REVIEW

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The Deficit of Nutrition Education of Physicians

Monica Aggarwal, MD,[a] Stephen Devries, MD,[b,c] Andrew M. Freeman, MD,[d] Robert Ostfeld, MD,[e] Hanna Gaggin, MD,[f,g] Pam Taub, MD,[h] Anne K. Rzeszut, MA,[i] Kathleen Allen, BA,[j] Richard C. Conti, MD[a]

[a]Division of Cardiology, University of Florida, Gainesville, FL; [b]Gaples Institute for Integrative Cardiology, Deerfield, Ill; [c]Northwestern University Feinberg School of Medicine, Chicago, Ill; [d]Division of Cardiology, Department of Medicine, National Jewish Health, Denver, Colo; [e]Division of Cardiology, Montefiore Medical Center, New York, NY; [f]Division of Cardiology, Massachusetts General Hospital, Boston; [g]Baim Institute for Clinical Research, Boston, Mass; [h]Cardiovascular Division, UC San Diego Health System, Calif; [i]Market Intelligence, American College of Cardiology, Washington, DC; [j]Department of Nutrition & Food Studies, New York University, New York, NY.

ABSTRACT

Globally, death rates from cardiovascular disease are increasing, rising 41% between 1990 and 2013, and are often attributed, at least in part, to poor diet quality. With urbanization, economic development, and mass marketing, global dietary patterns have become more Westernized to include more sugar-sweetened beverages, highly processed foods, animal-based foods, and fewer fruits and vegetables, which has contributed to increasing cardiovascular disease globally. In this paper, we will examine the trends occurring globally in the realm of nutrition and cardiovascular disease prevention and also present new data that international nutrition knowledge amongst cardiovascular disease providers is limited. In turn, this lack of knowledge has resulted in less patient education and counseling, which is having profound effects on cardiovascular disease prevention efforts worldwide.

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INTRODUCTION

Cardiovascular disease is the leading cause of death globally, accounting for 31% of all deaths in 2013.[1] In the United States, recent decreases in cardiovascular disease mortality appear to have plateaued.[2-4] However, worldwide death rates from cardiovascular disease are increasing, rising 42% between 1990 and 2013[5] (**Figure 1**). Poor diet quality is a leading cause of cardiovascular disease, both internationally and in the United States.[6-8] With urbanization, economic development, and mass marketing, global dietary patterns have become more Westernized to include more sugar-sweetened beverages, highly processed foods, animal-based foods, and fewer fruits and vegetables.[9,10] Concurrently, cardiovascular disease rates have increased around the world.[10-13] As such, the World Health Organization and other groups are pursuing initiatives to improve dietary habits.[14-19]

MODIFYING EATING HABITS AND RISK FACTORS

Modifying eating habits to decrease cardiovascular risk is a time-tested approach.[20-28] As early as the 1950s, Ancel Keys with the Seven Countries Study showed that certain dietary patterns, especially those with a higher composition of saturated fat and cholesterol, were associated with increased risk of cardiovascular disease. In contrast, societies with diets of <10% saturated fat had a low risk of cardiovascular disease, even after accounting for varying amounts of total fat in the diet, blood pressures, and tobacco use.[29] In the 1980s, the

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Requests for reprints should be addressed to Monica Aggarwal, MD, Division of Cardiovascular Medicine, Health Science Center, University of Florida, Room M-415, PO Box 100288, 1600 SW Archer Road, Gainesville, FL 32610-0277.

E-mail address: Monica.aggarwal@medicine.ufl.edu

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Lifestyle Heart Study was conducted in which 48 patients with moderate-to-severe coronary artery disease were directed to eat a 10% fat vegetarian diet, do moderate aerobic exercise, undergo stress management training and smoking cessation counseling, and participate in support groups. Over 1 and 5 years post intervention, plaque regression occurred in the treatment group, while progression was observed in the control group.[30]

THE MEDITERRANEAN AND PLANT-BASED DIETS

Early studies on the Mediterranean diet, which features an abundance of vegetables, fruit, and fiber, as well as fatty fish and nuts, have also shown that diet modifications can reduce heart disease risk.[25,31] The more recent and pivotal PREDIMED study looked at the Mediterranean diet for primary prevention of coronary heart disease. In this study, men (55-80 years) and women (60-80 years) had either diabetes mellitus or 3 other cardiovascular risk factors. A Mediterranean diet with olive oil or nuts was compared with a standard low-fat diet. The Mediterranean diet showed a 30% relative risk reduction of the combined endpoint of myocardial infarction, stroke, or death from cardiovascular diseases in both the olive oil and walnut groups.[31]

