Research Editorial

The Minnesota Heart Survey: Nutrition Successes Pave the Way for Strategic Opportunities for Food and Nutrition Professionals

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Cardiovascular disease (CVD) remains the leading cause of death for males and females in the United States (readers are referred to an excellent resource from the American Heart Association that provides current heart and stroke statistics reported herein; see reference 1). Of the six leading causes of death (total CVD, cancer, accidents, chronic lower respiratory diseases, diabetes mellitus, and Alzheimer's disease) for males and females in the United States, total CVD deaths accounted for approximately 51% of all deaths in 2003 (1). Death from diseases of the heart increased progressively from the early 1900s until the 1970s, after which it stabilized and, more recently, began to decline. Importantly, the decline in CVD mortality has been more apparent in men than women, with a more pronounced widening of the "gender gap" emerging in the early 1990s. Even though measurable progress has been made toward reducing CVD death rates, the fact that hospitalization rates for coronary heart disease (CHD) have increased, as have hospitalization rates for congestive heart failure, reaffirms the reality that CVD is not "fading away" as a major public health concern in the United States. Quite the contrary, morbidity and mortality statistics underscore the severity of the impact of CVD on public health. Concurrent with these demographic trends in CVD prevalence has been the emergence of an impressive array of medical technologies to diagnose and treat CVD. At the forefront has been the remarkable increase in the number of CVD operations and procedures between 1979 and 2003; with the greatest increases occurring for catheterizations (≈4-fold), open heart surgeries (≈3-fold), and bypass procedures (≈2.5-fold) (1). These procedures have been lifesaving for countless individuals. Nonetheless, as is widely acknowledged, healthful diet and lifestyle behaviors remain the "centerpiece" for prevention of CVD. This course of action is certainly preferred to intensive and invasive surgical procedures, which are costly and accompanied by increased risk.

Important progress has been made in decreasing some of the major risk factors for CVD. Data from the National Health Examination Survey (1960-1962) and the National Health and Nutrition Examination Survey 1971-1975 to 1999-2000 indicate that prevalence of high blood cholesterol levels, high blood pressure, and cigarette smoking has decreased (2). Unfortunately, diagnosed diabetes has increased markedly during this time period (2). This most likely reflects the explosion in prevalence of overweight and obesity in America that has occurred over the past 40 years (3). Moreover, prevalence of metabolic syndrome has paralleled the increase in obesity (4). Diabetes, metabolic syndrome, and obesity all are independent risk factors for CVD, and present with multiple CVD risk factors (5,6). In fact, diabetes is a coronary heart disease risk equivalent (7). As is well established from the Framingham Study (8), with increasing numbers of CVD risk factors, risk of heart disease and stroke increase dramatically. Collectively, the triad of diabetes, metabolic syndrome, and obesity, coupled with an escalation in prevalence of these conditions, is a harbinger for a public health crisis. This is not only problematic for coronary diseases, but for many other diseases and conditions as well.

Diet and other lifestyle practices are the cornerstones of prevention and treatment of coronary diseases. There is a long history of different groups issuing dietary recommendations for prevention and treatment of many chronic diseases, including CVD. The US Departments of Agriculture and of Health and Human Services issue *Dietary Guidelines for Americans* every 5 years, most recently in 2005 (9). For heart disease specifically, the American Heart Association (AHA) has a long-standing commitment to providing dietary guidance to reduce risk of CVD. Their first statement was released in 1957 (10) and, as new scientific evidence emerged, the AHA dietary guidance has been updated. The most recent diet and lifestyle recommendations from the AHA were released in 2006 (11). The National Cholesterol Education Program has published three Adult Treatment Panel Reports, in 1998 (12), 1993 (13), and 2002 (14), which target the treatment of high blood cholesterol in adults. The American Dietetic Association recently developed an online

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Evidence Analysis Library on hyperlipidemia (15). Likewise, the American Diabetes Association has a long-standing record of issuing dietary recommendations on an ongoing basis, with the most recent published in 2006 (16). These recommendations have evolved from strictly dietary recommendations (made on the basis of a numerical target for nutrients such as saturated fat, as well as dietary cholesterol), to recommendations for healthful lifestyle behaviors to decrease risk of CVD, which include smoking cessation and physical activity. Very recently, the guidance has evolved to a food-based platform where specific recommendations are made about foods and amounts that should be consumed (17). The rationale for the latter is that diet and lifestyle guidance should be easy to understand and implement by the general public.

