidelines was 75% for TLC, 76% for drug therapy and 28% for follow-up recommendation. The rates of compliance of resident physicians for recommending the ATP III guidelines to patients in each group are given in Table 2 and represented in Figure 1. There was no statistically significant difference in compliance with follow-up recommendations when compared between high-risk, moderately high-risk, moderate-risk, and lower-risk groups. In the subgroup analysis of interventions in each risk group, compliance with TLC and follow-up was statistically greater in the abnormal lipid value group compared with the normal lipid value group.

When analyzing the drug therapy compliance in the high-risk group, we found that the rates of compliance with the various guidelines were 77% (2001 standard recommendation LDL >130), 77% (2001 optional recommendation [as well as 2004 standard recommendations] LDL >100), and 44% (2004 updated guidelines optional

Table 2 Percentage compliance of resident physicians with ATP III guidelines

Recommendations	2001 Standard			2001 Optional			2004 Standard			2004 Optional		
Risk category	TLC	D	F/U	TLC	D	F/U	TLC	D	F/U	TLC	D	F/U
High risk	83	77	31	84	77	31	84	77	31	58	44	31
Moderately high risk	56	56	22	56	56	22	56	56	22	44	67	22
Moderate risk	63	76	26	63	76	26	63	76	26	63	76	26
Lower risk	71	83	23	71	66	23	71	83	23	71	66	23

ATP, Adult Treatment Panel; D, drug therapy; F/U, follow-up; TLC, therapeutic lifestyle changes.

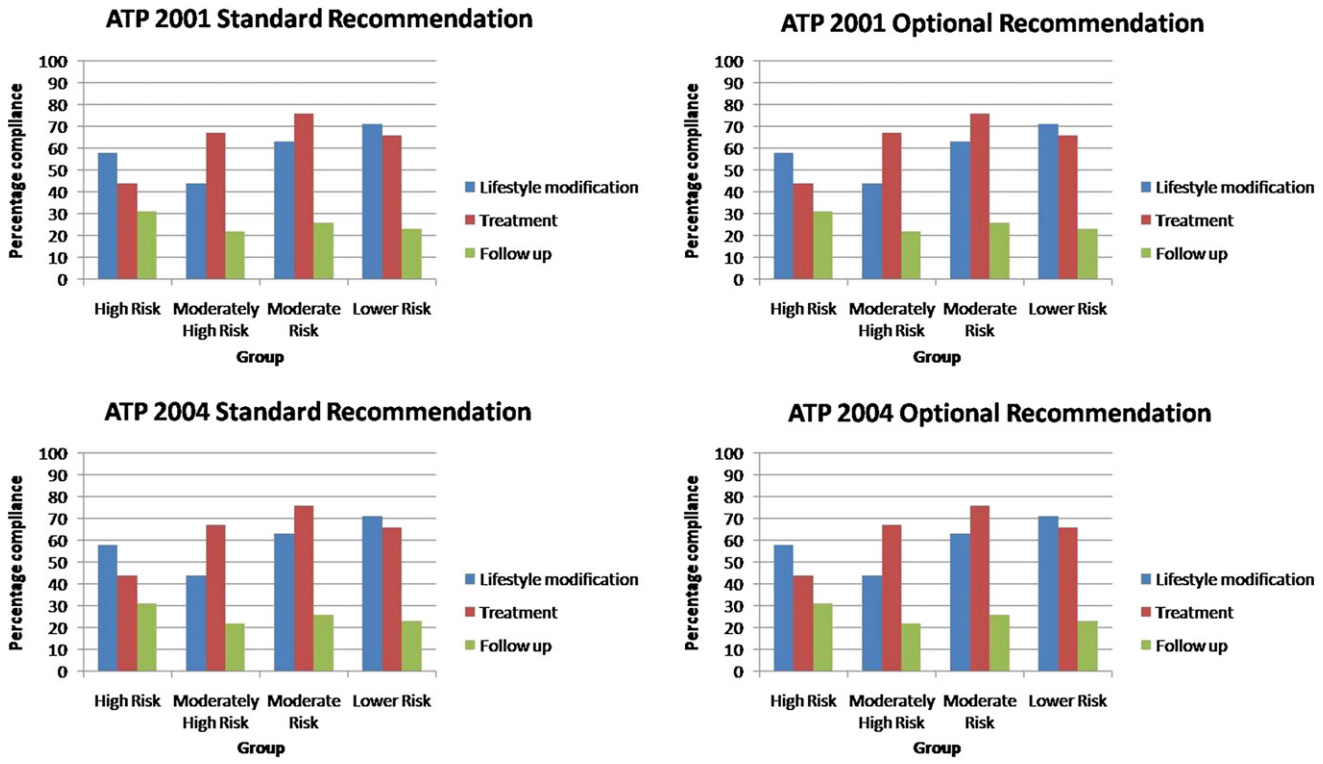

Figure 1 Percent compliance in the different risk categories.

recommendation LDL >70). Hence, the rate of compliance in instituting drug therapy according to the updated optional guideline for high risk patients was very low ($P = .0001$). As noted in Table 2, in all groups, compliance was lowest in the follow-up recommendation category, compared with other interventions such as TLC or treatment.

