Two intervention trials have found significant reduction in coronary heart disease mortality and morbidity following reduction of plasma cholesterol levels by diet or drugs. The implications of these studies have been broadened to support a national effort directed to plasma lipid reduction. The evidence suggests that both a public health and medical approach can be effective and that each would be complementary in a national initiative. An important and critical dimension would be education, both of the public and of health professionals. The pertinent educational issues are identified in the categories of knowledge, attitudes, and skills. Economic considerations are an important factor in implementing a national initiative and require attention in development of a program.

RECENT reports of the effectiveness of lipid lowering in the primary prevention of coronary artery mortality have heightened interest in a major national effort to decrease plasma cholesterol levels.12 The cholestyramine drug trial (Lipid Research Clinics Coronary Primary Prevention Trial, or LRC-CPPT) has been widely cited as providing critical evidence that proves the lipid hypothesis by demonstrating that decreases in plasma lipid levels lead to decreases in cardiovascular events. Although the LRC-CPPT was limited to men aged 35 to 59 years, the positive reduction in cardiovascular mortality has been cited as an imperative to initiate lipid-lowering therapy in adult men and women of all ages and at levels below those used for trial recruitment (265 mg/dL, the 95th percentile for this age group). The earlier Oslo Study Group trial, which achieved a mortality reduction through dietary intervention and smoking cessation, is cited as being concordant with the LRC-CPPT and providing evidence that hygienic measures can be as effective as drugs.1 Butressed with these positive results from intervention trials and acknowledging the overwhelming biologic and epidemiologic associations between serum cholesterol and coronary heart disease, it seems rational, if not imperative, to mount a major educational effort to lower plasma cholesterol levels. Primary prevention is most appropriate from the health perspective and, intuitively, should be the most cost-effective approach.

This sequence of logic is formidable and leaves unresolved only the implementation strategy and the degree of diligence that should be applied. However, this suggests that we understand and can orchestrate the social and medical changes necessary to achieve a national goal of lower plasma lipid levels. The proponents of a lipid reduction campaign point to the success of the national effort to identify and treat hypertensive Americans following the reports of the Veterans Administration Collaborative Trial and the Hypertension Detection and Follow-up Program.134 Remarkable increases have occurred in personal awareness of high blood pressure and in initiation and persistence of treatment. The lowering of blood pressure in all segments of the US population are well documented in national surveys from 1960 through 1980.1 The National High Blood Pressure Education Program and the American Heart Association can share considerable credit for this remarkable change. Their strategy was primarily educational and directed simultaneously to the public and to medical providers. By logical extension, an analogous educational effort directed toward plasma lipid reduction should be similarly effective, if the same factors operate. However, our thesis is that the educational and medical approaches to lipid reduction differ considerably from those related to blood pressure reduction. This discussion examines this premise from an educational perspective and identifies differences that necessitate different educational and practice strategies. These differences encompass the traditional educational components (knowledge, skills, and attitudes) and extend to the complementary intervention strategies of public health and of medical care.

Public Education, Societal Change, and the Public Health Approach

The educational program for high blood pressure was addressed initially and primarily to the public, rather than health professionals. The strategy was to focus public attention on blood pressure as a personal health problem that requires attention by medical providers. Physicians were encouraged to take a more active role in detection and treatment, but considerable impetus for change came from an aware and concerned public. Implementing a strategy of public education required straightforward educational messages that directed simple behaviors: Have your blood pressure checked yearly; if it is elevated, seek treatment; if it is treated, maintain treatment conscientiously. The response was striking and rapid. Blood pressure screening increased...
awareness even for segments of society that were not thought to have ready access to care. Screening outside of physicians' offices was popular, and automated blood pressure devices or self-measurement were economically rewarding to equipment vendors. Initiation and maintenance of pharmacologic therapy increased so that hypertension is now the most common reason for office visits to primary care physicians. This remarkable educational success reflects many factors that are germane to public education for plasma lipid lowering. This is demonstrated in Table 1, where the message for hypertension is contrasted to the current situation regarding lipids. The lesson is that an important health message can be conveyed to the public and the medical care system can respond to achieve a public health goal, but in the case of lipids, many questions must be answered and clear-cut guidelines developed for personal awareness and the guidance of physicians' actions.

