

Family Physician's Knowledge, Beliefs, and Self-reported Practice Patterns Regarding Hyperlipidemia: A National Research Network (NRN) Survey

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Objective: Family physicians have the potential to make a major impact on reducing the burden of cardiovascular disease through the optimal assessment and management of hyperlipidemia. We were interested in assessing the knowledge, beliefs, and self-reported practice patterns of a representative sample of family physicians regarding the assessment and management of hyperlipidemia 2 years after the release of the evidence-based National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III guidelines.

Methods: A 33-item survey was mailed to a random sample (N = 1200) of members of the American Academy of Family Physicians in April of 2004, with 2 follow-up mailings to nonresponders. Physicians were queried about sociodemographic characteristics, their knowledge, attitudes, and self-reported practice patterns regarding the assessment and management of hyperlipidemia. Four case scenarios also were presented.

Results: Response rate was 58%. Over 90% of surveyed family physicians screened adults for hyperlipidemia as part of a cardiovascular disease prevention strategy. Most (89%) did this screening by themselves without the support of office staff, and 36% reported routine use of a flow sheet. Most had heard of the ATP III guidelines (85%), but only 13% had read them carefully. Only 17% of respondents used a coronary heart disease (CHD) risk calculator usually or always. Over 90% of those responding reported using low-density lipoprotein (LDL) as the treatment goal but only 76% reported using non-high-density lipoprotein (HDL) cholesterol as a secondary goal of therapy.

Conclusion: We found a large variability in knowledge, beliefs, and practice patterns among practicing family physicians. We found general agreement on universal screening of adults for hyperlipidemia as part of cardiovascular disease prevention strategy and use of LDL cholesterol as a treatment goal. Many other aspects of the NCEP ATP III guidelines, such as use of a systematic, multidisciplinary approach, using non-HDL cholesterol as a secondary goal, routinely using a CHD risk calculator for risk assessment to guide cholesterol management, have not yet penetrated into self-reported clinical practice. (J Am Board Fam Med 2006;19:46–53.)

Cardiovascular disease is the leading cause of death and disability in the United States and most western societies. The prevalence of cardiovascular disease is now increasing, presumably due to the aging of the population and the near epidemic rise in the prevalence of obesity and diabetes mellitus.^{1,2} These trends are potentially reversible with the

optimal assessment and management of cardiovascular disease risk factors, of which hyperlipidemia is prominent. Well designed clinical trials have demonstrated the efficacy of pharmacologic treatment of hyperlipidemia in men and women, both middle-aged and older, those with established cardiovascular disease and those without, and in all racial

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groups, diabetics, smokers, and hypertensive subjects.^{3,4} Despite this evidence, over 40 million Americans are estimated to have lipid disorders that are not optimally treated.⁵ The National Cholesterol Education Program (NCEP) developed consensus guidelines for treatment based on this new scientific evidence and released the third report of the expert panel on the detection, evaluation, and treatment of high blood cholesterol in adults in April of 2001 (Adult Treatment Panel [ATP] III)⁶ and proposed modifications based on new clinical trial evidence in July 2004.⁷

The bulk of the ambulatory medical care in the United States is provided by approximately 160,000 primary care clinicians of which family physicians are the largest segment. Thus, family physicians have the potential to considerably reduce the burden of cardiovascular disease through the optimal assessment and management of hyperlipidemia. We were interested in assessing 2 years after the release of the ATP III guidelines and before the update, the knowledge, beliefs, and self-reported practice patterns of a representative sample of family physicians regarding the assessment and management of hyperlipidemia. In addition, we were interested in family physicians' perceptions of barriers to the optimal assessment and treatment of hyperlipidemia in primary care practice. Specifically, we were interested in the following questions:

1. What are the knowledge, beliefs, and self-reported practice patterns of family physicians regarding hyperlipidemia assessment and management, and how variable are these phenomena across reporting family physicians?
2. How did family physicians' knowledge, beliefs, and self-reported practice patterns compare to the NCEP ATP III guideline recommendations?
3. What barriers do family physicians report to the optimal assessment of coronary heart risk and treatment of hyperlipidemia?

