

Management of Hypercholesterolemia in a Family Practice Setting

Steven J. Levin, MD, and Steven M. Ornstein, MD
New Brunswick, New Jersey, and Charleston, South Carolina

A study was undertaken to assess physician adherence and patient compliance with the National Cholesterol Education Program guidelines for the management of newly detected hypercholesterolemia. The study site was the Department of Family Medicine, Medical University of South Carolina, Charleston, a university-based family medicine residency program. All serum cholesterol levels measured between July 1, 1988, and September 30, 1988, were reviewed. Patients were classified as normal, borderline, or hypercholesterolemic based on serum cholesterol levels and coronary heart disease risk factors. Patients previously recognized to be hypercholesterolemic were excluded. Six months later, medical record reviews were performed for the 192 hypercholesterolemic and 107 borderline hypercholesterolemic patients. Only 39 of the hypercholesterolemic patients (20%) had received appropriate dietary therapy and follow-up. Patient compliance with physician recommendations was excellent. There was minimal unnecessary testing or treatment of borderline hypercholesterolemia. Low rates of appropriate management of hypercholesterolemia may be related to inadequate physician knowledge, low physician-perceived self-efficacy regarding dietary counseling, or time constraints. J FAM PRACT 1990; 31:613-617.

Hypercholesterolemia is widely recognized as a major risk factor for coronary heart disease. Numerous studies have demonstrated a direct and linear relationship between serum cholesterol and coronary heart disease morbidity and mortality.¹⁻³ Cholesterol reduction, through dietary and pharmacologic means, can lower coronary heart disease morbidity and mortality.⁴

Several studies have examined physician screening, diagnosis, and treatment of hypercholesterolemia. Estimates are that only 5% to 22% of all American adults have had their serum cholesterol measured.⁵ In addition, there is evidence that elevated cholesterol levels are often ignored or inadequately managed by physicians. Studies have found that physicians recognize only 33% to 66% of patients with elevated cholesterol levels, recommend dietary therapy to 29% to 46%, and prescribe pharmacotherapy to 6% to 10%.⁶⁻⁸ It is possible, however, that these chart audit studies have underestimated physician

performance. Furthermore, previous studies have failed to distinguish between physicians' rates of treatment of newly diagnosed compared with previously diagnosed hypercholesterolemia.

In January 1988, the National Cholesterol Education Program Adult Consensus panel published national guidelines for the screening, diagnosis, and treatment of hypercholesterolemia.⁹ Physician compliance with these guidelines has not yet been examined.

A study was undertaken to evaluate whether the initial management of newly diagnosed hypercholesterolemia by residents and faculty in a university-based family medicine residency program complied with the National Cholesterol Education Program guidelines. The study distinguished between physician and patient completion of three steps: confirmation of the diagnosis, initiation of treatment, and follow-up. Additionally, the study evaluated whether unnecessary testing or treatment of patients with borderline hypercholesterolemia occurred.

METHODS

The study site was the Department of Family Medicine, Medical University of South Carolina, Charleston. As of

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From the Division of Research, Department of Family Medicine, Medical University of South Carolina, Charleston, South Carolina. Requests for reprints should be addressed to Steven J. Levin, MD, Family Practice Center, 1 Penn Plaza, New Brunswick, NJ 08901.

TABLE 1. CLASSIFICATION AND INITIAL MANAGEMENT OF HYPERCHOLESTEROLEMIA*

| Cholesterol | Classification | Initial Management† |
|---|----------------|---|
| Total <5.2 mmol/L (200 mg/dL) | Normal | Repeat within 5 years |
| 5.2–6.2 mmol/L (200–240 mg/dL) Without coronary heart disease, one or no other coronary heart disease risk factors | Borderline | General dietary advice, recheck in 1 year |
| With coronary heart disease or two other coronary heart disease risk factors | High | Lipoprotein analysis |
| ≥6.2 mmol/L (240 mg/dL) | High | |
| Low-density lipoprotein cholesterol 3.36–4.14 mmol/L (130–160 mg/dL)‡ | Borderline | General dietary advice, recheck in 1 year |
| Without coronary heart disease, one or no other coronary heart disease risk factors | | |
| With coronary heart disease or two other coronary heart disease risk factors | High | Clinical evaluation, dietary therapy, reevaluate at 4–6 weeks and 3 months |
| ≥4.14 mmol/L (160 mg/dL)§ | High | |