A public health campaign can provide an alternative, or be an adjunct, to a medical intervention. The public health approach is directed to the entire population regardless of risk, with the goal of favorably altering lipid levels regardless of the initial level or the relative risk of disease. The potential impact of a public health program is great because the largest number of cardiovascular events occur in those persons with levels below the 90th percentile although the relative risk is greatest above this level. Several community trials are under way to determine the effectiveness of this strategy.

A public health approach to disease prevention has been under way for several years in the United States, although not as a controlled trial. Considerable changes in food consumption patterns have occurred over the past 25 years, and these changes in dietary intake have been associated with declines in plasma cholesterol levels. The message to the public regarding decrease in dietary fat and cholesterol and the response of food processors in altering product composition has led to a decline in saturated fat and cholesterol intake and an increase in the proportion of polyunsaturated fats consumed. Compliant with this change, serum cholesterol values in national surveys have declined about 15 mg/dL for each age group despite an increase in body weight. Although it is not possible to attribute the recent decline in cardiovascular mortality to this decrease in serum cholesterol values, estimates indicate that this decline could have made a considerable impact on mortality.

We believe these population trends indicate that the public health model has been effective and deserves more attention and effort directed to groups who have not made dietary changes thus far. However, public education will not be effective for all persons, and medical providers must also be involved, particularly in management of persons with the highest lipid levels and the greatest risk of disease.

**Medical Education and the Medical Model**

The impact of the medical care system on treatment of high blood pressure has been extraordinary, and this success defines the great potential of medicine for preventive care. Can this potential be applied to lipid lowering? It is instructive to examine the reasons for the success of antihypertensive therapy and to contrast this situation with that currently operative for plasma lipids. Physicians have unequivocally believed for 50 years that hypertension was deleterious to health. The controversies have centered around what level defines "hypertension" and the need for treatment, around appropriate diagnostic tests for secondary hypertension, and around the most effective and safest treatment. Essentially, all primary care physicians entering practice in the past 30 years have successfully managed many persons with hypertension and have watched the therapeutic armamentarium broaden and the toxic side effects of drugs decrease.

Contrast this physician experience with that associated with lipid-lowering therapy. The scientific rationale for treating very high (>300 mg/dL) levels of cholesterol has been as commanding as that for treating severe hypertension, but the therapeutic experience of physicians has been discouraging. A series of drugs have been employed that have either serious toxic effects (triparanol, dextrothyroxine, and estrogen) or aggravating side effects (nicotinic acid) or have yielded uncertain lowering of plasma cholesterol levels. Moreover, with few exceptions, lipid-lowering agents did not alter fatal myocardial infarction rates.

Except for the Oslo study, the experience with dietary treatment has not been much better, but for different reasons. Most physicians do not feel capable of handling dietary therapy, nor are they comfortable with other therapies that require the patient to initiate and maintain a change in lifestyle. They get little personal experience in applying principles of behavioral change or have little opportunity to follow up patients with behavioral therapy long enough to develop confidence with this type of treatment. Moreover, few physicians have worked with nutritionists in managing patients over long periods. Rather, physicians customarily order a diet and have the diet prescription performed at a single session by a professional with whom they have little contact. The patient is directed to return in several months to the physician for follow-up. When practical diet questions arise during the initial or return visits, the physician is unable to respond knowledgeably and the nutritionist is not available.

In general, physicians are uncomfortable with therapy to modify behavior, because successes are marked by small increments of change and recidivism and failures are common. Physicians like to deal in absolutes—health vs disease, normal vs abnormal, and total compliance vs noncompliance. This compulsion and impatience to restore abnormal to normal is rewarded in the competitive premedical environment and is reinforced in most training experiences thereafter. This ensures good technical performance but poor handling of behavioral problems. The fact that most successful programs for weight control, smoking cessation, and alcohol abstinence are currently based in nonmedical settings and rarely use physicians as the effectors perhaps speaks most strongly to physician ineffectiveness in implementing changes in life patterns.