During the early investigations of the Mediterranean diet, the notable Dietary Approach to Stop Hypertension (DASH) trial was conducted. In this trial, patients with hypertension were given a diet rich in fruits and vegetables, whole grains, and low in fat,[32] and within weeks, without a change in sodium content, the subjects studied demonstrated a decrease in blood pressure. Nonrandomized studies of plant-based diets have also shown compelling improvements regarding decrease in blood pressure and rates of cardiovascular events.[33-36]

Very recently, a study was done to assess diet quality using multiple surveys (Mediterranean, DASH, and Alternate Healthy Eating Index). Notably, a 20% improvement in diet quality was associated with an 8%-17% decrease in mortality.[37] The foundation of each of the diets is the same; namely, whole grains, fruits and vegetables, and fatty fish or a source of omega-3 fatty acids. The study noted that each diet type, as long as it has this same foundation, was associated with improved mortality.[37]

These studies have effectively shown that a diet based on fruits and vegetables, whole grains, and minimally processed foods is effective in reducing cardiovascular disease risk, as compared with the standard Western diet. As a result, the World Heart Federation has emphasized that a Mediterranean-type diet emphasizing plant-based foods may reduce cardiovascular disease.[38] The World Health Organization recommends at least 5 servings (400 grams) of fruits and vegetables daily, as well as daily consumption of legumes, nuts, and whole grains.[39]

CLINICAL SIGNIFICANCE

- Worldwide death rates from cardiovascular disease (CVD) are rising, and are often due, in part, to poor diet quality.
- New survey data of international cardiologists shows that nutrition knowledge and the ability to apply nutrition to everyday care is very limited.
- Nutrition counseling during patient visits worldwide is very limited, in part due to knowledge gaps and limited time, despite the beliefs by most that this would improve outcomes.
- Empowering health care providers with the tools they need in nutrition and lifestyle medicine could significantly combat CVD worldwide.

INTERNATIONAL EFFORTS FOR DIETARY MODIFICATION

Diets vary widely across the globe (as shown in the **Table**), as does the extent to which they are considered to be good for vascular health. Educating the public in certain world regions through impactful policy initiatives has shown signs of success. As an example, the multifaceted North Karelia Project in Finland reduced smoking and decreased butter and saturated fat by coordinating public policy, industry, nongovernmental organizations, health-focused programs at local community organizations, and media messaging.[17,40-42] These changes were associated with reducing age-adjusted coronary heart disease mortality by 73% among 35–64-year-old men over a 25-year span.[17,40,42] In South Korea, during a period of Westernization and rapid economic development, a multipronged effort among government, private organizations, and health care professionals (emphasizing the traditional South Korean diet high in vegetables, fermented foods, and low in fat) was associated with slowing the trend toward the adoption of a more Westernized diet.[43] In Iran, the Isfahan Healthy Heart Program improved dietary habits in 2 intervention counties as compared with a control county by implementing multiple outreaches and community educational programs.[44] In the late 1980s, in response to rising rates of cardiovascular disease, the island nation of Mauritius created a noncommunicable disease outreach program within its Ministry of Health, which targeted 25–74-year-old individuals. Using legislation, media, and educational efforts, serum cholesterol, rates of hypertension, and smoking were reduced.[45] Furthermore, the Mexican "soda tax," which increased the cost of sugar-sweetened beverages, is projected to lower incident diabetes and cardiovascular disease.[18] There are multiple successful paradigms of community, government, and countrywide efforts leading to health improvements.[46] Nevertheless, despite these impressive efforts, additional measures are needed.

THE ROLE OF THE PHYSICIAN IN IMPACTING PATIENTS' DIETS

Physician investment in patients' dietary habits is a key influence in behavior change but has been described as