Discussion

Cardiovascular disease is the leading cause of death among adults in the United States.[5] The leading modifiable risk factors for heart disease and stroke are high blood pressure, high cholesterol, tobacco use, diabetes, poor diet and physical inactivity, overweight, or obesity.[6–9] Hyperlipidemia is considered as one of the most important modifiable risk factor for cardiovascular morbidity and mortality in adults. Studies during the 1980s showed for the first time that lowering high cholesterol levels significantly reduced the incidence of myocardial ischemia and infarcts and related morbidity and mortality, leading to the establishment of the NCEP in 1985.

Since the NCEP was launched, the percentage of people who have ever had their blood cholesterol checked has more than doubled, from 35% in 1983 to 71.1% in 1995.[10] With the decrease in the consumption of saturated fat and cholesterol declining during the 1980s and 1990s, average blood cholesterol levels in adults decreased from 213 mg/dL in 1978 to 203 mg/dL in 1991 (age adjusted to 1980 population). These results reflect the impact of NCEP's population and high-risk strategies for lowering cholesterol.

The ATP III classified various lipids on the basis of an individual's absolute risk and recommended the desirable level of total cholesterol to be less than 200 mg/dL, normal HDL more than 40 mg/dL, desirable LDL 100−129 mg/dL, and optimal LDL less than 100 mg/dL.[3] Healthy People 2010 objective to reduce mean serum cholesterol levels among adults to <200 mg/dL (objective 12−14) was initiated, and the goal was met for the overall adult population aged >20 years, and for men, but not for women (by the year 2005–2006). From 1999−2000 to 2005−2006, the mean age-adjusted serum total cholesterol level for all U.S. adults aged >20 years reduced by 4 mg/dL, in the male population by 8 mg/dL, and in the female population by 4 mg/dL.[1]

Clinical trials have proved that lowering cholesterol in persons with and without existing CHD reduces illness and death from CHD and even reduces overall death rates. The incidence of heart disease can be reduced to 30% by a 10% decrease in total blood cholesterol.[11] Approximately 2.7 million life-years were gained by people with CHD after the reduction in the prevalence of smoking, high cholesterol, high blood pressure, and physical inactivity, partially offset by an increase in the prevalence of obesity and diabetes (causing a loss of 0.7 million life-years).[12]

The Behavioral Risk Factor Surveillance System study by the Centers for Disease Control and Prevention in 2009 demonstrated that adults who have had their blood cholesterol checked within the last 5 years and ever had their

blood cholesterol checked, nationwide, was 76.9% and 80.6%, respectively. Of these, the percent of adult population who had been told that they have high cholesterol was only 37.5%.[10] This, along with the overall gain in life-years attributed to the decreased prevalence in modifiable risk factors, formed the background for our study.

During our review of the literature, we did not come across many publications in which authors highlighted the compliance of physicians with ATP III guidelines in an ambulatory care clinic setting. Moreover, in this report, we focused on the compliance of internal medicine residents with ATP III recommendations in an ambulatory clinic setting. This study is important in many ways because continuing education is a part of the resident curriculum, and one needs to be aware of the guidelines and recommendations for health care maintenance.

Our study observed that the overall compliance of the medical residents with the 2001 ATP III recommendations was greater than with updated 2004 optional recommendations. The compliance was more for TLC and drug therapy interventions rather than follow-up recommendations in all risk categories in both 2001 recommendations as well as 2004 updated version. We observed that compliance declined when optional recommendations were considered as targets to be achieved rather than standard recommendations. Another interesting observation was the increase in compliance (TLC and follow-up) when the patients had an abnormal lipid profile when compared with a normal profile.

The main reason for the overall low compliance in our study was the lack of emphasis on TLC and follow-up recommendations during the patient visit. Also, there were huge variations in follow-up recommendations ranging from 3 months to 6 months in patients who as per current recommendations needed a 6-week follow up. Such recommendations were considered as noncompliance for purposes of analysis, in our study. One major barrier to educating patients about TLC recommendations was the inability to refer to a dietician when target LDL goals were not achieved after two or three office visits. A major reason for noncompliance with pharmacological therapy was attributed to borderline LDL levels (target level + upto 5 mg/dL) and the reluctance of resident physicians to increase medications or add another agent to achieve target levels. Another reason for poor compliance is the lack of documentation, even though most of the time the resident physicians would have mentioned about TLC and follow-up recommendations to the patients during their visits but failed to document the same.

During our study, we came across many practice recommendations that could improve the compliance of resident physicians with the ATP III guidelines. As a result of our study, we believe that resident physicians should discuss all three components of the ATP III recommendations at each patient visit if they are not at goal. Also, the establishment of lipid or general cardiovascular subclinic once a month could serve as an additional venue for education of new residents assigned to the clinic. Posters and monthly update lectures on the current major healthcare maintenance can be initiated for the internal medicine residents to improve their compliance.

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