Translation of nutritional sciences into medical education: the Nutrition Academic Award Program¹⁻³

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ABSTRACT For the past 40 y the scientific community has decried the inadequacy of the training of physicians and other health professionals in the subject of human nutrition. In 1997 the National Heart, Lung, and Blood Institute developed the Nutrition Academic Award (NAA) Program, an initiative to improve nutrition training across a network of US medical schools. The purpose of this funding, which began in 1998, is to support the development and enhancement of nutrition curricula for medical students, residents, and practicing physicians to learn principles and practice skills in nutrition. The NAA recipients developed the Nutrition Curricular Guide for Training Physicians, a plan to incorporate clinical guidelines into physician practice skills, create educational and assessment practice tools, and evaluate curricula, materials, and teaching tools. Dissemination of NAA activities and materials will be facilitated by a national website, presentations and publications, and consultants and advisors from the NAA nutrition education programs. The NAA Program constitutes a major new effort to enhance nutrition knowledge and skills among health care providers and to effectively apply the science of human nutrition to clinical medicine. This article describes the purpose and aims of the NAA Program, the organizational structure of the network of recipients, a profile of the recipients and individual programs at 21 medical schools, the various strategies to overcome barriers in training physicians in human nutrition, and collaborative and dissemination efforts. Am J Clin Nutr 2001;74:164–70.

KEY WORDS Medical education, nutrition education, curriculum, medical students, residents, clinical competence, Nutrition Academic Award Program

INTRODUCTION Nutrition is a crucial component of health promotion and disease prevention. The National Heart, Lung, and Blood Institute’s (NHLBI) Nutrition Academic Award (NAA) Program was developed to design and implement effective nutrition curricula for physician education and training programs. The new century marks the 40th anniversary of the report from the American Medical Association’s (AMA) Council on Food and Nutrition that criticized medical student education in the science and practice of human nutrition (1). Fifteen years ago a committee of the National Research Council identified deficiencies in US medical school education and recommended that nutrition become a required course in every US medical school, with a minimum of 25 h of core curricular time (2). In 1989 the American Society for Clinical Nutrition (ASCN) reported that little progress had been made subsequent to the National Research Council’s recommendation (3). These reports prompted the US Congress to charge federal agencies to identify ways of “assuring that students enrolled in U.S. medical schools and physicians practicing in the U.S. have access to adequate training in the field of nutrition and its relation to human health” (4), including passage of the National Nutritional Monitoring and Related Research Act of 1990 (5).

Many efforts have been undertaken at the national and regional levels to respond to the recognized need to promote nutrition education. Expert panels convened by both the ASCN in 1989 (3) and the American Medical Student Association in 1994 (6) developed comprehensive lists of essential topics that should be part of the medical school curriculum. A regional consortium of medical schools in 6 southeastern states, the Southeastern Regional Medical Nutrition Education Network, was created in the 1980s and continues to provide collaborative support for nutrition education at participating institutions (7). The ASCN has supported many of these efforts, including the promotion of nutrition education in graduate medical education programs (8), the establishment of physician nutrition specialists (9), and participation in the endeavors of the Intersociety Professional Nutrition Education Consortium (10).

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Despite numerous important efforts by professional groups and committees to improve nutrition education for physicians and despite recommended clinical guidelines for dietary changes, deficiencies and inconsistencies remain in many medical schools. Technologic and pharmaceutical approaches still far outnumber nutritional and behavioral interventions as the treatment of choice for major public health disorders including obesity, atherosclerosis, diabetes, and cancer. The purpose of this article is to describe the NAA Program, which was developed to advance the effectiveness of training physicians in human nutrition at several levels in US medical schools. The major areas covered are the purpose and aims of the NAA Program, the organizational structure of the network of recipients, a profile of the recipients and individual programs at 21 medical schools, the various strategies to overcome barriers in training physicians in human nutrition, and collaboration and dissemination.