Methods

A survey consisting of 32 items was developed in an iterative fashion by the study investigators and pre-tested in the fall of 2003 with 155 survey respondents (representing a 60% response rate) who were physician members of the American Academy of Family Physicians (AAFP) National Research Net-

work (NRN). After analyzing the responses, we added some questions, deleted others, revised the wording of selected items, and reformatted others. We included 4 short clinical scenarios to assess physicians' management of: (1) a patient with an elevated low-density lipoprotein (LDL) cholesterol despite maximal dose of a statin, (2) a patient with type 2 diabetes mellitus on a moderate dose of a statin and inadequate lipid control, (3) elevated liver function tests in a patient on a statin, and (4) elevated creatinine phosphokinase (CPK) in a patient on a statin. Response categories were multiple choice or written answers, except for open-ended responses to 2 questions: "What are the two or three greatest barriers you face in *assessing* coronary heart disease risk in your patients?" and "What are the two or three greatest barriers you face in *treating* your patients with hyperlipidemia?"

In April of 2004 we mailed the revised 33-item survey to a random sample of 1200 active members of the AAFP who resided in the United States and who had previously reported at least 50% of their professional effort in direct patient care (AAFP master database). We sent up to 2 follow-up surveys to nonrespondents.

This study was not designed for hypothesis testing, and therefore, the analyses are purely descriptive. The sample size of 1200 was large enough by conventional standards⁸⁻¹⁰ to adequately describe this population within an acceptable margin of error for both 5-point Likert scale items (95%, ± 12 , estimated variance = 2.0), and dichotomous survey items (95%, $\pm 5.0\%$, estimate $P = .50$), both assuming a 50% response rate, which was achieved. We used SPSS, version 11.5.1¹¹ for the analyses, and included summary descriptions of demographic data and frequency data of survey answers. The study was approved and designated exempt by the University of Missouri-Kansas City Social Science Institutional Review Board.

Statistical analysis

We first developed frequency distributions of responses to each survey item. To evaluate the extent of agreement of family physicians with selected items from the 2001 NCEP ATP III guidelines, we compared family physician responses to ATP III recommendations for (1) the age to begin screening young adults, (2) the use of non-high-density lipoprotein (HDL) as a secondary goal for patients with hypertriglyceridemia, (3) the use of 3 times the

upper limit of normal to define liver function test abnormalities requiring discontinuation of a medication, and (4) the use of a coronary heart disease risk calculator to risk stratify patients for lipid management.

To determine barriers to assessment and treatment, open-ended responses were coded by study staff into 40 categories based on the wording of physician responses such as adherence to blood tests, medication adherence, beliefs regarding risk of medications, costs of laboratory tests and medication, attitudes toward diet, exercise, smoking, obesity, etc, lack of time for office visits, family history of hyperlipidemia, older patients, refer patients to specialists, doctor-patient communication, direct to patient advertising, volume of patients, etc. These responses were reviewed by 3 authors (JMG, JH, CBE) and recoded into 3 supra-categories: patient factors, provider factors, and systems issues. Two authors (CBE, JH) coded a random sample of 20% of the responses and compared them to the original coding. Between-coder agreement was 96% for treatment barriers and 94% for assessment barriers.

Results

Thirty-five (3%) surveys were returned with wrong addresses or ineligible practice status, reducing the sample size to 1165. There were 677 completed surveys (58%) of which 641 were available for analysis—these respondents provided survey data on their “percentage of time in direct patient care” of more than 50%. The remaining 36 respondents either did not answer this question (n = 21) or reported this percentage to be less than 50% (n = 15). Table 1 summarizes the demographic characteristics of the respondents.