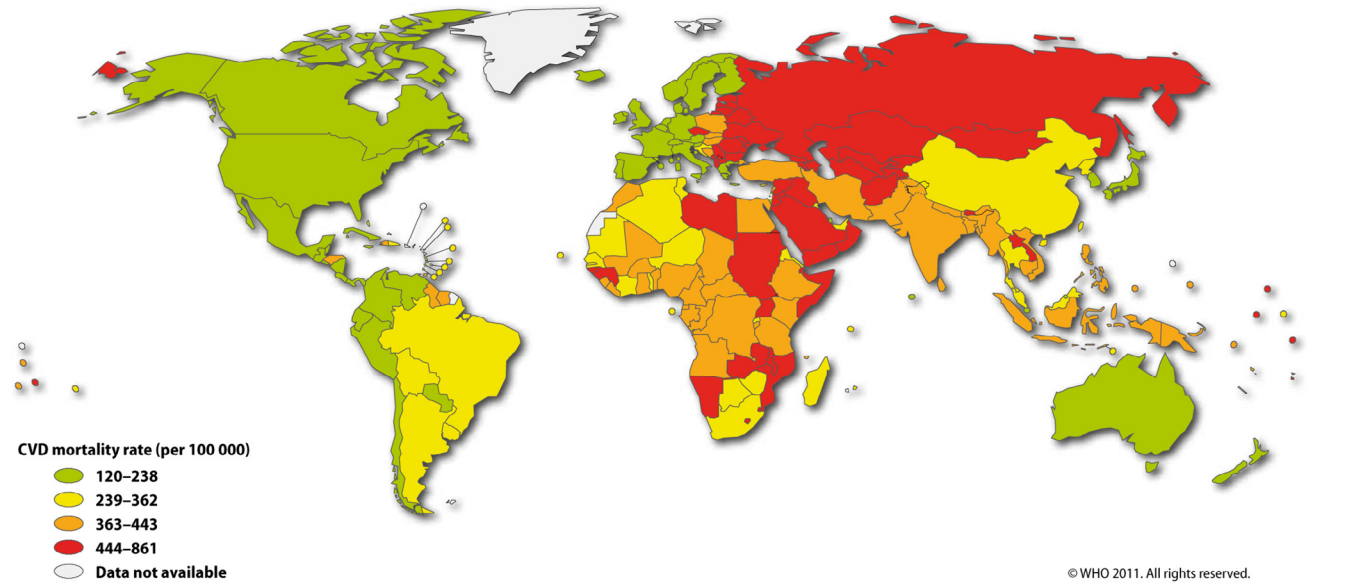

Figure 1 Global mortality rates in males due to cardiovascular disease; originally published jointly by the World Health Organization in collaboration with the World Heart Federation and World Stroke Organization in 2011 as part of the Global Atlas On Cardiovascular Disease Prevention and Control; permission granted by World Heart Federation, November 14, 2017 and World Health Organization, November 23, 2017 (Permission access number 243602).

suboptimal,[47] due in part to limited time with the patient,[47-51] low reimbursement,[48,49,51] minimal education, and lack of comfort in counseling about healthful dietary patterns.[48-51] Given the rising global burden of cardiovascular disease and the potential for dietary change to positively influence this trend, physicians are well positioned to help "bend the curve." As a result, the Nutrition and Lifestyle Working Group of the American College of Cardiology's Cardiovascular Disease Prevention Section conducted a survey to assess international nutrition education gaps for physicians on a global level with a focus on Southeast Asia.

STATE OF NUTRITION EDUCATION IN INTERNATIONAL MEDICAL TRAINING

The Nutrition and Lifestyle Working Group of the American College of Cardiology's Cardiovascular Disease Prevention Section developed an online survey that asked primarily cardiovascular specialists outside of the United States to describe their nutrition education, as well as knowledge, attitudes, and practice related to nutrition counseling to understand whether this can become an area of focus for undergraduate and graduate medical training.

In this survey of physicians, 6 of 7 believed that dietary interventions were likely to provide a substantial additional benefit to patients with cardiovascular disease. The majority of physicians also felt that they should play an active role in educating their patients about nutrition. In the Americas and Europe, over 70% of physicians felt that it is an essential part of their role to incorporate detailed nutrition counseling into their cardiology practice. In Asia and Africa, this perception was lower; only 50%-56% of physicians felt that their role was to include nutrition counseling in their practice. This perception of their role in nutrition counseling seems to correspond to the amount of actual time spent with patients; that is, the majority of physicians spent fewer than 3 minutes of patient visit time on nutrition counseling.

PHYSICIAN AND NUTRITIONAL COUNSELING OF PATIENTS

Even when physicians did participate in nutritional counseling, only 57% engaged in a direct discussion, and many employed other measures such as referring to dietician (64%) and providing educational handouts (35%). When physicians would engage in direct discussion, that discussion would focus mainly on the disease management and pathophysiology of the illness. Education on nutrition topics was often limited to the ill effects of high sodium, sugars, and fried foods. After counseling, physicians (72%) believed that most patients understand the role of nutrition and disease. Previous studies, however, show that while physicians often feel that they have effectively relayed information, only 21% of patients feel that they received effective communication from