RATIONALE FOR THE NAA PROGRAM

Nutrition plays a major role in the nation’s efforts to promote disease prevention and health in the 21st century. McGinnis and Foege (11) estimated that 300,000–800,000 preventable deaths in the United States annually are nutrition related; these include deaths from atherosclerotic diseases, diabetes, and certain cancers. Only tobacco carries a similar burden of preventable death. Healthy People 2010 lists numerous nutritional goals that could contribute to better health for Americans (12). The most recent Dietary Guidelines for Americans provides additional up-to-date information for nutritional changes in populations and individuals (13). Although some of the objectives of Healthy People 2010 can be achieved outside the “medical model,” physicians and other health care providers are clearly charged, including by the US Preventive Services Task Force (14), to provide nutritional assessment and counseling to their patients. The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (15); the third report of the Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol (Adult Treatment Panel III) of the National Cholesterol Education Program, released in 2001 (16); a report from the NHLBI Obesity Education Initiative Expert Panel (17); and the American Diabetes Association’s Standards of Medical Care for Patients with Diabetes Mellitus (18) provide physicians with specific guidelines for implementing nutritional assessment and counseling. Despite these guidelines, nutrition counseling in clinical practice continues to be limited (19–24).

An important aim of the NAA Program is to incorporate these nutritional recommendations into the curricula for health professionals so that the recommendations will be implemented routinely in patient care and clinical practice.

Finally, physicians must understand the risks and benefits of an expanding array of nutritional information and products, advice, and programs promoted in the general public and know how to judge the validity of evolving approaches in the context of eating patterns proven to promote health. A continuing paradox is that, according to consumer surveys, physicians remain one of the most credible sources of nutrition information, despite repeated surveys documenting physicians’ recognition of their deficiencies in nutrition knowledge and their lack of confidence in providing effective dietary counseling (25). Together, these observations create a strong rationale for renewed efforts to upgrade physicians’ knowledge of nutrition and practice behaviors to improve their skills related to taking a nutrition history, providing dietary counseling, and referring patients to qualified dietitians and nutrition specialists (26).

PURPOSE OF THE NAA PROGRAM

The NAA is a 5-y grant awarded to schools of medicine in the United States. The award was developed in 1997 by the NHLBI to encourage the development and enhancement of medical school curricula to increase opportunities for students, residents, fellows, faculty, and practicing physicians to learn nutrition principles and clinical practice skills with an emphasis on preventing cardiovascular diseases, obesity, diabetes, and other chronic diseases. A second objective of the award is to provide educational materials in human nutrition, including a curricular guide, training modules, and other teaching and assessment tools for eventual dissemination to interested medical schools and graduate programs to aid in training health care professionals.

The first 10 NAA awards were funded in 1998 by the NHLBI in response to a request for applications. The NHLBI funded 9 more awards in 2000 and the National Institute of Diabetes and Digestive and Kidney Diseases funded 2 awards in 2000, for a total of 21 awards. Since 1970 the NHLBI has supported several other academic award programs addressing various topics in medical school curricula. The Preventive Cardiology Academic Award Program, which addressed multiple risk factors in the prevention of heart disease (27, 28) and involved 60 medical schools from 1979 to 1995, served as a model for the NAA Program. The NAA is the first academic award to focus specifically on nutrition.

ORGANIZATIONAL STRUCTURE AND COMMUNICATIONS

The NAA Program is coordinated and administered by the NHLBI. The organizational structure includes a Steering Committee, an Executive Committee, and many other committees and working groups. The Steering Committee comprises the principal investigators and the NHLBI Program Director. The Steering Committee holds a one-day meeting once or twice a year and communicates via conference calls, e-mails, and websites at other times. The Nutrition Education, Research, and Dissemination; Medical School Curriculum; Graduate Medical Education; Medical Education Strategies; Practice and Patient Education Materials; and Evaluation Committees report to the Steering Committee. In addition, working groups report to these specific committees and address areas of special emphasis such as websites, problem-based learning and standardized patient cases, and residency training programs. Both the committees and the working groups have a mission statement and a chair or co-chairs to provide leadership for the volunteer membership from the NAA teams. The administrative structure enhances coordination between the medical schools and promotes collaborative projects. An extranet system of websites was developed by the University of Rochester (New York) and is used by all 21 schools to promote communication and sharing of teaching ideas.

