

Recognition and Treatment of Hypercholesterolemia in a Family Practice Center

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Elevated levels of serum cholesterol are a major risk factor for coronary artery disease, yet few studies have investigated the extent to which practicing physicians recognize and treat their patients with hyperlipidemia. A retrospective chart review was performed on 93 patients who had documented cholesterol levels greater than or equal to 6.20 mmol/L (240 mg/dL) in an outpatient setting to determine the degree of recognition and treatment of hypercholesterolemia.

Hypercholesterolemia was diagnosed in 66 percent of patients, dietary recommendations were made in 46 percent, and lipid-lowering medication was prescribed in only 6 percent. Lipid profiles or high-density lipoprotein levels were determined in 22 percent, and thiazide diuretics were being prescribed for 32 percent. There was a trend toward greater recognition and treatment in patients with cholesterol levels greater than 7.75 mmol/L (300 mg/dL) and in patients less than 70 years of age.

These results suggest that physician recognition of hypercholesterolemia is greater when compared with previous studies, but more aggressive diagnosis and intervention are needed. Greater utilization of lipid-profile analysis in hypercholesterolemic patients should also be encouraged.

Elevated levels of cholesterol are a major independent risk factor for coronary artery disease,¹ and studies have demonstrated that lowering cholesterol reduces the risk of developing atherosclerotic heart disease.²⁻⁴ The risk appears to increase continuously and curvilinearly with increasing cholesterol levels above 4.65 mmol/L (180 mg/dL).^{5,6} Thus elevated cholesterol levels should be identified and treated early in a patient's life. Few studies, however, have examined how practicing physicians are incorporating this information by recognizing and treating their patients with hypercholesterolemia.

In review of the literature, one article⁷ was found in which only 13 of 38 charts of hospitalized patients with cholesterol levels above 9.05 mmol/L (350 mg/dL) included the diagnosis of hyperlipidemia. A more recent report on large-scale screening of cholesterol levels found that 70 percent of individuals with cholesterol levels between 5.70 and 6.70 mmol/L (220 and 260 mg/dL) were

advised by their physicians to "do nothing" or "not worry."⁸

The present study was undertaken to evaluate how well primary care physicians recognize elevated cholesterol levels in the outpatient setting, and whether they intervene in attempts to lower these levels. The study included both practicing family physicians and family practice residents.

METHODS

This study was undertaken at the Scottsdale Memorial Family Practice Center, an outpatient facility associated with the 360-bed Scottsdale Memorial Hospital in Scottsdale, Arizona. Four attending physicians and 17 family practice residents treated patients at the center during the study period. The attending physicians are board certified in family practice, maintain practices at the center, and also function as faculty members.

Patients at the center represent a broad range of ages and socioeconomic status. In January 1987 the charts of all patients who had their serum cholesterol measured from January through June 1986 were reviewed retrospectively. This review included all patients who had

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TABLE 1. SUMMARY OF RECOGNITION AND TREATMENT RESULTS

Study Results	Cholesterol mmol/L (mg/dL)			
	All Patients >6.20 (>240) (n = 93) No. (%)	Group A 6.20-6.70 (240-259) (n = 36) No. (%)	Group B 6.70-7.75 (260-299) (n = 35) No. (%)	Group C >7.75 (>300) (n = 22) No. (%)
Recognition				
Previous diagnosis	18 (19)	4 (11)	6 (17)	8 (36)
New diagnosis	43 (46)	16 (44)	18 (51)	9 (41)
Total	61 (66)	20 (56)	24 (69)	17 (77)
Therapy				
Diet	43 (46)	12 (33)	15 (43)	16 (73)
Cholestyramine	6 (6)	1 (3)	2 (6)	3 (41)
Lipid profile or high-density lipoprotein ordered	20 (22)	5 (14)	6 (17)	9 (41)
Patients using thiazide diuretics	30 (32)	10 (28)	16 (46)	4 (18)

chemistry panels (SMAC-12 or SMAC-20), lipid profiles, or individual cholesterol measurements. All patients with a cholesterol reading of greater than or equal to 6.20 mmol/L (240 mg/dL) were entered into the study group (6.20 mmol/L was believed to represent moderate risk for all age ranges).^{1,5} Cholesterol measurements were performed by Technicon SMAC instruments in the Scottsdale Memorial Hospital laboratory. On the laboratory reports, the range of normal values was listed as 3.87 to 5.17 mmol/dL (150 to 200 mg/dL).

The clinic charts were examined carefully, and the following information was tabulated for each patient:

1. Age and sex of physician ordering test
2. Total cholesterol level, lipid profile
3. Cardiac risk factors: history of hypertension, smoking, diabetes, or family history of heart disease under the age of 65 years
4. Evidence of vascular disease: coronary artery disease, cerebrovascular disease, or peripheral vascular disease
5. Use of thiazide medication
6. Diagnosis of hypercholesterolemia prior to present laboratory test
7. Recognition or diagnosis of hypercholesterolemia after current test
8. Treatment of hypercholesterolemia: diet or medication.