*Modified from National Cholesterol Education Program.⁹
†All total serum cholesterol values ≥5.2 mmol/L (200 mg/dL) should be confirmed by repeating the test and using the average value for decision making. Treatment decisions should be based on low-density lipoprotein cholesterol values.
‡Corresponds to a total serum cholesterol of 5.2–6.2 mmol/L (200–240 mg/dL).
§Corresponds to a total serum cholesterol of 6.2 mmol/L (240 mg/dL).

July 1, 1988, 7397 adult patients (>18 years) were active in the clinic. Sixty-one percent of the patients were black, 58% were women, 41% had private health insurance, 11% had Medicaid or Medicare, and 48% were uninsured. The clinic staff consisted of 15 first-year residents, 12 second-year residents, 13 third-year residents, 2 fellows, and 5 faculty.

Using a previously described computerized laboratory system,¹⁰ all patients aged 18 years and over who had a serum cholesterol level measured between July 1, 1988, and September 30, 1988, were identified. For each patient whose serum cholesterol level was 5.2 mmol/L (200 mg/dL) or greater, a medical record review was performed 6 months after the date of the initial serum cholesterol measurement. All medical record reviews were performed by the same physician following a written protocol. Data were abstracted on sociodemographic information (age, race, sex, and insurance status), the presence of coronary heart disease or coronary heart disease risk factors, and previous diagnosis or treatment of hypercholesterolemia. Using National Cholesterol Education Program guidelines,⁹ patients were classified as having hypercholesterolemia or borderline hypercholesterolemia (Table 1). Patients previously recognized to be hypercholesterolemic were excluded. Previous recognition was defined by a prior diagnosis of hypercholesterolemia, prior use of antihyperlipidemic medication, or a prior recommendation of dietary modification.

Additional chart review and review of the nursing telephone logs were conducted for patients classified as hypercholesterolemic, evaluating for physician and patient confirmation, treatment, and follow-up. For patients classified as borderline, evaluation was made for unnecessary testing and treatment. Physician confirmation of hypercholesterolemia was defined as the ordering or completion of a lipid profile or repeat serum cholesterol level. Acceptable physician treatment of hypercholesterolemia included requesting that the patient return to clinic for dietary advice, providing dietary advice during a visit or by mail, referring the patient to a dietician, providing an explanation for not treating the problem, or prescribing pharmacotherapy. Physician follow-up was determined by the ordering or completion of laboratory testing after treatment. Patient confirmation and follow-up were defined as the actual completion of laboratory testing. The completion of laboratory testing was defined as the presence of a serum cholesterol level in the medical record or in the computerized laboratory database. Patient treatment, defined as the receipt of the recommended dietary advice, was assessed by reviewing physicians' progress notes and the dietician's appointment schedule. Mailed diets were assumed to have been received.

In the case of borderline hypercholesterolemia, unnecessary testing or treatment included ordering a lipid profile, referral to the dietician, or prescription of pharmacotherapy.

TABLE 2. CHARACTERISTICS OF PATIENTS WITH HYPERCHOLESTEROLEMIA* (N = 192)

| Characteristics | No. (%) |
|---|-----------------|
| Female | 140 (72.9) |
| Male | 52 (27.1) |
| Black | 141 (73.4) |
| White | 49 (25.5) |
| Other | 2 (1.0) |
| Age (years) | |
| Mean (\pm SD) | 53.2 \pm 14.5 |
| Range | 18-87 |
| Hypertension | 117 (60.9) |
| Tobacco abuse | 45 (23.4) |
| Diabetes | 69 (31.3) |
| Cerebrovascular or peripheral vascular disease | 14 (7.3) |
| Family history premature coronary heart disease | 13 (6.8) |
| Severe obesity | 20 (10.4) |
| Previous myocardial infarction | 9 (4.7) |
| Definite coronary artery disease | 7 (3.6) |

*As defined by the National Cholesterol Education Program.⁹

Using Student's *t* tests, the mean serum cholesterol level was compared between patients for whom physicians ordered confirmatory testing, treatment, and follow-up and patients for whom these items were not ordered. Mean age was similarly examined.