PROFILE OF THE NAA PROGRAM RECIPIENTS

A profile of the institutions and principal investigators who received NAAs is shown in Table 1. Ten medical schools were funded from 1998 to 2003 and 11 additional schools were funded
### TABLE 1
Nutrition Academic Award (NAA) Program recipients

<table>
<thead>
<tr>
<th>Medical school; principal investigator; and award period</th>
<th>Level of training</th>
<th>Training of other health professionals</th>
<th>Nutrition center or advisory committee</th>
<th>Number of entering medical students in 1999</th>
<th>Type of curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albert Einstein College of Medicine; Judith Wylie-Rosett</td>
<td>UME, GME, and Fellows</td>
<td>Dietetics (G and U)</td>
<td>—</td>
<td>180 (53% women), 40% nonwhite</td>
<td>PBL, T, I, and WB</td>
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<tr>
<td>EdD, RD; 1998–2003</td>
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<tr>
<td>Brown University School of Medicine; Charles Eaton,</td>
<td>UME, GME, and CME</td>
<td>Dentistry, dietetics (G and U), nursing, and pharmacy</td>
<td>Advisory committee</td>
<td>80 (52% women), 62% nonwhite</td>
<td>C-B, I, and PBL</td>
</tr>
<tr>
<td>Columbia University College of Physicians and Surgeons;</td>
<td>UME, GME, Fellows, and CME</td>
<td>Dentistry and nursing (G and U)</td>
<td>Nutrition center and advisory committee</td>
<td>149 (43% women), 32% nonwhite</td>
<td>I, T, and PBL</td>
</tr>
<tr>
<td>Lars Berghlund, MD, PhD; 2000–2005</td>
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<tr>
<td>Harvard University School of Medicine; Allan Walker, MD,</td>
<td>UME, GME, Fellows, and CME</td>
<td>Dietetics (G and U), nursing, pharmacy (U), and physician assistants</td>
<td>Nutrition center and advisory committee</td>
<td>165 (45% women), 51% nonwhite</td>
<td>PBL, I, and WB</td>
</tr>
<tr>
<td>Francine Welty, MD, PhD; 2000–2005</td>
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<tr>
<td>Mercer University School of Medicine; Brian Tobin, PhD,</td>
<td>UME, GME, Fellows, and CME</td>
<td>Dietetics (G and U), nursing (G and U), physical education, exercise physiology, and public health</td>
<td>Nutrition center and advisory committee</td>
<td>54 (41% women), 4% nonwhite</td>
<td>PBL, I, and WB</td>
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<tr>
<td>MS; 2000–2005</td>
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</tr>
<tr>
<td>Northwestern University Medical School; Linda Van Horn, PhD,</td>
<td>UME, GME, Fellows, and CME</td>
<td>Dietetics (G and U), nursing, and public health</td>
<td>Advisory committee</td>
<td>173 (46% women), 60% nonwhite</td>
<td>PBL and I</td>
</tr>
<tr>
<td>RD; 1998–2003</td>
<td></td>
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<tr>
<td>Stanford University School of Medicine; John Kerner, MD,</td>
<td>UME and GME</td>
<td>Nurse practitioners and physician assistants</td>
<td>—</td>
<td>86 (46% women), 41% nonwhite</td>
<td>WB and I</td>
</tr>
<tr>
<td>and Phyllis Gardner, MD; 2000–2005</td>
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<tr>
<td>Tufts University School of Medicine; Margo Woods, DSc; 1998–2003</td>
<td>UME, GME, Fellows, and CME</td>
<td>Dietetics (G)</td>
<td>Nutrition center</td>
<td>173 (43% women), 50% nonwhite</td>
<td>PBL, T, I, and WB</td>