Recognition of hypercholesterolemia was affirmed if hyperlipidemia or hypercholesterolemia was on the problem list or was mentioned in a progress note or telephone call note.

A total of 331 patients had cholesterol levels measured during the study period. Ninety-six patients had results

greater than or equal to 6.20 mmol/L (240 mg/dL). Three of these patients were excluded from the study because they were considered inappropriate candidates for routine screening or cholesterol intervention: a patient with pancreatic cancer who died one month post-testing, a 92-year-old with severe dementia and an acute illness who died two weeks post-testing, and a dialysis patient with chronic renal failure. Six patients had more than one cholesterol test during the study period. In these cases the earliest level was used to establish severity of hypercholesterolemia and to evaluate physician recognition.

Statistical comparisons were calculated from contingency tables using chi-square. The Yates' correction for contingency was applied in the one situation with an expected frequency of less than five.

RESULTS

The 93 patients (34 male, 59 female) ranged in age from 15 to 86 years, with a mean age of 59 years. Twenty-five had documented vascular disease, including 17 with coronary artery disease, 3 with cerebrovascular disease, 2 with peripheral vascular disease, and 3 with vascular disease at multiple sites. For coexisting risk factors, 46 had hypertension and seven had diabetes. Family history of heart disease was positive in 26 of the 58 patients with documented family histories. Of the 82 patients with a smoking history available, 26 currently smoked. Thirty of the 93 (32 percent) were taking thiazide medication.

Recognition and treatment results are summarized in Table 1. A total of 61 of 93 (66 percent) had documented recognition of hypercholesterolemia in their outpatient charts. The condition was diagnosed previously in only

18 of 93 cases (19 percent). Forty-three of the 61 recognized patients (70 percent) were given dietary instruction; only six were placed on lipid-lowering medication as well as diet (cholestyramine in all six cases). Roughly 10 percent of patients had no further office visits or chart notes in the six- to 12-month period following determination of their cholesterol levels.

To determine whether the degree of hypercholesterolemia affected recognition and treatment, the patients were separated into three groups: group A, 6.20 to 6.70 mmol/L (240 to 259 mg/dL); group B, 6.70 to 7.75 mmol/L (260 to 299 mg/dL); and group C, greater than 7.75 mmol/L (300 mg/dL). These groups were thought to represent moderate, high, and very high risk, respectively. More patients in the group with very high cholesterol levels (36 percent), compared with those in the group having moderate levels (11 percent), had been previously given the diagnosis of hyperlipidemia ($P < .005$).

When these previously identified patients were excluded from the analysis, nine of 14 (64 percent) patients in the group with very high cholesterol levels were newly diagnosed as having hyperlipidemia, compared with 16 of 32 (50 percent) patients in the group with moderately elevated levels of cholesterol. Although this trend toward higher recognition at higher levels was not statistically significant, significantly more patients in the very high risk group (73 percent) than in the moderate risk group (33 percent) were treated with diet or medication ($P < .005$).

Only 20 patients (22 percent) had lipid profiles or high-density lipoprotein levels determined. Patients in the very high risk group did have significantly more lipid profiles determined than those in the moderate group—41 percent vs 14 percent ($P < .05$).

Because the benefit of intervention in the elderly with hyperlipidemia is less well established, patients aged 70 years and above were compared with patients aged 15 to 69 years to determine whether advanced age influenced diagnosis and treatment. Patients with cholesterol levels greater than 7.75 mmol/L (300 mg/dL) were excluded because only one of 22 patients in this group was aged 70 years or above. Groups A and B had an even distribution of younger and more elderly patients and were used for the comparison. These results are summarized in Table 2. Of the elderly group, 13 of 26 (50 percent) were recognized vs 31 of 45 (69 percent) in the younger age group. This trend toward less recognition of hyperlipidemia in elderly patients was not statistically significant.

Finally, the 47 patients seen by attending physicians were compared with the 46 patients seen by resident physicians. There were no differences between the groups with regard to recognition or treatment (attending physicians recognized 64 percent and treated 43 percent, whereas residents recognized 61 percent and treated 50 percent). There was a good deal of variability, however, among the

TABLE 2. RESULTS BY AGE OF PATIENTS WITH CHOLESTEROL LEVELS OF 6.20 TO 7.75 mmol/L (240-299 mg/dL)

Study Results	Aged 15 to 69 Years (n = 45) No. (%)	Aged 70 Years and Above (n = 26) No. (%)
Recognition of hyperlipidemia		
Previous diagnosis	7 (16)	3 (12)
New diagnosis	24 (53)	10 (38)
Total	31 (69)	13 (50)
Therapy		
Diet	21 (47)	6 (23)
Cholestyramine	1 (2)	2 (8)
Lipid profile or high-density lipoprotein ordered	8 (18)	3 (12)
Patients using thiazide diuretics	15 (33)	11 (42)

individual physicians. One attending physician, for example, recognized 86 percent of his patients with hypercholesterolemia and accounted for five patients taking cholestyramine.