RESULTS

During the 3-month enrollment period, 638 patients had serum cholesterol level determinations. Of these 638 patients, 279 (44%) had normal serum cholesterol levels, 98 (15%) were classified as having borderline hypercholesterolemia, and 261 (41%) were classified as having hypercholesterolemia. Of the 261 hypercholesterolemic patients, 69 were excluded because they had been previously recognized as hypercholesterolemic, leaving 192 newly detected hypercholesterolemic patients. Physicians added hypercholesterolemia to the problem list for 38% of the 192 newly detected hypercholesterolemic patients. Characteristics of the newly detected hypercholesterolemic patients are presented in Table 2.

Confirmation

Physicians ordered confirmatory testing for 85 (44%) of the 192 hypercholesterolemic patients and did not order confirmatory testing in 107 cases. The patients for whom physicians ordered confirmatory testing had a higher mean serum cholesterol level (7.01 mmol/L [271 mg/dL]) than did the patients for whom confirmatory testing was not ordered (6.49 mmol/L [251 mg/dL]) ($P = .0002$). The

mean age of the two groups (51.8 vs 54.3) was not significantly different ($P = .24$).

Of the 85 patients for whom physicians ordered confirmatory testing, 65 (76%) actually obtained the tests. Fourteen (16%) were reclassified as borderline or normal, while the other 51 (60%) were confirmed to be hypercholesterolemic. Of the 20 patients who did not comply with confirmatory testing, 9 were prescribed dietary therapy anyway, while 11 were lost to follow-up.

Initiation of Treatment

Of the original 192 patients, 167 should have been recommended dietary therapy. The remaining 25 patients were either reclassified as normal or borderline during the confirmation step (14) or lost to follow-up after not complying with the physician's request for confirmation (11).

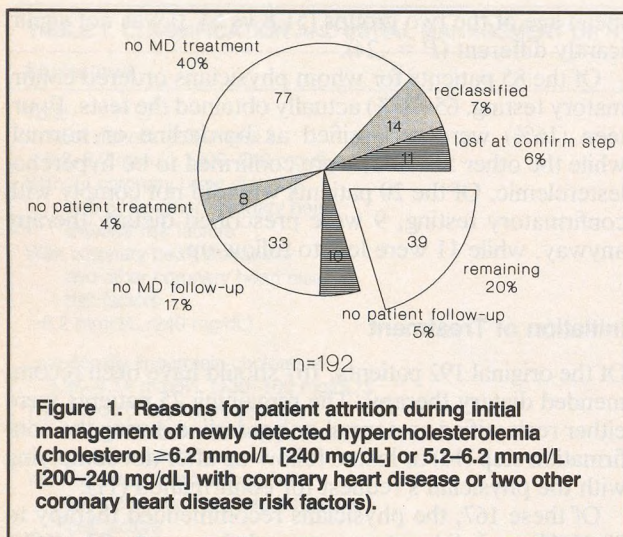
Of these 167, the physicians recommended therapy to 90 (54%) and did not recommend therapy to 77 (46%). Physicians provided dietary therapy by referring the patient to a dietician, counseling the patient, or by mailing the patient information on a low-cholesterol diet. No physician prescribed pharmacotherapy at this point. The patients for whom physicians prescribed treatment had a higher mean serum cholesterol level (6.93 mmol/L [268 mg/dL]) than did the patients for whom treatment was not prescribed (6.39 mmol/L [247 mg/dL]) ($P = .0002$). The mean age of the two groups (52.8 vs 54.6) was not significantly different ($P = .42$). Patient participation in obtaining recommended dietary advice was high. Eighty-two (91%) of the 90 patients obtained the advice.

