CLINICAL RESEARCH STUDY

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A Deficiency of Nutrition Education and Practice in Cardiology

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ABSTRACT

BACKGROUND: Nutrition is one of the foundations of cardiovascular guidelines for risk reduction and treatment. However, little is known about whether cardiologists, cardiology fellows-in-training, and cardiovascular team members have the nutrition education and knowledge necessary to implement these guidelines. The aim of this study was to describe the educational experiences, attitudes, and practices relating to nutrition among cardiovascular professionals.

METHODS: Surveys completed by cardiologists, fellows-in-training, and cardiovascular team members inquired about their personal dietary habits, history of nutrition education, and attitudes regarding nutrition interventions.

RESULTS: A total of 930 surveys were completed. Among cardiologists, 90% reported receiving no or minimal nutrition education during fellowship training, 59% reported no nutrition education during internal medicine training, and 31% reported receiving no nutrition education in medical school. Among cardiologists, 8% described themselves as having "expert" nutrition knowledge. Nevertheless, fully 95% of cardiologists believe that their role includes personally providing patients with at least basic nutrition information. The percentage of respondents who ate $\geq$5 servings of vegetables and fruits per day was: 20% (cardiologists), 21% (fellows-in-training), and 26% (cardiovascular team members).

CONCLUSIONS: A large proportion of cardiovascular specialists have received minimal medical education and training in nutrition, and current trainees continue to experience significant education and training gaps.
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KEYWORDS: Graduate medical education; Lifestyle; Medical education; Nutrition; Prevention

Among the top 17 risk factors, poor diet quality has been identified by the US Burden of Disease Collaborators as the leading cause of premature deaths and disability in the United States.[1] Ischemic heart disease, influenced markedly by dietary factors, is the condition most responsible for years of life lost due to premature death. Although the mortality rate from cardiovascular disease had been on the decline for more than a decade, a concerning plateau in that trend has emerged recently, largely fueled by the high prevalence of diet-related obesity and diabetes.[2]

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The recent 2015-2020 Dietary Guidelines for Americans[3] recommend healthy dietary patterns, including a Healthy Mediterranean Style Eating Pattern and Healthy Vegetarian Eating Pattern.

A Mediterranean-style diet was shown to significantly benefit both primary and secondary prevention. The Primary Prevention of Cardiovascular Disease with a Mediterranean Diet trial achieved a 30% reduction in major cardiovascular events, largely driven by reduction in stroke. In secondary prevention, the Lyon Diet Heart study[4] documented a 72% reduction of myocardial infarction and cardiac deaths. A low-fat vegetarian diet was a component of the Lifestyle Heart Trial, a multimodality lifestyle intervention study that demonstrated angiographic regression of coronary disease.[5] Additionally, in a nonrandomized study of patients with coronary disease who followed a vegan, no added oil diet, the rate of major cardiovascular events over 3.7 years was 0.6%.[6]

CLINICAL SIGNIFICANCE

- Ninety percent of surveyed cardiologists reported receiving no or minimal nutrition education during fellowship training.
- Nevertheless, 95% of cardiologists believe that their role includes personally providing patients with at least basic nutrition information.
- Nutritional interventions are the foundation of clinical care guidelines, yet cardiovascular specialists lack the nutrition education to effectively implement these guidelines.

The total annual cost related to heart and vascular diseases in the United States is a staggering $315 billion; of this, $193 billion is due to direct medical costs.[7] Given the documented cardiovascular event reduction of 30% to 70% or more from dietary changes, the potential for cost savings achievable by emphasizing nutrition education and practice is substantial.

To learn more about the knowledge, attitudes, and practices related to nutrition counseling in cardiovascular care, a survey was conducted of cardiologists, fellows-in-training, and nonphysician cardiovascular team members.

METHODS

An online survey was developed that asked cardiovascular specialists to describe their nutrition education, as well as knowledge, attitudes, and practice related to nutrition counseling. The survey was sent to the American College of Cardiology (ACC) CardioSurve panel, a group of Fellows of the ACC selected by a random selection technique to obtain a representative sampling of US cardiologists among key demographics. Surveys were also sent to members of 4 ACC specialty listservs (academic, early career, imaging, interventional), a fellows-in-training listserv, and nonphysician cardiovascular team listserv members from September 9 to October 8, 2015 and from February 11 to March 28, 2016. This survey was conducted by ACC staff, including survey programming, fielding, and analysis.