Survey participants spent, on average, 89% (SD = 12) of their professional effort on clinical practice, 8% (SD = 9) on administration, 3% (SD = 5.7) on teaching, and less than 1% (SD = 1.4) on research. Based on bivariate statistical comparisons between survey respondents and the population of AAFP active members on available demographic characteristics taken from the AAFP master database, the 2 groups did not differ statistically on age (47.3 versus 46.9, $Z = 1.13$, $P > .05$), years in practice (19.3 versus 18.9, $Z = 1.24$, $P > .05$), gender ($\chi^2 = 0.01$, $P = .904$), geographic region ($\chi^2 = 3.14$, $P = .370$), and practice location ($\chi^2 = 1.40$, $P = .998$).

Table 1. Sociodemographics of Family Physician Survey Respondents

Item and Response Categories	Percentage
Age (N = 629)	
31–40	28
41–50	38
51–60	29
61+	6
Gender (N = 641)	
Male	70
Female	30
Years in practice (N = 624)	
1–5	16
6–10	22
11–20	32
21+	29
Practice type (N = 641)	
Solo	20
2-person	12
FM group	38
Multi-spec group	20
Other	10
Population of community (N = 632)	
<2500	7
2500–19,999	29
20,000–249,999	39
250,000–999,999	14
>1,000,000	11
Type of location (N = 625)	
Inner city urban	5
Urban (not inner city)	21
Suburban	39
Rural	35
Geographic region (based on states) (N = 641)	
Northeast	16
South	31
Midwest	30
West	24

Self-reported practice patterns

Assessment

The responses to the survey items about assessment of hyperlipidemia are summarized in Table 2.

For patients without established cardiovascular disease, an overwhelming majority of family physicians (92%) reported “usually” or “always” assessing for cardiovascular disease risk factors using a history and a lipid profile. Only 11% reported using a team approach, and 36% usually or always used a system-based approach such as a flow sheet.

The family physicians reported a wide range of ages at which they begin cardiovascular risk assessment. A total of 69% report screening men in early adulthood (ages 18 through 34), whereas 62% report screening women in early adulthood. Risk calculators are usually or always used by only 17% of the family physicians despite NCEP ATP III guidelines recommending their use. Of the 363 family physicians who use risk calculators with any

Table 2. Self-reported Screening

Item and Response Categories	Percentage
“How frequently do you assess your adult patients who do not have an established diagnosis of heart disease for personal risk factors (history and lipid profile) related to coronary heart disease risk?” (N = 637)	
Never	0
Rarely	1
Occasionally	7
Usually	56
Always	36
“Do you use a flow sheet or other tracking mechanism in your office chart system to track screening for heart disease prevention?” (N = 624)	
Never	34
Rarely	15
Occasionally	15
Usually	21
Always	16
“At what age do you typically start lipid screening in women?” (N = 628)	
Under age 18	2
18–23	30
24–34	32
35–39	7
>40	29
“At what age do you typically start lipid screening in men?” (N = 627)	
Under age 18	2
18–23	32
24–34	37
35–39	10
>40	19
“Who typically does the risk assessment?” (N = 639)	
Family physician	89
Staff	0
Combination	11
“When you assess patients for coronary risk, how often do you use a coronary heart disease risk calculator?” (N = 628)	
Never	42
Rarely	20
Occasionally	20
Usually	12
Always	5

frequency (“rarely” to “always”), 54% use paper calculators, 36% use electronic calculators, and 10% use both types (data not shown in Table 2).

Management

Approximately 96% of family physicians reported prescribing statin medications routinely for patients with established coronary heart disease (CHD). Given a patient with established CHD, LDL = 120 mg/dL, and on a top dose of statin, respondents were asked (yes versus no) whether they would add a second drug to bring the patient’s LDL cholesterol to <100 mg/dL. If “yes,” respondents were asked what second agent they would most likely use among fibrate, niacin, cholesterol