There is a most impressive effort ongoing by many different groups to communicate nutrition messages to many target populations. With respect to the *Dietary Guidelines for Americans*, www.mypyramid.gov (18) is an online resource that provides easy-to-understand information about implementation of the guidelines. The AHA has developed and distributed many materials for both health professionals and consumers that span the spectrum from cookbooks to online materials that deliver information about heart health. Likewise, the National Heart, Lung and Blood Institute has a great deal of information available in print or online. In addition, food and nutrition professionals play key roles in delivering nutrition and lifestyle messages to many different target groups. American Dietetic Association dietetic practice groups provide an educational forum for disseminating diet and lifestyle guidance. Moreover, many health professionals from different disciplines are actively engaged in communicating nutrition messages to decrease risk of CVD. Approaches range from publishing books, giving lectures, writing for magazines and newspapers, producing Web sites, counseling patients on a one-on-one basis, or holding group classes, among many other activities.

The article by Lee and colleagues (19) reports the results from the Minnesota Heart Survey, a repeated population-based survey designed to examine trends in mortality, morbidity, and risk factors for CHD within a geographically defined population of adults residing in Minneapolis, MN over the past 2 decades. Using a heart disease prevention eating index that the authors developed to measure overall diet quality in response to compliance with the 2000 AHA Dietary Guidelines, they reported an improvement in a mean total score for diet quality during the 20-year survey period. The authors reported improvements in consumption of total grain, whole grain, total fat, saturated fatty acids plus trans fatty acids, and dietary cholesterol. In addition, fruit and vegetable intake insignificantly improved over time. However, mean energy intake increased considerably. The score for sodium intake decreased, indicating no improvement and, in fact, decreased adherence to dietary sodium recommendations. The score for fish was low and did not change throughout the survey period, indicating that the population did not heed advice to increase fish consumption. The more-educated subjects (ie, those with a college degree) had greater improvements in diet quality scores compared to individuals with less education. In this population, improvements in diet quality generally accompanied declining rates of CHD incidence and death, which suggests that public health education efforts targeted to CHD risk reduction appeared to have meaningful health outcomes. This is a critical finding that reaffirms the importance of our current dietary recommendations for CHD risk reduction. Indeed, some diet changes, consistent with current dietary guidance, were made, resulting in declining rates of CHD. With greater dietary changes, a larger decrease in CHD events likely would be expected. This study is also important because the authors used a consistent methodology throughout the study to collect and analyze dietary data. As a result, it is possible to conclude that dietary changes were made and that the changes in the intake data are not reflective of changes in the methodologies used to collect the dietary data. The results show what dietary changes were made or not made, providing useful information for future intervention efforts. This provides helpful information about food- and nutrient-specific interventions that are susceptible to change and resistant to change, which are recommended to reduce risk of CVD. However, the authors also reported that the diet-quality score improvement appears to have plateaued and leveled off during the last 5-year period of the study. The fact that diet-quality score improvements plateaued suggests that additional intervention efforts are needed to attain greater dietary changes, or there may be a limit to the extent to which changes can be made, especially given current communication strategies. Also, the fact that changes are seen in the most educated people indicates that we need to find ways to get our messages to those who are less educated. These are very important issues that need to be experimentally addressed.

We have a good understanding of healthful dietary patterns that reduce risk of CVD and other chronic diseases, but much remains to be learned about effective behavior-change intervention strategies to elicit recommended diet and lifestyle behaviors. There is a pressing need to identify behavior-change strategies that elicit long-term healthful lifestyle behaviors in different population groups. This will provide seminal information that should facilitate effective intervention programs for major diet and lifestyle behavior changes that build on the successes achieved to date. The article by Lee and colleagues (19) has provided a promising start that should be an impetus for subsequent research that results in more effective behavior-change strategies on a population basis. Consistent with findings reported by Lee and colleagues (19), the PREMIER investigators also reported that individuals can make multiple lifestyle changes and reduce their risk of CVD (20,21). The PREMIER Study tested the effects of comprehensive and simultaneous lifestyle changes on blood pressure. PREMIER evaluated three different interventions that combined lifestyle changes (weight loss, exercise, and a healthful diet) to assess effects on blood pressure reduction in subjects with above-optimal blood pressure, including stage 1 hypertension, not taking antihypertensive medications. An established group (a behavioral intervention that implemented established recommendations) achieved similar reductions in blood pressure as with an established intervention group plus the National Heart, Blood and Lung Institute's Dietary Approaches to Stop Hyperten-