Statistical analysis of the responses was performed using SPSS version 23 (IBM, Armonk, NY). Chi-squared tests were used to calculate significant differences, with statistical significance defined as $P < .05$.

RESULTS

Survey Respondent Demographics

Survey respondent demographics are shown in the Table. From the 20,608 surveys distributed, a total of 930 (4.5%) were completed. Within the limited dataset obtained regarding tenure and gender, the tenure of respondents mirrored the ACC membership at large (1-10 years 33% vs 36%; 11-20 years 24% vs 25%; 21 years or more 43% vs 39%). More cardiologist respondents were female (88% vs 81%, $P < .05$).

Nutrition Education

Survey responses related to nutrition education are shown in Figure 1.

Medical School. Overall, 31% of cardiologists and 21% of fellows-in-training did not recall receiving any nutrition education during medical school. More extensive nutrition education, consisting of a series of lectures in medical school, was reported by 21% of cardiologists and 39% of fellows-in-training.

Internal Medicine Residency. During internal medicine residency training, 59% of cardiologists did not recall receiving any nutrition lectures, 9% recalled only a single lecture, and 6% reported receiving a series of nutrition lectures.

Cardiovascular Fellowship Training. Among cardiologists, 90% reported receiving no or minimal nutrition education during fellowship training (57% and 33%, respectively). Only 8% had a "solid nutrition education" that they considered "adequate," and 1% reported a "high level of nutrition education that gave me excellent skills for counseling patients."

The experience of nutrition education for current fellows-in-training, of whom 46% were in their third year of fellowship or beyond, was similar to that of practicing cardiologists, with 56% reporting that they did not receive any nutrition education to date in their fellowship program.

Continuing Medical Education in Nutrition. After cardiovascular fellowship training, 56% of cardiologists described receiving no formal education in nutrition, and 20% received 2 or more hours per year.

Among cardiologists surveyed, 53% reported that they would be likely to participate in an online series of webinars discussing nutrition and lifestyle, followed by 40% inclined

Table Respondent Demographics

Variable	n or %
Survey source (n = 930)	
CardioSurve panel	149
Interventional listserv	184
Academic listserv	133
Imaging listserv	115
Early career listserv	65
Fellows-in-training listserv	75
Nonphysician CV team listserv	209
Stage of fellowship training (n = 75) (%)	
1st y	27
2nd y	27
3rd y	23
Subspecialty fellowships/unspecified	23
CV team breakout (n = 209) (%)	
Nurse Practitioner (and Advanced)	51
Registered Nurse	20
Physician Assistant	14
Pharmacist	7
Other	8
Gender (%)	
Female cardiologists (n = 276)	18
Male cardiologists (n = 63)	82
Female fellows-in-training (n = 20)	27
Male fellows-in-training (n = 55)	73
Female CV team members (n = 186)	89
Male CV team members (n = 21)	11
Years in practice (n = 551) (%)	
≤10	28
11-20	26
≥21	43
Physician practice setting (n = 851) (%)	
University-based group practice	34
Hospital non-university group practice	38
Free-standing group practice	13
Solo practitioner	6
VA/Government health facility	5

CV = cardiovascular; VA = Department of Veterans Affairs.

to attend a local lifestyle education program, and 35% who would participate in a lifestyle track at a national meeting.

Attitudes Regarding the Impact of Dietary Interventions. Survey responses related to attitudes regarding the impact of dietary interventions are shown in Figure 2.

A total of 89% of cardiologists and 87% of fellows-in-training believe that "dietary interventions are likely to provide substantial additional benefit to patients with cardiovascular disease who adhere to guideline based pharmacologic therapy."

Cardiologists Perception of Their Role in Delivering Nutrition Counseling. Survey responses related to cardiologists' perception of their role in delivering nutrition counseling are shown in Figure 3.

Fully 95% of cardiologists believe that their role includes personally providing patients with at least "basic nutrition information." There was no difference between cardiologists in university-based practices who held this view (66%) compared with those in non-university settings (72%) (nonsignificant).