Follow-up

Physicians ordered a follow-up serum cholesterol level for 49 (60%) of the 82 patients who obtained dietary advice. The patients for whom physicians ordered follow-up had a mean serum cholesterol level (7.09 mmol/L [274 mg/dL]) that was similar to the mean serum cholesterol of the patients for whom follow-up was not ordered (6.75 mmol/L [261 mg/dL]) ($P = .10$). The two groups had the same mean age (53.3 years) ($P = .98$). Of the 49 patients referred for follow-up, 39 (80%) patients obtained it. The mean serum cholesterol level of these 39 patients dropped from 7.09 \pm 0.96 mmol/L (274 \pm 37 mg/dL) before treatment to 6.67 \pm 1.01 mmol/L (258 \pm 39 mg/dL) after treatment, representing a 5.8% decline. Figure 1 displays the final disposition of the 192 patients.

Borderline Hypercholesterolemia

There were 107 patients with borderline hypercholesterolemia: 98 based on initial serum cholesterol levels and 9



who were reclassified as borderline after confirmatory testing. Sixty-three percent of these patients were black, 81% were women, and their mean age was 45.1 ± 16.5 years. Physicians ordered lipid profiles for 7 (6.5%) of these patients, referred 2 (1.9%) to the dietician, and did not prescribe pharmacotherapy to any. Therefore, 9 (8.4%) cases satisfied the definition for having received unnecessary testing or treatment.

DISCUSSION

The management of hypercholesterolemia, like most chronic medical problems, requires a balance between treating the problem and monitoring the effects of treatment. It also requires active participation by both physicians and patients. Reduction in cholesterol is less likely when any of these features are missing. Six months was a reasonable amount of time to see how well physicians and patients would initially manage newly detected hypercholesterolemia. As the National Cholesterol Education Program guidelines were readily available and had been actively discussed in the clinic for over 6 months, they were used as a model of appropriate hypercholesterolemia management.

Of the 192 patients newly detected as hypercholesterolemic, only 39 patients received both dietary advice and a follow-up serum cholesterol determination. The majority of the attrition can be attributed to physician failure to initiate treatment and order follow-up testing.

Physician compliance with confirmation was especially poor (44%). This tendency to not confirm the diagnosis is a concern, as 14 of the 65 (22%) who obtained a lipid

profile or repeat serum cholesterol level were ultimately reclassified as borderline or normal. These results support the National Cholesterol Education Program recommendation to confirm an elevated screening serum cholesterol level with further testing.

Physicians' rates of treatment were also low. Although differences in study design make comparisons difficult, it is noteworthy that the treatment rate in this study (54%) is higher than that demonstrated in any previous study.⁶⁻⁸ This observation could be related to the emphasis on health promotion in the residency program studied or the publication of the National Cholesterol Education Program guidelines in the interval between previous studies and this study. It was not surprising that no physician prescribed pharmacotherapy, as the study examined the initial management of newly detected hypercholesterolemia.

The reasons for poor physician compliance with the confirmation, treatment, and follow-up of newly detected hypercholesterolemia are unknown. Similar to previous studies,⁶⁻⁸ this study found that higher levels of cholesterol elevation positively influence physician behavior. While studies have shown physicians' attitudes toward the importance of cholesterol reduction to be positive,¹¹⁻¹³ physician knowledge of appropriate treatment levels has varied.^{7,12,13} Furthermore, physicians do not feel that they are as effective in managing hyperlipidemia as they are in managing hypertension.¹² This finding is particularly important, as 61% of the hypercholesterolemic patients also had hypertension. It is possible that in a time-limited visit, physicians chose to address the problem with which they were more comfortable. Other possibilities for poor physician compliance include lack of time, inadequate reminder systems, and excessive data.

In contrast to physician compliance, patient compliance was high. In this study, patient compliance only involved obtaining recommended testing and treatment. It did not assess whether patients actually followed the dietary advice they received.

There are several limitations to this study. As a medical record review study, it is dependent on physician documentation and therefore likely to have underestimated actual physician behavior. By reviewing the nursing telephone logs, the dietician's appointment schedule, and the computerized laboratory database of all subsequent serum cholesterol determinations, 12 cases were found of uncharted physician behavior, modifying 6.2% of the classifications. An additional limitation is the applicability of results from a residency-training site to community family practice.

This study has demonstrated that physicians in a university-based family medicine residency often fail to treat hypercholesterolemia. This finding is in contrast to evidence that such treatment is worthwhile. Further research

is needed to better understand why physicians have poor compliance and to test whether interventions such as improving physician knowledge or providing physicians with reminders can improve their performance.

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