Thus far, we have focused on scientific and professional training issues, but economics is an increasingly per-

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To the physician, the minimum cost-effective solution is the approval of a new therapy provided by the third-party payer. The patient, or his or her family, may not agree. On the other hand, patients and their families may be persuaded to change their lifestyles, diet, and drug regimens. The physician, along with the patient and the family, will be the prime source of the best intervention for hypertension and hyperlipidemia. The physician must take a proactive role in determining the best intervention that can be delivered in a cost-effective manner. The physician must be able to convince the patient that the change is necessary and that the change is possible, and that the change is achievable.

Establishing a pattern of return visits (every two to six months) will make this physician or clinician a likely source of other medical services for the patient or his or her family, thus creating a positive force in building a practice.

It is useful to examine hyperlipidemia treatment in the same context and to define educational approaches and economic incentives that will foster medical care. A consensus panel has defined levels that require medical attention, and over 50% of the population has been defined as eligible for therapy. This overwhelming number of patients implies that primary care physicians must assume most of the treatment responsibilities. Public interest in identification and management of hyperlipidemia is relatively high, and one could anticipate a brisk demand for physician care. Treatment of hyperlipidemia is currently not economically efficient for primary care physicians. Diet is generally considered the primary modality or a mandatory adjunctive therapy to drugs. Dietary instruction, repeated monitoring, and reinstruction take considerable time, and there has been little effort to develop more cost-effective approaches. Moreover, technical expertise is not available in most office staffs, and this requires referral to an outside source. Institution of dietary change impacts on the entire family unit, and success in initiating and maintaining change will require that the education effort be directed to the whole family or, at minimum, to the patient and the purchaser and preparer of food.

Will the patient or third-party payer pay for this service at rates that will cover the cost? The experience with smoking-cessation therapy suggests that changes in social behavior moderated by physicians will not be reimbursed at a level that provides physician incentive to recruit patients into a relatively time-consuming program. The utilization of drug treatment for hyperlipidemia will not necessarily improve economic efficiency for the physician. This is particularly the case for cholestyramine resin, the only pharmacologic agent with validated efficacy in primary prevention of coronary mortality without offsetting effects from other mortality causes. Compliance was a major problem in the LRC-CPPT, and persons counted as compliance successes took only half the prescribed dose and experienced less decrease in serum cholesterol levels than predicted. To accomplish this "success" in compliance required intensive team efforts by study staff. In its present formulation, achieving drug compliance for cholestyramine may be as difficult and economically inefficient as achieving dietary compliance and poses many of the same problems.

If the public message is to seek treatment at cholesterol levels above 200 mg/dl, then even a modest response will fill physicians' offices and find them unprepared to manage effectively. From an educational perspective and to maximize effectiveness of the primary physician, it would be preferable to improve physician efficacy and efficiency by initially focusing on clearly high levels (perhaps ≥265 mg/dl), cases in which the risk of disease and benefit of treatment are proved. Moreover, the numbers of patients will not inundate the practitioner during the "learning phase." In assessment of a strategy for developing effective and efficient models to deliver preventive care, it is clear that response of health maintenance organizations and large clinic groups will be critical. These units have sufficiently large patient clienteles and the requisite capital and personnel and educational resources to develop economically efficient approaches.

The Educational Imperative

The educational effort to inform the public and professionals about treatment of hyperlipidemia will require attention to clear educational messages, setting practical and achievable objectives, training in necessary attitudes and skills, and recognizing and utilizing contemporary economic forces. The educational messages should be disseminated simultaneously to the public and to health professionals. Both groups have complementary roles in making the desired changes, and their efforts can be synergistic.