A relationship was noted in cardiologists between their personal dietary behavior and their attitude regarding nutrition counseling: 74% of cardiologists who ate 5 servings or more of vegetables and fruit per day felt that their role included personally delivering "more detailed dietary information" to patients, whereas only 61% of those who ate 1 to 2 servings of vegetables and fruit endorsed that statement ($P < .05$).

Fellow-in-training Personal Beliefs and Perception of Mentor Attitudes About Nutrition

Responses from fellows-in-training showed that 63% felt that their role included providing more detailed nutrition counseling. However, only 40% of fellows-in-training believed that their closest clinical mentor shared that view.

Conversely, 3% of fellows-in-training reported that they did not believe their role included counseling patients about nutrition, whereas 16% of fellows-in-training reported that their closest mentor did not consider nutrition counseling to be their personal responsibility ($P < .05$).

Time Spent Counseling About Nutrition

During an average patient appointment, 4% of cardiologists reported not discussing nutrition, 18% reported spending 1 minute or less on nutrition, 40% spent 2 to 3 minutes per visit, 25% estimated 5 minutes per visit, 8% reported 10 minutes per visit, and 4% spent 15 minutes or more. Nutrition counseling time reported by fellows-in-training was similar to that reported by the cardiologists.

Among all physicians (cardiologists and fellows-in-training), women spent more time with nutrition counseling than men: 18% of women estimated spending 10-15 minutes per clinic visit devoted to nutrition, but only 6% of men did so ($P < .05$).

Self-assessment of Nutrition Expertise and Comfort in Patient Counseling

Among cardiologists, just 8% described themselves as having "expert" knowledge in nutrition and agreed with the statement, "I feel that I keep up to date and able to answer any question thrown my way." Knowledge was self-assessed by 22% of cardiologists as better than average, 23% average, 27% adequate, and 18% described "feeling uncomfortable teaching patients on this topic."

Dietary Habits of Cardiovascular Professionals

Survey responses related to dietary habits of cardiovascular professionals are shown in Figure 4.

Among cardiologists, 20% consume a total of 5 or more servings of fruit and vegetables per day, as do 21% of