Table 3. Self-reported Hyperlipidemia Management Practices of Family Physicians

Item and Response Category	Percentage
“If a patient’s hyperlipidemia is <i>uncontrolled</i> , how frequently do you typically see the patient?” (N = 627)	
<4 visits per year	27
4 visits	53
4–6 visits	16
>6 visits	4
“If a patient’s hyperlipidemia is <i>controlled</i> , how frequently do you typically see the patient?” (N = 628)	
<2 visits per year	26
2 visits	49
2–4 visits	23
>4 visits	1
If patient is on statin, “What is your most likely next step if the LFPs are normal but the lipid is abnormal?” (N = 637)	
Restart statin at lower dose	10
Change to different statin	57
Switch class of drug	30
Other	4
“How often do you monitor CPK in patients on statin therapy for hyperlipidemia?” (N = 636)	
Baseline and if symptoms	14
Periodically	12
Only if symptoms	67
Only high risk patients	2
Other	5

absorption inhibitor, bile acid sequestrant, plant stanol/sterol ester, or other. A total of 92% of respondents reported they would add a second agent to lower the patient’s LDL cholesterol below 100 mg/dL. Among those respondents, the most likely drug recommended was a cholesterol absorption inhibitor (60%), followed by niacin (21%), fibrate (9%), bile acid sequestrant (5%), and other (5%).

Given a patient with diabetes mellitus and an LDL cholesterol >130 mg/dL who is already treated with a moderate dose of statin, maximal lifestyle management and optimal glycemic control, 60% of responders would increase the dose of the current statin, 26% would add a second drug, 14% would switch to a more potent statin, and only 1% would refer to a lipid specialist. Other management decisions regarding abnormal liver function tests and monitoring of CPK by family physicians regarding hyperlipidemia are summarized in Table 3.

Family physicians see patients with controlled hyperlipidemia in the office an average of 2 times a year and patients with uncontrolled hyperlipidemia an average of 4 times a year, but there were large variations in both instances. There was also large variability in the management of elevated liver

function tests (LFTs) and monitoring of CPK levels.

Beliefs and concordance with NCEP ATP III guidelines

Most (85%) respondents had heard of the ATP III guidelines: 13% reported reading them carefully, 19% read a summary, 23% read them quickly, 21% skimmed them, and 21% had not read them. Over half (58%) of family physician respondents had attended a CME or lecture on the management of hyperlipidemia in the past year.

A total of 65% of the surveyed physicians agreed with the ATP III guideline to screen for hyperlipidemia in early adulthood. The ATP III recommendation to treat CHD equivalent risk patients (>2 risk factors and a 10-year CHD risk of >20%) to an LDL goal of less than 100 mg/dL was endorsed by 74% of respondents. An even higher percentage of respondents (87%) concurred with an LDL goal of less than 100 mg/dL in diabetic patients, and 97% of respondents concurred for patients with non-coronary atherosclerosis, when asked as a yes/no question. In addition, 76% of family physicians agreed with the use of non-HDL cholesterol as a secondary goal of therapy in subjects with high triglycerides. Contrary to the ATP III guidelines, a minority of family physicians surveyed (28%) used 3 times the upper limit of normal to define the liver function abnormality that was the threshold for changing statin therapy.

Barriers to assessment and treatment of hyperlipidemia

Physician respondents reported that the majority of barriers to assessment and treatment are patient factors. Cost, adherence, and patient beliefs, attitudes, and health habits accounted for 50% of the reported barriers to assessment and 73% of barriers to treatment. System issues such as direct-to-patient advertising and doctor and patient fear of adverse outcomes comprised 20% of the reported barriers to treatment. Physician factors accounted for only 2% of the barriers to treatment (Table 4).

Discussion

This is an important study because it provides insight into the self-reported practice patterns of family physicians, one of the largest groups of clinicians providing preventive services for cardiovas-

Table 4. Barriers to Assessment of Hyperlipidemia Reported by Family Physicians

“What are the two or three greatest barriers you face in assessing coronary heart disease in your patients?”	Percentage of Total Barriers to Assessment
Patient Factors	50
Adherence	18
Beliefs and Attitudes	16
Cost	12
Health Habits	2
Other	2
Physician Factors	25
Time	23
Other	2
System Factors	25
Insurance	11
Doctor-Patient Communication	9
Other	5

cular disease and hyperlipidemia in the United States. This study demonstrates that many but not all recommendations of the new ATP III guidelines have been adopted in clinical practice by most family physicians that are members of the AAFP. It also demonstrates the large degree of practice variation regarding cholesterol assessment and management and, therefore, much room for improvement.

