
Physician Practice for Cardiovascular Disease Risk-Factor Reduction in Six Upper Midwestern Communities

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Preventive practice for coronary heart disease risk is increasingly accepted in the medical community. To determine the extent and characteristics of treatment advice for high blood pressure, blood cholesterol, and cigarette smoking, 274 randomly selected primary care physicians were interviewed by telephone in six Midwestern cities. Participation in the survey was 90%. Reported care for high blood pressure was consistent with national guidelines. Management of high blood

cholesterol varied significantly among physicians and frequently differed from national recommendations. Although consensus existed on the importance of advising cigarette smoking cessation, reported approaches differed. The results observed indicate improved preventive practice compared with earlier surveys and recent national reports. Continued improvement, however, is needed in cholesterol and smoking-cessation management. *J Fam Pract* 1991; 32:49-55.

Coronary heart disease is the most common cause of death in the United States. The role of hypertension, elevated blood cholesterol, and cigarette smoking in the development of this disease is well documented, as is prevention of morbidity and mortality by risk reduction.¹⁻⁶ The role of the physician as a provider of individualized health information and advice is also recognized. Second only to family members, the physician is reported to be the most sought after source of such advice, and thus is a crucial person in encouraging preventive behaviors.⁷

The perceptions and practice of physicians for managing cardiovascular risk factors vary by individual practitioner and risk factor. Pharmacologic treatment of high blood pressure is widespread, while nonpharmacologic methods are less commonly prescribed.^{8,9} Physician attitudes toward the detection and treatment of elevated blood cholesterol are improving.¹⁰ Although most physicians agree that smoking cessation is important, many feel unable to facilitate smoking cessation successfully in their patients.^{8,9}

The purpose of the study reported here was to

describe current physician practices in the prevention of coronary heart disease in six upper Midwestern communities and to provide a basis for the planning of future physician education programs.

Methods

As part of the Minnesota Heart Health Program (MHHP), annual risk-factor surveys were conducted in random population samples in six upper Midwestern cities.¹¹ Two of these cities are small (28,000 and 36,000 inhabitants), two are medium-sized (85,000 and 105,000 inhabitants), and two are suburbs in a metropolitan area (75,000 and 95,000 inhabitants). Participants (N > 10,000) in these surveys had risk-factor data sent to their personal physician. In the fall of 1986, a stratified random sample of physicians was selected among all those who from 1981 through 1985 were named personal physicians by MHHP survey participants. In the two small towns, all mentioned physicians were included to balance the sampling frame cell sizes between towns. The total number of physicians selected was 552. Of the selected physicians, 114 were no longer in practice (died, retired, or moved); consequently, the final sample comprised 438 active physicians.

From December 1986 through March 1987, physicians were mailed an introductory letter describing the survey objectives and the procedure for scheduling and

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completing a telephone appointment interview. Survey staff then telephoned the clinic receptionist or nurse to schedule a specific telephone interview time. Physicians declining the interview were again telephoned by a study physician and asked to reconsider participation. During this second telephone contact, questions were answered about the objectives of the survey and concerns were addressed. All physicians who refused to participate were characterized as to sex, specialty, year of graduation from medical school, percentage of primary care patients, average number of patients seen per day, and barriers to participation.

Eligibility requirements for participation in the study were determined by the first three questions of the survey questionnaire. Those requirements included that current practice was general practice or one of the following specialties: family medicine, general internal medicine or internal medicine subspecialty, or general surgery. In addition, only those physicians who stated that they provided primary care to a minimum of 10% of their patients and that they saw a minimum of five patients per day were included in the survey.

Physicians fulfilling eligibility requirements completed a 20-minute telephone interview by trained survey staff. The survey questionnaire contained 29 closed and 9 open-ended questions. Questions about the diagnosis and treatment of hypertension were related to a brief case description that was read to the physician: "Please consider a 48-year-old man with no obvious cardiovascular risk factors except hypertension and no signs of cardiovascular or other significant disease," whereafter they were asked which blood pressure levels they considered normal and which required drug treatment, the number of blood pressure readings taken before instituting drug treatment, whether nonpharmacologic advice was given, and their first and second choices of drugs. The brief case description was then repeated with hypercholesterolemia, cigarette smoking, and physical inactivity given as the single risk factors in a "48-year-old man." Questions appropriate to the specific risk factor followed the initial statement.

The data were analyzed using a chi-square method for categorical variables (Yates' correction). A difference was considered statistically significant if $P < .05$.