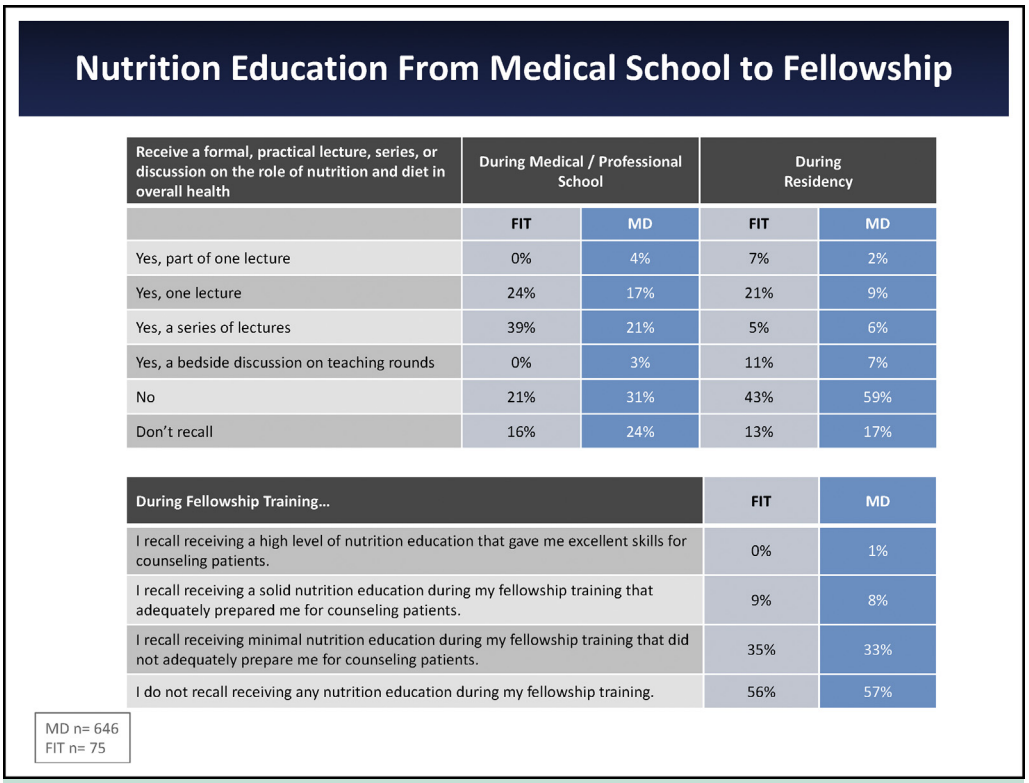

Figure 1 Nutrition education from medical school to fellowship. Q: Did you ever receive a formal, practical lecture, series, or discussion on the role of nutrition and diet in overall health during medical school? Q: Did you receive a formal, practical lecture, series, or discussion on the role of nutrition and diet on overall health during residency? Q: Which statement best describes your recollection of nutrition education during cardiovascular fellowship training? FIT = fellow-in-training.

fellows-in-training and 26% of cardiovascular team members. Considering all physician respondents (cardiologists and fellows-in-training), a nonsignificant trend was observed for more women than men eating 5 or more servings of fruit and vegetables per day (27% vs 15%, respectively; $P < .07$).

DISCUSSION

This cross-sectional survey of practicing cardiovascular specialists documents the deficiency of nutrition education, lack of self-assessed knowledge and counseling skills, and low personal adherence to a heart healthy diet pattern. The reasons for the lack of nutrition training are multifactorial and certainly include lack of adequately trained physician mentors, as well as lack of financial incentives that drive various aspects of practice and, consequently, clinical training.

Cardiology Guidelines Emphasize the Importance of Nutrition but Training Does Not

The 2013 ACC/American Heart Association Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults[8] emphasizes the importance of a healthy diet.

In view of our finding that only 30% of cardiologists described their nutrition knowledge as "mostly up to date" or better, it is difficult to reconcile how cardiologists could effectively implement these guidelines. Moreover, given that 59% of cardiologists reported spending 3 minutes or less per visit discussing nutrition with their patients, the attention to nutrition and lifestyle advised in the guidelines seems to be poorly realized in practice.

Nutrition Education in Medical School

In our survey, nearly one-third of cardiologists did not recall receiving any nutrition education during medical school. The National Academy of Sciences recommends a minimum of 25 required hours of nutrition instruction.[9] A recent survey conducted in accredited US medical schools between 2008 and 2009 found that only 25% provided a dedicated nutrition course, compared with 30% just several years earlier.[10]

Of concern, studies show that incoming medical students generally arrive with a strongly positive view of the role of nutrition in health but often leave medical school with somewhat diminished enthusiasm. In a study of students