Nearly all family physicians responding to this survey reported that they routinely assess adult patients without established cardiovascular disease for coronary risk. This is a higher degree of screening than found in previous studies but compares favorably with recent data obtained from chart abstraction in primary care settings.¹² Most risk assessment is performed by the physician without the support of flow sheets, decision aids, or support personnel. Only a minority of family physicians stated they used a risk calculator always or usually when risk stratifying a patient. Of those reporting use of a calculator, the majority used a paper format but a large minority reported using an electronic calculator. Thus recommendations of using a systematic team-based approach in organizing CHD risk factor assessment have not yet penetrated clinical practice.¹³

In addition, the recommendation of the ATP III to risk stratify patients using their 10-year risk of CHD does not seem to have been adopted by most physicians in this study. A recent Internet survey commissioned by the National Lipid Association of Physicians (n = 200) found that most physicians (81%) surveyed reported being very familiar with the NCEP guidelines, and 73% felt that they ad-

hered to them but perceived that only 46% of other physicians were very familiar with these guidelines and only 33% of them were adherent.¹⁴ The second estimate is more compatible with the data reported here. Another Internet study of 300 primary care physicians in 2004 found that 95% of physicians were aware of the ATP III guidelines, but less than 50% of primary care clinicians correctly identified low-risk and intermediate-risk patients. Use of pharmacotherapy for high-risk patients was recommended in over 95% of the cases by primary care physicians in this second survey.¹⁵

The age at which family physicians in our survey begin screening seems to lie between the ages recommended by the ATP III guidelines and the U.S. Preventive Services Task Force. The ATP III recommends screening at age 20 or older, whereas the U.S. Preventive Services Task Force recommends that screening begin at age 35 for men and at age 45 for women.¹⁶

Nonetheless, the U.S. Preventive Services Task Force recommendations also state that *earlier* screening is indicated for patients at higher risk (eg, diabetes, smoking, patients with cholesterol disorder, etc). The physician-reported gender differences in screening observed in our survey probably reflect these disparate clinical recommendations.

The frequency of primary care visits seems fairly uniform for both well-controlled (average 2.2 visits per year) and uncontrolled hyperlipidemic (4.2 visits per year) patients. Alternatively, the levels at which medications are stopped due to biochemical abnormalities shows a great deal of variability. Many surveyed physicians seem to be conservative and do not follow the FDA package insert or the National Cholesterol Guideline recommendations but rather report stopping lipid-lowering medications at low levels of biochemical abnormalities. This finding suggests that many family physicians are either unaware of the guideline recommendations or have adapted these recommendations to patient concerns or an individualized style of practice. The case scenarios of “second steps” in management of high-risk hyperlipidemic patients who are not at NCEP goals show a wide range of practice patterns. The observed variability in responses is not surprising given the lack of clear benefit to any particular therapeutic approach. The low use of plant stanol/sterol esters, fibrates, and lipid specialist referral, and the high reported use of cholesterol absorption inhibitors, and increasing doses of st-

atins are of interest for those desiring a better understanding of how family physicians manage their difficult-to-control hyperlipidemic patients.