Results

Of the 438 selected physicians, 396 agreed to participate in the survey, for an initial participation rate of 90%. Of the 42 nonparticipants, 21 (50%) refused and 21 (50%) could not be reached despite multiple attempts. Those refusing gave lack of time as their primary barrier to

Table 1. Characteristics of the Survey Participants

Characteristic	Number	Percent
Sex		
Male	261	95
Female	13	5
Year of graduation from medical school		
Before 1950	32	12
1950-1969	124	45
After 1969	118	43
Specialty		
Family/general practice	126	46
Internal medicine, cardiology	116	42
Other	32	12
Number of patients seen per day		
5-14	33	12
15-24	121	44
25-34	86	32
35-44	28	10
≥45	5	2
Percentage of patients seen that were primary care		
10-49	24	9
50-59	14	5
60-69	12	4
70-79	16	6
80-89	26	9
90-99	72	26
100	110	40

participation. They did not differ from the participants regarding year of graduation, specialty, percentage of primary care patients seen, or number of patients seen per day. Because of the eligibility criteria, 122 physicians completed only the first three questions of the survey. Thus, 274 eligible physicians, hereafter referred to as participants or physicians, completed the entire survey.

Most of the participants were men (Table 1). There was a wide range in practice years (4 to 53 years). The most common specialty was family practice, followed by internal medicine. The average daily patient load was 22.6 ± 8.4 visits a day, with a range of 5 to 50. The typical number of patients seen per day was in the range of 15 to 24, and two out of three physicians regarded more than 90% of their practice primary care.

Hypertension

There was consensus among the majority of physicians regarding the values below which systolic and diastolic blood pressures can be judged normal in an otherwise healthy 48-year-old man (Table 2). The median value for systolic blood pressure was 140 mm Hg, and for diastolic, 90 mm Hg. The currently recommended levels of 140 mm Hg systolic and 90 mm Hg diastolic¹² were

Table 2. Physician Response to the Questions About Criteria for the Categorization of Blood Pressure Levels

Range Including Survey Response	Physicians Reporting Level Below Which Blood Pressure Is Normal No. (%)	Physicians Reporting Level Above Which Treatment Is Considered No. (%)
Systolic blood pressure (mm Hg)		
<130	3 (1)	0 (0)
130-139	15 (5)	2 (1)
140-149	206* (75)	104 (38)
150-159	35 (13)	86 (31)
160-169	13 (5)	58 (21)
170-179	2 (1)	9 (3)
≥180	0 (0)	3 (1)
Do not know	0 (0)	1 (<1)
Do not use systolic as a criterion	— (—)	11 (4)
Diastolic blood pressure (mm Hg)		
<80	3 (1)	1 (<1)
80-84	9 (3)	0 (0)
85-89	33 (12)	10 (4)
90-94	224† (82)	166 (61)
95-99	4 (1)	57 (21)
100-104	1 (<1)	38 (14)
≥105	0 (0)	1 (<1)
Do not know	0 (0)	0 (0)
Do not use diastolic as a criterion	— (—)	1 (<1)

*Of all physicians, 190 (69%) reported the level of 140 mm Hg.

†Of all physicians, 211 (81%) reported the level of 90 mm Hg.

identified by 190 (69%) and by 221 (81%) participants, respectively.

Before commencing drug treatment, all physicians stated that they required more than one blood pressure reading. The mean (\pm SD) number of measures was 3.8 ± 1.7 with a range of 2 to 12. One of the physicians used systolic blood pressure only as the criterion for institution of medication, and 11 (4%) physicians used diastolic levels only. Thus, a majority of physicians (262 or 96%) regarded diastolic and systolic blood pressure readings as relevant in the decision to institute pharmacologic treatment.

Most physicians (77%) indicated that they would immediately advise nonpharmacologic treatment if the blood pressure level was above the level they considered normal at the first reading. If, during repeated measure-

ments, the level was not high enough to require drug treatment, 248 (90%) stated that they would provide nonpharmacologic advice. Such advice included, in order of the highest to the lowest frequency, salt restriction, weight reduction, increased exercise, smoking cessation, stress reduction, dietary fat and cholesterol reduction, and alcohol restriction. (Table 3).

As shown in Table 2, compared with the definition of normal, there was less physician consensus on the level above which medical treatment of hypertension is required. The median value reported for systolic blood pressure was 150 mm Hg and for diastolic, 90 mm Hg. Of all physicians, 108 (39%) gave the same systolic number for the upper limit of normal and those requiring treatment. The corresponding number for diastolic pressure was 133 (49%).