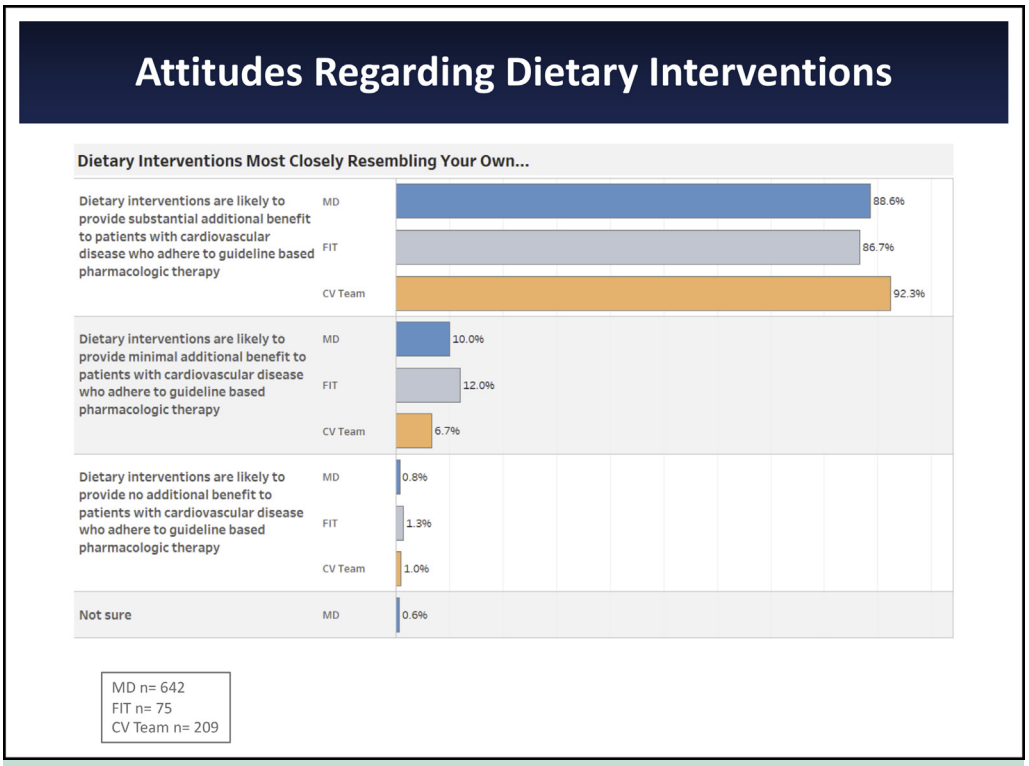

Figure 2 Attitudes regarding dietary interventions. Q: Which of the following perspectives on dietary interventions most closely resembles your own? CV = cardiovascular; FIT = fellow-in-training.

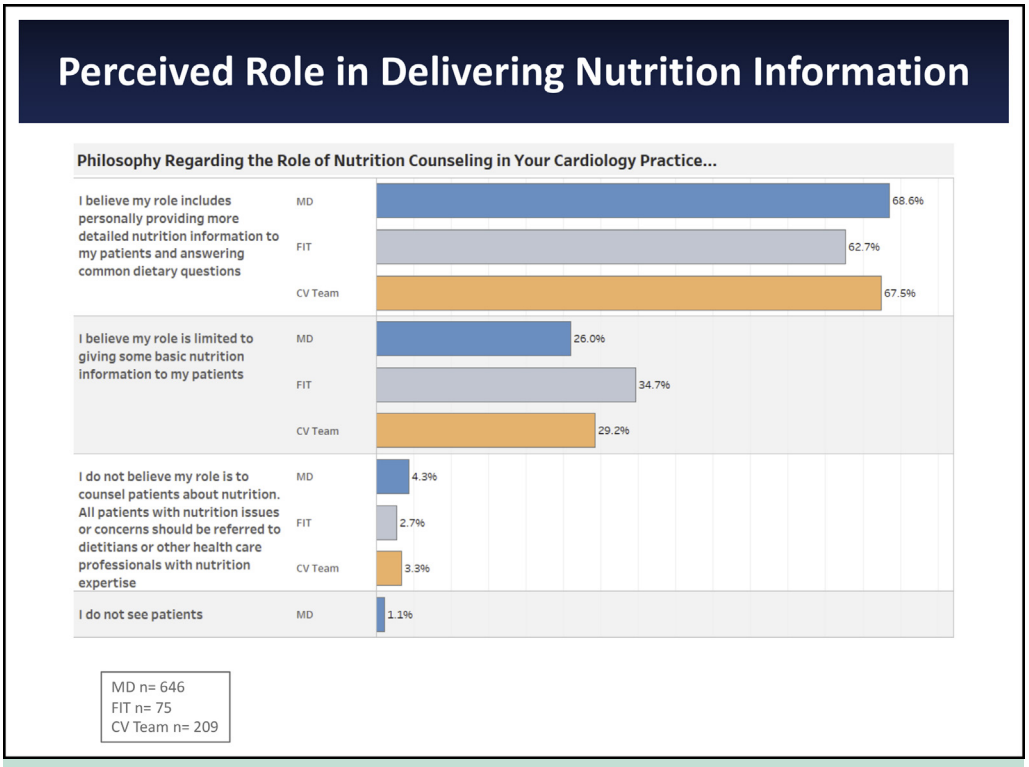

Figure 3 Perceived role in delivering nutrition counseling. Q: Which statement best describes your philosophy regarding the role of nutrition counseling in your cardiology practice? CV = cardiovascular; FIT = fellow-in-training.