Table Summary of Regional and Global Cuisine

Continent	Major Regions	Example Countries	Predominant Ingredients	Example Food	Comments
Africa	North Africa + Middle East	Algeria, Morocco, Tunisia, Egypt, Israel, Iran, Iraq, Turkey	Wheat, spices (saffron, nutmeg, cinnamon, ginger, cloves, chilies), tomatoes, potatoes, seafood, goat, lamb, beef, dates, almonds, olives, olive oil, lemons, peppers, rice, vegetables, milk, cereal grains, honey, sesame seeds, meats	Couscous, stewed meats such as lamb tagine, grilled meats such as kebabs, dolma such as stuffed grape leaves	Less pork consumption due to religion – Islam and Judaism
	Sub-Saharan Africa	South Africa, Namibia, Botswana	Grains, red meat, dried meats, potatoes, rice, butter, sugar, beans, milk, vegetables, corn, curry, lemon, rice, fruits and vegetables, cornmeal	Braai (barbecued red meat), stewed meats, biltong (dried, cured meat)	Also referred to as "rainbow cuisine" due to a mix of influence from native tribes, Europe and Asia
Americas	North	United States, Canada	Meats, wheat	Burgers, pasta, "fast food"	Immigrant European cuisine
	South and Central	Brazil, Ecuador, Belize, Costa Rica	Corn, beans, potatoes, less meats	Rice and chicken, rice and beans	
Asia	East	Japan	Rice, ginger, garlic sesame, soy and tofu, seafood	Rice, sushi, pickled and fresh vegetables	Korea: pickled cabbage (Kimchi)
		China Korea	Rice, noodles, tofu, pork, beef, mutton, duck, pigeon	Rice/noodles with tofu and meat	
	South West	India, Vietnam, Malaysia	Vegetables, coconut milk, chickpeas, lentils, rice, wheat, yogurt, seafood	Coconut milk-based curries, biryani, chapati (flat bread), roti	Less beef in locations with predominant Hinduism, less pork with predominant Islam
Europe	North	Norway, Belgium, Germany	Wheat, rye, butter, meat, cured meat, rice, pickled food	Sausages, polenta, smoked salmon	Also can be divided as Eastern and Western Europe
	South	Italy, Malta, Croatia	Olive oil, pasta, vegetables, seafood	Pasta dishes, Mediterranean cuisine	
Oceania		Australia, New Zealand, islands in the Pacific	Sweet potato, taro, fish, fruits	Meats, barbecued meats, seafood	Immigrant European cuisine as well as native Aboriginal Australian cuisine

their physicians.[52] Patient adherence to therapies is directly related to their understanding of their illness and the therapies.[53]

NUTRITION EDUCATION IN MEDICAL SCHOOL

Lack of patient counseling and attentiveness to this topic is likely related to physicians' lack of knowledge in the nutrition field. According to survey data, 22% of polled physicians recall receiving no nutrition education in medical school. While the majority of physicians recollect receiving some nutrition education in medical school, 35% of those polled said that came in the form of a single lecture or a section of a single lecture. Unfortunately, the situation does not improve during medical residency. Seventy-three percent of those surveyed felt they received minimal or no education during their medical residency necessary for counseling patients on nutrition topics. Lack of nutrition education appears to be more prevalent in the Americas, where 58% of physicians had no memory of, or there was a notable absence of, nutrition education in medical school. In Asia and Europe, the absence of any education seemed like less of a problem: only 30% of polled physicians in those continents recalled no medical education on nutrition.

GRADUATE NUTRITION EDUCATION

Lack of nutrition education persists after completion of graduate medical education, where almost half of polled physicians had not received any nutrition continuing medical education. Moreover, physicians were unlikely to be readers or consumers of nutrition education through studies, books, or documentaries post graduation. In fact, 67% of physicians read about nutrition less than once every 3 months.

Without adequate education in training, it is no surprise that most physicians around the world do not feel well equipped to counsel their patients about nutrition. While physicians feel some comfort talking about fat and cholesterol, they have little knowledge about protein, carbohydrate quality, gluten, and plant-based nutrition. Despite the data on the effectiveness of dietary interventions,[54] groups like the American Heart Association[55] and World Health Organization[39] advocating for a minimum consumption of 5 servings of fruits and vegetables (400 grams) a day, the daily intake of fruits and vegetables in physicians and consumers alike remains low.

LACK OF FRUIT AND VEGETABLE CONSUMPTION—AN INTERNATIONAL PROBLEM

In 2007-2010, one-half of the US population had less than one cup of fruits and <1.5 cups of vegetables per day.[56] The lack of consumption of fruits and vegetables extends to physicians as well. Among US cardiologists, the average number of servings consumed was 3 servings of fruits and vegetables per day.[57] Globally, the majority (61% of physicians) consume 2 or fewer fruits and vegetables per day, and only 7% had 5 or more servings. In contrast, 81% of international physicians stated that they have 1-2 servings of meat products per day and 75% of physicians had 1-2 servings of dairy per day (**Figure 2**).