Table 3. Physician Advice on Nonpharmacologic Treatment of High Blood Pressure and High Blood Cholesterol

Area of Advice	Physicians Advising Treatment for Blood Pressure No. (%)	Physicians Advising Treatment for Blood Cholesterol No. (%)
Dietary fat, cholesterol reduction	23 (8)	169 (62)
Weight reduction	163 (59)	137 (50)
Salt restriction	184 (67)	5 (2)
Exercise	128 (47)	125 (46)
Stress reduction	39 (14)	5 (2)
Alcohol restriction	20 (7)	15 (5)
Smoking cessation	80 (29)	48 (18)

Note: Answers were unaided recall, and respondents could give more than one answer.

Table 4. Physician First and Second Choice of Medication for Hypertension and Hypercholesterolemia

Medication	First Choice No. (%)	Second Choice No. (%)
Antihypertensive agents		
Diuretic	166 (60)	81 (30)
β -blocker	85 (31)	143 (52)
Angiotensin-converting enzyme	13 (5)	15 (6)
Calcium-channel blocker	2 (1)	12 (4)
Vasodilator	2 (1)	6 (2)
Other	6 (2)	17 (6)
Cholesterol-lowering agents		
Cholestyramine	95 (35)	44 (16)
Colestipol	7 (2)	6 (2)
Nicotinic acid	41 (15)	36 (13)
Gemfibrozil	36 (13)	21 (8)
Probucol	29 (11)	18 (6)
Clofibrate	12 (4)	7 (3)
Other	13 (5)	7 (3)
Refers for selection of medication	10 (4)	0 (0)
Never selects drugs for this purpose	31 (11)	135 (49)

First and second choices of medication for hypertension are presented in Table 4. Most commonly prescribed medications for hypertension were diuretics and β -blockers. A minority of the physicians regarded angiotensin converting enzyme (ACE) inhibitors and calcium-channel blockers as either first choice (15%) or as a second choice (6%) when the first choice was ineffective. Vasodilators were used by few physicians (3%).

Those physicians who graduated after 1950 were more likely ($P < .01$) than those who graduated previously to advise nonpharmacologic advice for patients whose average blood pressure was below the level qualifying them for medication (93% vs 75%). In addition, those who graduated after 1970 were more likely ($P < .05$) to give nonpharmacologic advice based upon a single high reading (84% vs 72%).

The family physicians and general practitioners and the internists and cardiologists both differed from the other specialists ($P < .05$) in that they were more likely

to advise nonpharmacologic treatment for the first single abnormal blood pressure reading (79%, 79%, and 59%, respectively).

Hypercholesterolemia

Compared with blood pressure, there was less consensus among physicians on a normal blood cholesterol level in an otherwise healthy 48-year-old man (Table 5). The median value for the definition of a normal blood cholesterol level was identified as below 5.70 mmol/L (220 mg/dL). The level below 5.15 mmol/L (200 mg/dL), suggested by the National Cholesterol Education Program,¹³ was identified by only 72 (26%) of the physicians.

A mean (\pm SD) number of 2.5 ± 1.0 (range 1 to 8) total cholesterol readings was suggested before instituting medication. The median number of two was reported by 134 (49%) physicians and one reading only by 14 (5%) physicians.

Table 5. Physician Response to the Questions About Criteria for the Categorization of Blood Cholesterol Levels

Range Including Survey Response mmol/L	Survey Response (mg/dL)	Physicians Reporting Level Below Which Blood Cholesterol Is Normal	Physicians Reporting Level Above Which Treatment Is Considered
		No. (%)	No. (%)
<5.15	(<200)	10 (4)	1 (<1)
5.15-5.65	(200-219)	73 (27)	2 (<1)
5.20-6.20	(220-239)	82 (5)	3 (1)
6.20-6.45	(240-259)	81 (13)	66 (24)
6.70-7.20	(260-279)	17 (6)	48 (17)
7.25-7.25	(280-299)	5 (2)	38 (14)
7.75-8.25	(300-319)	2 (<1)	67 (24)
8.30-8.75	(320-339)	0 (0)	2 (<1)
5.70-6.20	(340-359)	1 (<1)	13 (5)
<5.15	(<360)	0 (0)	14 (5)
Do not know		3 (1)	24 (9)

Advice for nonpharmacologic treatment of elevated blood cholesterol was common, with 262 (96%) of physicians stating they would suggest these methods. Nonpharmacologic advice for cholesterol therapy was significantly more common than for blood pressure ($P < .05$). The nature and frequency of this advice is reported in Table 3. Nonpharmacologic advice for lowering an elevated blood cholesterol level included, from the highest frequency to the lowest, dietary fat and cholesterol reduction, increased exercise, weight reduction, and smoking cessation. Only 25 (9%) of physicians reported referral of patients with a high blood cholesterol to a dietitian.