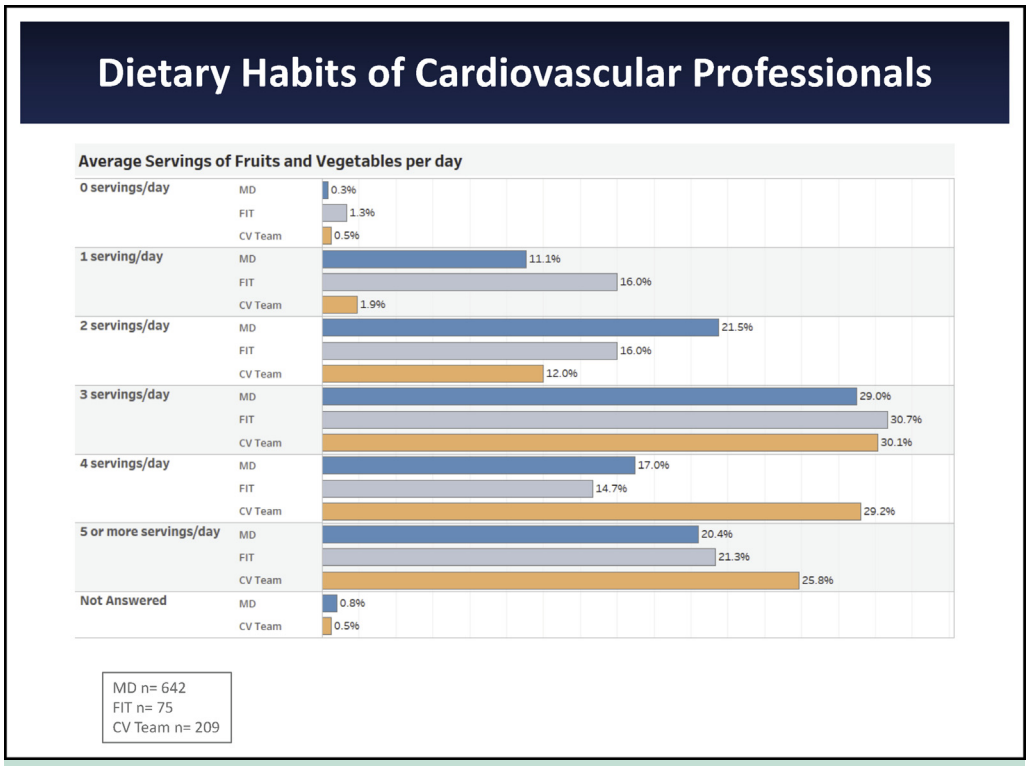

Figure 4 Dietary habits of cardiovascular professionals. On average, how many servings of fruits and vegetables do you eat every day? (1 cup of uncooked green leafy vegetables = 1 serving; ½ cup of other cooked vegetables = 1 serving). CV = cardiovascular; FIT = fellow-in-training.

from 11 medical schools, 74% of newly arrived medical students believed that nutrition would be important for their careers, but only 59% held that view by the end of medical school.[11]

Nutrition Education in Graduate Medical Training

The Accreditation Council for Graduate Medical Education (ACGME), in conjunction with representatives of medical specialty groups, establishes training requirements for graduate medical education. In the 38-page ACGME document for training in cardiovascular disease,[12] as well as the 39-page training program requirement document for internal medicine, the words "nutrition" and "diet" are absent.

The lack of requirements for teaching nutrition in internal medicine[13] and cardiovascular fellowship training[12] is reflected in the results of the present survey, which found 59% of cardiologists unable to recall any nutrition lectures during internal medicine residency, and 57% reporting not even a single nutrition lecture during fellowship training. Furthermore, there is no evidence for a trend toward more nutrition education in current cardiovascular fellowship trainees: 56% of current fellows-in-training stated that they have not received any nutrition training.

The ACC has issued recommendations for training in cardiology (which go beyond the ACGME requirements), published in a Core Cardiology Training Statement, which calls for a dedicated 1-month rotation for cardiology fellows in preventive cardiology. However, a recent survey found only 24% of training programs in compliance.[14]

Fellows-in-training and Mentor Attitudes About the Role of Cardiologists in Nutrition Counseling

Of note, 69% of cardiologists believed that their role included personally providing more detailed nutrition counseling—very similar to 63% of fellows who endorsed that same viewpoint.

It is revealing to note that the fellows perceived their mentors to be less invested in delivering nutrition counseling than they are, with fellows believing that only 40% of their mentors took personal ownership for offering detailed nutritional counseling to their patients. This suggests a discrepancy between attitudes and behaviors on the part of mentors regarding their role in providing nutrition counseling.

Recommendations to Enhance Nutrition Education of Cardiologists

As demonstrated in this survey, there are considerable gaps in nutrition education across all stages of training of

cardiovascular specialists. Several strategies may be considered to close this gap.