Family physicians believe that the majority of barriers to assessment and treatment are patient factors. Cost, adherence, and patient beliefs, attitudes, and health habits account for approximately 50% of the barriers to assessment and almost 75% of the barriers to treatment (Table 5). These findings are similar to those found in a recent Internet survey of clinicians¹⁴ where 61% of respondents in that survey believed that many patients were concerned about potential side-effects of prescription drugs. A total of 59% of physicians stated that many patients were unable to afford prescription drugs, and 58% stated that many patients do not comply with long-term cholesterol-lowering drugs. These same investigators, however, found quite different responses from consumers, with only 31% fearing the side-effects of cholesterol-lowering medication, 34% stating that medications cost too much, 28% not liking to take prescription medications, and 58% willing to control cholesterol with diet and exercise. We believe that clinicians would do better by focusing on the barriers they can ostensibly influence, such as establishing standard assessment and treatment protocols in their offices, using risk calculators regularly to guide treatment, and using a team approach to ensure that all adult patients are appropriately assessed and treated.

Previous work using chart audits indicates actual lipid management may not be as good as physicians report it to be. Eaton et al¹² showed that in 5 community family practices in southeastern New

Table 5. Barriers to Treatment of Hyperlipidemia Reported by Family Physicians

“What are the two or three greatest barriers you face in treating your patients with hyperlipidemia?”	Percentage of Total Barriers to Treatment
Patient factors	74
Adherence	34
Cost	28
Beliefs and attitudes	8
Health habits	4
Physician factors	3
Time	2
Other	1
System issues	23
Insurance	5
Doctor-patient communication	3
Other	15

England in 2003, only 23% of CHD equivalent-risk patients were at an LDL goal <100 mg/dL and 42% of high-risk patients were at an LDL goal <130 mg/dL. Pearson et al¹⁷ evaluated 5 regions of the United States (lipid treatment assessment project [L-TAP]) and found that only 38% of patients met their LDL goals, and only 18% of established CHD patients were at their LDL goal.

Examining only high-risk women in a 1.1 million member-integrated managed care program, Mosca et al¹⁸ found only 7% at LDL goal <100 mg/dL initially with an increase to 12% after 36 months. These treatment gaps—despite clinician statements that they treat most of their high-risk patients to goal—are hard to reconcile as largely patient-related barriers as our survey would suggest. Quality improvement projects focusing on a team-based system approach have demonstrated improvement in the number of hyperlipidemia patients at goal.¹⁹

We recognized a number of limitations to our study. The sampling frame was United States AAFP members who spent at least 50% of their time in direct patient care (according to the AAFP membership database and self-reports obtained in this survey), so the results may not apply to physicians who spend less time in patient care or to other primary care physicians. Our response rate of 58% is good for this population, but the results may not reflect the practices and beliefs of nonrespondents. The most important reason for refusal to complete a survey is lack of interest in the subject.^{20,21} Therefore, it is likely that family physicians who completed the survey were more interested in and knowledgeable about hyperlipidemia than those who did not. With few exceptions, survey respondents were very comparable statistically both to nonrespondents and to the larger AAFP active member population on available individual and practice demographics from the AAFP master database (results available from JMG).

Our data also are self-reported, and as discussed above, there may be discrepancies between what physicians self-report about their practice patterns and their actual behavior. We did not determine the actual practice patterns of the surveyed family physicians.

Conclusion

The results of this survey demonstrated variability in knowledge, beliefs, and practice patterns among

practicing family physicians. We found general agreement on universal screening of adults for hyperlipidemia as part of cardiovascular disease prevention strategy and use of LDL cholesterol as a treatment goal especially for diabetics and patients with established coronary and non-coronary atherosclerotic disease. Many other aspects of the NCEP ATP III guidelines, such as use of a systematic, multidisciplinary approach, using non-HDL-cholesterol as a secondary goal, using a CHD risk calculator for risk assessment to guide cholesterol management, and use of combination therapy for patients not at their LDL goals, have not yet penetrated self-reported clinical practice. This insight may be helpful in designing quality improvement projects aimed at improving optimal cholesterol management in primary care. Given the prevalence of cardiovascular disease in the United States, the estimates of increase in this prevalence over time, and the large numbers of patients-at-risk seen routinely by family physicians, these same physicians would do well to understand and implement the recommendations of the U.S. Preventive Services Task Force and NCEP ATP III to better manage patients with risk factors for cardiovascular disease.

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