Of all physicians, 24 (9%) were unable to give a level above which they felt pharmacological treatment of hypercholesterolemia was indicated (Table 5). In the remaining 81% of physicians, there was little consensus on what the level should be. The median value reported for drug treatment was 7.25 mmol/L (280 mg/dL); however, 96 (35%) said they prescribed medication only for levels above 7.75 mmol/L (300 mg/dL). Mean (\pm SD) difference between normal cholesterol levels and levels requiring treatment was 1.50 ± 1.20 mmol/L (59 ± 46 mg/dL).

Thirty-one (11%) of the physicians reported never prescribing medication for hypercholesterolemia. An additional 10 (4%) physicians always referred the patient for the selection of pharmacological treatment. Among those prescribing medication, the most common first choice was bile-sequestering resins (35%) and the second was nicotinic acid (15%) (Table 4). Gemfibrozil (13%) and probucol (11%) were also first choices. A second choice of cholesterol-lowering drug was reported by one half of the physicians. The pattern of second-choice medication was similar to that of the first choice.

Fifty-nine percent of physicians who had graduated after 1970 had a usual second choice of cholesterol-lowering drug compared with 48% of those graduating between 1950 and 1969 and 41% of those graduating before 1950. The trend was, however, not statistically significant ($P = .089$).

A significantly greater proportion of the internists and cardiologists (63%) than the family physicians and general practitioners (48%) had a usual second choice antihypercholesterolemic drug ($P < .01$). An even lower proportion among other specialties (28%) was not statistically significant from family physicians and general practitioners ($P = .14$).

Smoking Cessation

Table 6 summarizes practice resources for nonsmoking advice. While the majority (87%) had a restrictive smoking policy for their clinic, fewer than one half prohibited

Table 6. Physicians Reporting Practice Resources to Support Nonsmoking Advice

Resource	Number	Percent
Nonsmoking policy in clinic	237	87
Smoking prohibited in clinic	115	42
Printed smoking cessation material available in clinic	231	84
Refer to cessation program	211	77
Trained smoking cessation staff in the office	74	27
Routine system to identify smokers from chart	80	29

smoking there. Most (77%) reported referral resources for patients requesting smoking cessation programs, whereas far fewer (27%) reported having a staff person trained to provide smoking-cessation programs. A minority of physicians (29%) reported having a routine system to identify smokers in the patient chart, and still fewer (20%) routinely requested a quit date from smoking patients. In this study, 265 (97%) physicians prescribed nicotine gum for smokers desiring to quit, and 91 (34%) reported doing so frequently.

Significant differences by year of graduation were also seen in these practice habits. Referral resources were more common ($P < .001$) in physicians who had graduated in 1970 or later (87%), compared with those graduating before 1970 (69%). Physicians who graduated before 1950 were also less likely ($P < .001$) to prescribe nicotine gum (81%) than those who graduated later (99%).

A lower ($P < .05$) proportion of internists and cardiologists (72%) reported referral resources for smoking cessation than did family physicians and general practitioners (83%). On the other hand, fewer ($P < .01$) family physicians and general practitioners (18%) than internists and cardiologists (35%) had access to trained quit-smoking staff in the clinic ($P < .01$). The proportions of the different specialties who had a nonsmoking policy in the clinic did not differ. Among those who actually had, however, significantly more ($P < .001$) of the family physicians and general practitioners had a restriction everywhere in the clinic compared with the internists and cardiologists (65% vs 37%).

Physical Activity

Visited by an otherwise healthy 48-year-old man, 228 (83%) physicians reported that they frequently or almost always would advise regular physical activity. This advice included recommendations for exercise sessions lasting 28 ± 9.9 (range 10 to 60) minutes occurring 3.6 ± 1.2 (range 1 to 7) times per week. The first, second, and third

most common types of exercise advised were walking, swimming, and jogging, respectively. Also, frequently given advice was to "choose any activity that is enjoyable" and to "use a specific community program."

There were no differences in practice habits regarding physical exercise advice, either by year of graduation or by specialty.