Beginning in undergraduate studies, it has been suggested that nutrition science may be a preferred replacement for organic chemistry as the high stakes prerequisite for matriculation to medical school.[15] Once in medical school, greater attention must be directed to teaching clinically relevant nutrition science and to identify clinical mentors who can guide/facilitate the application of nutrition knowledge into clinical practice. Finally, all graduate medical education programs need to include a core curriculum in nutrition and lifestyle, along with the development of competencies in motivational interviewing and counseling.

After the completion of formal training in cardiology, continuing education programs, including those required for maintenance of certification, need to be developed that include review topics, as well as introduction of new advances in clinical nutrition. An important objective of continuing education in nutrition is to foster the development of cardiology role models with expertise in nutrition science and counseling, an essential but often absent resource in current training programs.

Range of Potential Roles for Cardiologists to Provide Direct Nutrition Counseling

Cardiovascular specialists with a solid background in nutrition will be well positioned to deliver effective nutritional counseling.[16,17] Nevertheless, many patients, especially those with multiple chronic illnesses, have complex nutritional needs or require detailed meal planning that exceed the expertise or time that can reasonably be delivered by cardiovascular specialists. In those cases the patient is clearly best served by referral to a registered dietitian or nutritionist. A team-based approach to care is becoming increasingly important to deal with the growing burden of chronic diseases and the needs associated with an aging population.[18]

Despite the well-documented benefits of team-based patient care, there continues to be poor referral by physicians to other healthcare professionals for diet and lifestyle interventions, including cardiac rehabilitation programs.[19] Of note, an intensive multidisciplinary cardiac rehabilitation program documented to reverse heart disease that incorporates dietary changes, smoking cessation, stress management, and group support has recently been approved for Medicare coverage.[20]

Personal Dietary Habits of Cardiologists

A single aspect of the dietary history of health professionals was surveyed: consumption of vegetables and fruit. The finding of low intake of vegetables and fruit by cardiologists, with only 20% reporting intake of 5 or more servings per day, is relevant for several reasons.

This finding suggests that in large numbers, the personal diet of cardiologists is deficient in this foundational element of a heart-healthy diet. However, the suboptimal dietary patterns of cardiologists have even broader implications; there is strong evidence that physicians with healthier personal health behaviors are far more likely to counsel their patients about lifestyle changes than are physicians with less favorable lifestyle habits.[21] Our findings were consistent with this observation: cardiologists with the most vegetable and fruit consumption were also more likely to believe it was their responsibility to discuss detailed dietary information with their patients. Therefore, it is conceivable that one way to improve patient counseling—and health—is for physicians to optimize their own diet.

Study Limitations

The response rate to the distributed surveys was relatively low. Therefore, it is possible that the results do not accurately reflect the experience and attitudes of the larger group of cardiologists and cardiovascular team members. It could easily be speculated, however, that cardiovascular specialists who did not respond to the nutrition survey might have even less education and engagement with clinical nutrition than those who did respond. As such, even the relatively low level of nutrition education and counseling among cardiologists identified in this survey could well underestimate the true extent of the problem. Compounding this possibility is the common tendency to color survey responses to present a more favorable description than a more objective assessment might render.

Nevertheless, to our knowledge this survey is the largest ever performed among physicians and health care professionals regarding education, attitudes, and practice of nutritional counseling—and the only such survey of cardiologists.

CONCLUSION

Although nutrition is described in cardiovascular guidelines as a foundation of care, neither education nor practice among cardiologists and cardiovascular team members reflect that priority. Cardiologists report inadequate training in nutrition, with minimal education in medical school, and often none during internal medicine residency and cardiovascular fellowship training. Fellows in cardiology perceive that they have greater interest in nutrition than their senior mentors.

The present report, while highlighting deficiencies in nutrition education and practice, can also be viewed as spotlighting tremendous opportunities to improve cardiovascular care. The urgency to act quickly is brought to light by the recent plateau in the previous declining trend in cardiovascular mortality—fueled largely by substantial increases in the prevalence of obesity and diabetes.[2] It is hoped that the survey presented in this report will serve as a call to action for much greater emphasis on nutrition in the training and practice of cardiovascular specialists and serve as a template for similar engagement in a wide range of lifestyle interventions.