HOSPITAL READMISSION DUE TO CARDIOVASCULAR DISEASE

Many hospitals in the United States and abroad suffer from frequent hospital readmissions due to cardiovascular disease, much of which is dependent on lifestyle, including nutrition. However, globally, little education is provided to patients on nutrition upon discharge. According to our survey results, physicians spend, on average, <2-3 minutes counseling hospitalized patients on nutrition. Internationally, 85% of hospitals provided discharge materials to their patients, but only 36% of those discharge instructions contain nutrition information. The survey did not query what level of nutrition education was provided in those discharge documents.

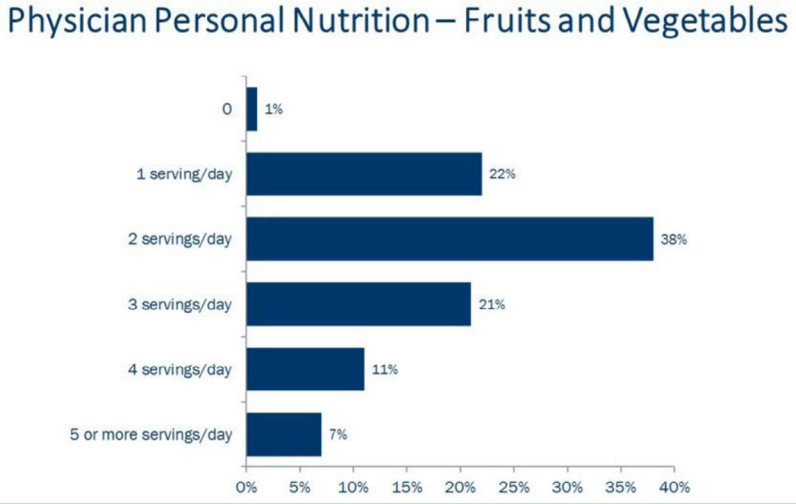

Figure 2 Physician personal nutrition – fruits and vegetables.

SOLUTIONS TO IMPROVING EDUCATIONAL EFFORTS

- **Patient Adherence to Therapy:** Patient adherence to therapies is positively related to physicians effectively counseling on the topics. In addition, patients feel that physicians are the most authoritative and credible sources for information[51,58] on diet and nutrition, despite the inadequate training they actually receive on this topic. The minimal time physicians spend educating patients on nutrition likely stems from their lack of education: over 52% of those polled felt that they did not possess enough expertise on this topic.
- **Improved Education of Physicians:** Improved education on topics of nutrition is essential at all levels of physician training. From the survey data, it is worth noting that the majority of physicians were open to online nutrition education modules and to education conferences on nutrition. Working on providing effective and thorough nutrition education to physicians that target different levels of education is essential. Thus, online modules such as the Nutrition in Medicine modules developed by the University of North Carolina at Chapel Hill, which provide nutrition education tailored to medical students, as well as practicing physicians, may be useful in addressing deficits in nutrition education.[59,60] Regional and local efforts to improve teaching both the patient and physician, along with government support, may be required to initiate change. With better education, physicians can become more effective at counseling and thereby provide much needed guidance on healthy eating.
- **Lifestyle Changes are the Key to Decreasing Cardiovascular Morbidity and Mortality:** Based on these results, an ideal physician–patient encounter for the risk reduction and treatment of cardiovascular disease would incorporate a discussion on lifestyle modification, including dietary counseling, in addition to optimal medical and revascularization therapies. In fact, this approach would likely not only empower patients to help themselves, but also may reduce the burden of disease, and even the number of drugs and treatments required, saving costs to the system as a whole.

CONCLUSIONS

Cardiovascular disease is an international problem. The benefit of improving diet quality to decrease cardiovascular risk is not a new concept, but implementation remains an ongoing issue. Poor diet quality is affected by issues of food attainability, urbanization, and education deficits among patients and physicians. Local and regional initiatives to improve awareness in areas such as Mexico, North Karelia, and South Korea have made a significant impact. More regional and local programs, perhaps along with government intervention, are needed to bring about further change. Improving education of physicians through more comprehensive nutrition training in medical schools and advanced postgraduate training is an essential step that can facilitate improvement in their own dietary habits and will eventually have a trickle effect on impacting patient counseling and education of the patient.

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