DISCUSSION

Hypercholesterolemia has been confirmed as a major risk factor for developing atherosclerotic heart disease, and treating elevated cholesterol is effective in reducing this risk. Apparently, physicians have been slow to incorporate this information into their clinical practices. Many patients with markedly elevated cholesterol levels, even after myocardial infarctions or coronary artery bypass grafting, have not been identified and treated for hyperlipidemia.⁷ Physicians often tell patients who have moderate elevations of their cholesterol not to worry or to do nothing about it.⁸

In this study, recognition was better than previously reported⁷: 66 percent of all patients who had cholesterol levels greater than 6.20 mmol/L (240 mg/dL) were identified as having hyperlipidemia. Despite a normal range of 3.87 to 5.17 mmol/L (150 to 200 mg/dL) listed on the laboratory reports, however, many patients with very high lipid levels were not identified. Less than one half of the patients were given dietary recommendations, and only 6 percent were placed on lipid-lowering medication.

The initial treatment for the vast majority of patients with hyperlipidemia is dietary management. Thus, low utilization of dietary recommendation in the present study

is disturbing. This finding may reflect physician perception that changing ingrained habits such as diet is difficult, and that treating diet-related conditions such as obesity shows poor results. Further studies regarding long-term efficacy of dietary recommendations and referrals would be helpful.

The low utilization of medication may be due to the high side-effect profile of currently available drugs, especially if the treating physician is not convinced that lowering cholesterol will reduce the chance of vascular disease. Physician inexperience with current medications may also contribute to low utilization. It is hoped that such new drugs as lovastatin will prove to be efficacious and well tolerated, leading to greater utilization. Meanwhile, recognition of hyperlipidemia appears to be increasing, but more aggressive diagnosis and management is needed.

In many studies it has been suggested that high levels of high-density lipoprotein protect against heart disease, yet this diagnostic tool was little used to further delineate the significance of hypercholesterolemia in the study group. Patients with very high cholesterol levels were more likely to have lipid profiles determined, but, nonetheless, only 40 percent of patients with cholesterol levels over 7.75 mmol/L (300 mg/dL) had these tests performed. Greater awareness and utilization of high-density lipoprotein levels in the primary care setting are needed.

Because many studies on the treatment of hyperlipidemia have been performed on middle-aged men, some controversy surrounds the benefit of treating elevated cholesterol levels in the elderly. In this study, a trend toward less recognition and treatment of hyperlipidemia in patients over the age of 70 years was apparent. Identification of lipid disorders in the young should be of greater importance than in the elderly. Until this issue is further clarified, however, advanced age alone should not prevent treatment of elevated levels of cholesterol.

Thiazide diuretics have been shown to elevate total cholesterol levels as well as total cholesterol to high-density lipoprotein ratios.^{9,10} Despite these potentially harmful effects, one third of the patients with hyperlipidemia were taking thiazides, and two thirds of patients with hyperlipidemia and hypertension were taking thiazide diuretics. It would seem prudent to avoid antihypertensive medication that adversely affects lipid levels in hypertensive patients with hypercholesterolemia. Many antihypertensive medications do not affect lipids, and some, such as prazosin, have been shown to reduce cholesterol.¹¹

The present study did not address the issue of screening. A recent report on cholesterol screening found that one half of the adults in the study had never had a cholesterol level measured.⁸ Public education programs and diligent efforts by primary care physicians are needed to increase screening for hypercholesterolemia.

An important aspect in the diagnosis of hypercholesterolemia is the identification of disorders that cause secondary increases in lipids. These conditions include diabetes, hypothyroidism, and renal failure. The present study did not investigate the extent to which physicians rule out or treat secondary causes of hyperlipidemia, but this is an important area for physician education and future research.

In summary, the current situation with hyperlipidemia is reminiscent of the treatment of hypertension 25 years ago. Researchers are finding that "lower is better" with cholesterol levels, much as they did with blood pressure, and that treating asymptomatic patients is clearly indicated. The study demonstrates that the level of physician awareness has increased since the time of Nash's study⁷ several years ago but that further improvement is necessary. Laboratories that have failed to do so should lower the upper limits of normal for cholesterol to appropriate levels to help with recognition of hypercholesterolemia. Finally, physician training in all settings should place emphasis on early identification and therapy of hypercholesterolemia to reduce the likelihood of vascular disease with advancing age.

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