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References

1. US Burden of Disease Collaborators. The state of US health, 1990-2010: burden of diseases, injuries, and risk factors. *JAMA*. 2013;310:591-608.
2. Sidney S, Quesenberry CP Jr, Jaffe MG, et al. Recent trends in cardiovascular mortality in the united states and public health goals. *JAMA Cardiol*. 2016;1:594-599.
3. US Department of Health and Human Services and US Department of Agriculture. *2015-2020 Dietary Guidelines for Americans*. Washington, DC: DHHS, USDA; 2015.
4. de Lorgeril M, Salen P, Martin JL, Monjaud I, Delaye J, Mamelle N. Mediterranean diet, traditional risk factors, and the rate of cardiovascular complications after myocardial infarction: final report of the Lyon Diet Heart Study. *Circulation*. 1999;99:779-785.
5. Ornish D, Brown SE, Scherwitz LW, et al. Can lifestyle changes reverse coronary heart disease? The Lifestyle Heart Trial. *Lancet*. 1990;336:129-133.
6. Esselstyn CB Jr, Gendy G, Doyle J, Golubic M, Roizen MF. A way to reverse CAD? *J Fam Pract*. 2014;63:356-364b.
7. National Center for Chronic Disease Prevention and Health Promotion. *Chronic Diseases: The Leading Cause of Death and Disability in the United States*. Atlanta, GA: NCCDPHP; 2016.
8. Stone NJ, Robinson JG, Lichtenstein AH, et al. 2013 ACC/AHA guideline on the treatment of blood cholesterol to reduce atherosclerotic cardiovascular risk in adults: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. 2014;63:2889-2934.
9. US National Research Council, Committee on Nutrition in Medical Education. *Nutrition Education in U.S. Medical Schools*. Washington, DC: National Academy Press; 1985.
10. Adams KM, Kohlmeier M, Zeisel SH. Nutrition education in U.S. medical schools: latest update of a national survey. *Acad Med*. 2010;85:1537-1542.
11. Weinsier RL, Boker JR, Morgan SL, et al. Cross-sectional study of nutrition knowledge and attitudes of medical students at three points in their medical training at 11 southeastern medical schools. *Am J Clin Nutr*. 1988;48:1-6.
12. Accreditation Council for Graduate Medical Education. *ACGME Program Requirements for Graduate Medical Education in Cardiovascular Disease (Internal Medicine)*. Chicago: ACGME; 2016.
13. Accreditation Council for Graduate Medical Education. *ACGME Program Requirements for Graduate Medical Education in Internal Medicine*. Chicago: ACGME; 2016.
14. Pack QR, Keteyian SJ, McBride PE, Weaver WD, Kim HE. Current status of preventive cardiology training among United States cardiology fellowships and comparison to training guidelines. *Am J Cardiol*. 2012;110:124-128.
15. Dalen JE, Devries S, Alpert JS, Willett W. It's time to replace organic chemistry with nutrition as a pre-med requirement. *Am J Med*. 2015;128:1048-1049.
16. Kris-Etherton PM, Akabas SR, Bales CW, et al. The need to advance nutrition education in the training of health care professionals and recommended research to evaluate implementation and effectiveness. *Am J Clin Nutr*. 2014;99(suppl):1153S-1166S.
17. Kushner RF, Van Horn L, Rock CL, et al. Nutrition education in medical school: a time of opportunity. *Am J Clin Nutr*. 2014;99:1167S-1173S.
18. Mitchell P, Wynia M, Golden R, et al. *Core Principles & Values of Effective Team-Based Health Care*. Washington, DC: Institute of Medicine; 2012.
19. Arena R, Williams M, Forman DE, et al. Increasing referral and participation rates to outpatient cardiac rehabilitation: the valuable role of healthcare professionals in the inpatient and home health settings: a science advisory from the American Heart Association. *Circulation*. 2012;125:1321-1329.
20. Centers for Medicare & Medicaid Services. *Decision Memo for Intensive Cardiac Rehabilitation (ICR) Program - Dr. Ornish's Program for Reversing Heart Disease (CAG-00419N)*. Baltimore, Md: CMMS; 2010.
21. Frank E, Segura C, Shen H, Oberg E. Predictors of Canadian physicians' prevention counseling practices. *Can J Public Health*. 2010;101:390-395.