Discussion

This study demonstrates consensus among the majority of physicians regarding the blood pressure levels used for diagnosis and treatment of hypertension. This diagnosis and treatment policy is reported in the literature as being associated with a high level of hypertension control. The numerous clinical trials demonstrating efficacy, the National High Blood Pressure Education Program, and the availability of numerous pharmacologic agents^{1,5,12} have defined a standard of care for the hypertensive patient. There was less consensus regarding the diagnosis and management of hypercholesterolemia. In view of the extended period necessary for consensus to develop for the medical management of hypertension, this finding was expected. Clinical trials have only recently begun to demonstrate the efficacy of cholesterol lowering in reducing coronary heart disease mortality risk. The First National Consensus Conference on Cholesterol Lowering was held 2 years before the current study was conducted.¹⁴ A National Cholesterol Education Program (NCEP) had only recently been initiated.¹³ The NCEP Adult Treatment Guidelines now provide physicians with clear, peer-accepted protocols that may reduce the large variability in the management of hypercholesterolemia.

The reported amount of activity in smoking cessation is higher than found in a previous survey in the same region.^{15,16} A relatively large percentage (42%) of physicians reported a nonsmoking policy in their clinic in that survey. Specific prescription of physical activity was reported by a majority of physicians (83%). These activities, together with the identification and management of patients with hypertension and hypercholesterolemia, indicate an awareness of preventive practice among the physicians surveyed.

The participation rate in this sample of physicians was substantially higher than in most other surveys.^{8,9,15,17,18} A letter of introduction, followed by scheduling of the telephone appointment, and the follow-up on nonresponders by a physician may have contributed to this high participation rate. Because of differences in participation rates, comparing data from earlier studies with findings from this study should be under-

taken cautiously. It is reasonable to assume that physicians who reject the survey are different from those who participate.

Several limitations are apparent in the present study. Self-reported behavior may reflect the anticipation of correct answers or how the physicians would like to practice in ideal circumstances, a bias that has been proven more important the higher the respondent's social status.^{19,20} Moreover, the sampling frame of the present study was restricted to physicians in the upper Midwest. Finally, the telephone survey format, although effective in increasing participation rates, is costly, time consuming, and requires a highly trained staff.

In 1982, with a participation rate of 60%, 328 physicians in four medium-sized Midwestern towns were surveyed by mailed questionnaire regarding their activities in risk-factor reduction.^{15,16} This study provided data from a comparable population. A higher frequency of dietitian referral (26%) to treat risk factors of cardiovascular disease was reported. A proportion of 68% of physicians, similar to the present study, reported frequent advice on salt restriction and weight loss for the treatment of hypertension.

In another survey conducted in 1986, participants in a screening program who were referred to their personal physicians because of hypercholesterolemia (≥ 6.70 mmol/L; 260 mg/dL) were asked to describe their physicians' advice.²¹ In that study a high proportion of patients visiting the physician had at least one repeat blood cholesterol determination (96%), similar to the current study. The majority of physicians in that study counseled patients about the effects of dietary change on blood cholesterol (reported by 73% of patients) and weight reduction (64%). While the number of patients reporting being placed on medication to lower blood cholesterol was small (7%), the most commonly prescribed drug was gemfibrozil as compared with bile acid sequestrates in the present study. The reported level of referral to a dietitian was higher (16%) than that found in the present study (9%).

In these two studies, questions regarding referral habits were asked. In the present study, the reported rates were those derived from the more general question about what advice the physician would give under specific circumstances. This explanation probably accounts for the lower frequency of referral in this study.

Two national surveys in 1983 and 1986 studied samples of physicians.¹⁰ Participation rates were 56% and 62%, respectively. The present study reported considerably lower values for the blood cholesterol level defined as normal and the level requiring medication as compared with the two national surveys. This finding could be the result of greater activity among Minnesota

physicians in the treatment of hypercholesterolemia. Reported counseling activities and the choices of medication, however, were very similar in the two earlier studies. The present study occurred a year later than the national surveys. Study differences could represent a growing awareness among physicians about national recommendations between 1986 and 1987.

A few differences were identified between physicians who graduated several years ago and those with fewer years of experience. The differences are all congruent with a greater interest in preventive cardiology among the latter, a finding that corresponds well with results from other studies.¹⁸ Only minor differences occurred between specialties and were not sufficiently uniform to draw any general conclusions.

In conclusion, the physician's office continues to be an important resource for health education. In spite of encouraging reports by physicians in this survey, the status of preventive practice in the medical office remains less than optimal. Further efforts to offer physicians education and assistance in developing individualized, systematic strategies for preventive practice are necessary, especially if cholesterol-lowering guidelines are to be incorporated into daily medical practice.²² With programs and efforts equaling those for hypertension in recent years, it is likely that physician awareness and skills regarding the diagnosis and management of hypercholesterolemia will approach the level for hypertension demonstrated by this study.

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