The public educational message might define two levels—those requiring physician intervention and those that are desirable. Between the medically "critical" levels (requiring physician attention) and the "desirable" levels, self-management might be suggested and simple principles elaborated for food selection and preparation. In this paradigm, the medical system would be used to measure levels and to manage high levels that would require medical attention, including major dietary alteration and drugs. Consensus development conferences provide a forum for compromise if not consensus on these issues of threshold.

Although an unambiguous informational message can generate interest in having lipid screening and in initiating dietary change, the critical element is maintenance of the new behaviors. Progress can be monitored through the periodic National Health and Nutrition Examination Surveys and by the community surveillance programs of the National Heart,
Lung, and Blood Institute. These surveys encompass all segments of our society and thereby permit identification of groups experiencing little change or at special risk. The medical system has specific educational needs. A clear consensus is required on what lipids should be measured, the frequency of screening measurements, the importance of confirmation, and the appropriate therapeutic approaches. High-risk groups that require special medical attention even with minimal lipid elevation should be defined. These might include patients with a history of cardiovascular disease in a family member before age 55 years, those with hypertension or diabetes, and those undergoing renal dialysis, coronary bypass grafting, or coronary angioplasty. The realistic potential for lipid lowering with diet or drugs needs clarification. Dietary changes may lower plasma cholesterol levels by 5% to 10% and may not return lipids to the normal or desirable range. This might be considered to be insignificant unless one recalls that total plasma cholesterol lowering with cholestyramine was only 8.5% greater than that achieved by diet in the LRC-CPPT, but the improvement in mortality and morbidity was proportionately twice as great.1 Imposing unattainable expectations for treatment can lead to a feeling of failure and disenchantment with the ability to lower lipid levels and to influence health favorably.

The ability to specify and change attitudes and skills of physicians is considerably more limited. It is imperative that physicians, regardless of age, develop a better appreciation and tolerance for the vicissitudes of carrying out life-style change. The small increments of change, the frequent setbacks, and the need for long-term monitoring and encouragement are features of this therapy that are not part of the medical school curriculum or practiced in postgraduate training. There is a need to create experiences in medical school and residency training and through continuing medical education that would enhance physician efforts toward life-style change.

There are important enabling skills that complement these attitudinal changes and require development. However, economic issues may be critical in determining whether the primary care physician is motivated to develop these skills. Fundamental to these issues is how the primary care physician might effectively manage behavioral change in the office or clinic. The physician will probably not personally provide all of the counseling, monitoring, and education required but will assume the role of manager, and other clinic personnel will perform much of the education. It is likely that they will assume dietary instruction, skills development in food purchase and preparation, and some of the monitoring and feedback of performance; also, they must be trained to carry out these tasks. Models of care must be developed that are not only valid educationally but are cost-effective and applicable to various segments of the population and to various-size clinics that operate under different financial structures. Recent trends in coronary artery disease mortality suggest that it is becoming a disease of lower economic and educational attainment, the opposite of what has been true historically. The need will increasingly be for effective, accessible, and affordable preventive services.

After this extensive recitation of the educational needs to mount an effective national campaign, it is important to note the importance of this effort to the health status of the population. Even modest reductions in plasma cholesterol levels are associated with proportionately greater (approximately 2 to 1) reductions in coronary risk. The high prevalence in the population and the high lethality of first events justify considerably public investment and effort to lower plasma cholesterol levels. In implementing the educational strategy for national change, there are several fundamental issues that must be addressed to achieve success. First, the educational approach to lipid lowering should differ from that for blood pressure reduction. To follow the algorithm of the National High Blood Pressure Education Program ignores important historical, educational, and economic differences between hypertension and hyperlipidemia. Second, the public health approach through education and marketing changes is working and deserves emphasis and renewed impetus. Third, life-style interventions have assumed greater importance in medical prevention and therapy, and new approaches to education must be developed. Finally, economic forces must be acknowledged and accommodated as the adoption of new treatments by physicians will be determined directly or indirectly by financial considerations. The public is interested in the health message related to lipids, but implementation of a broad and effective intervention will require new initiatives in education.

References

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