</tr>
<tr>
<td>University of Alabama School of Medicine; Frank Franklin, Jr, MD, PhD; 1998–2003</td>
<td>UME, GME, Fellows, and CME</td>
<td>Dietetics (G and U) and public health</td>
<td>Nutrition center and advisory committee</td>
<td>160 (36% women), 24% nonwhite</td>
<td>PBL and T</td>
</tr>
<tr>
<td>University of Arkansas for Medical Sciences; Ronald Kahn, MD; 2000–2005</td>
<td>UME, GME, and CME</td>
<td>Dietetics (G and U), nursing (G), and pharmacy (U)</td>
<td>Nutrition center and advisory committee</td>
<td>149 (33% women), 18% nonwhite</td>
<td>PBL and I</td>
</tr>
<tr>
<td>University of Colorado School of Medicine; Nancy Krebs, MD; 2000–2005</td>
<td>UME, GME, Fellows, and CME</td>
<td>Physician assistants</td>
<td>Nutrition center and advisory committee</td>
<td>132 (52% women), 10% nonwhite</td>
<td>PBL and I</td>
</tr>
<tr>
<td>University of Iowa College of Medicine; Linda Snetselaar, PhD, RD; 1998–2003</td>
<td>UME, GME, Fellows, and CME</td>
<td>Dietetics (G and U), physician assistants, and public health</td>
<td>Nutrition center and advisory committee</td>
<td>175 (41% women), 19% nonwhite</td>
<td>PBL and T</td>
</tr>
<tr>
<td>University of Maryland School of Medicine; Stephen Havas, MD, MPH; 2000–2005</td>
<td>UME, GME, and CME</td>
<td>Nursing (G)</td>
<td>Advisory committee</td>
<td>138 (59% women), 38% nonwhite</td>
<td>PBL, CB, and I</td>
</tr>
<tr>
<td>University of Nevada School of Medicine; Sachiko St Jeor, PhD, RD; 2000–2005</td>
<td>UME, GME, and CME</td>
<td>Dietetics (G), nursing (G and U), and health ecology</td>
<td>Nutrition center and advisory committee</td>
<td>55 (36% women), 2% nonwhite</td>
<td>I, PBL, WB, and T</td>
</tr>
<tr>
<td>University of Pennsylvania School of Medicine; Gail Morrison, MD, and Lisa Hark PhD, RD; 1998–2003</td>
<td>UME, GME, Fellows, and CME</td>
<td>Nursing</td>
<td>Advisory committee</td>
<td>153 (44% women), 35% nonwhite</td>
<td>CB, I, WB, T, and PBL</td>
</tr>
<tr>
<td>University of Rochester School of Medicine and Dentistry; Thomas Pearson, MD, PhD, MPH; 1998–2003</td>
<td>UME, GME, Fellows, and CME</td>
<td>Dentistry, dietetics (G and U), interns, and nursing</td>
<td>Advisory committee</td>
<td>100 (48% women), 34% nonwhite</td>
<td>PBL, T, and I</td>
</tr>
<tr>
<td>University of Texas Southwestern Medical Center at Dallas; Scott Grundy, MD, PhD, and Jo Ann Carson, PhD, RD; 1998–2003</td>
<td>UME and GME</td>
<td>Dietetics (U) and physician assistants</td>
<td>Nutrition center and advisory committee</td>
<td>203 (38% women), 41% nonwhite</td>
<td>PBL, I, and WB</td>
</tr>
</tbody>
</table>

(Continued)
from 2000 to 2005. The medical schools included both private (48%) and public (52%) institutions. Twelve of the medical schools have nutrition research centers that are funded by a variety of sources, including the National Institutes of Health, the US Department of Agriculture, foundations, endowments, and industry. In addition, 16 of the schools have either internal or external advisory committees for their NAA Program.

**Demographics of the principal investigators, NAA teams, and medical students**

Sixty-seven percent of the principal investigators were physicians, one of whom was a vice dean and one of whom was an associate dean. All of the recipients were full or associate professors at their medical schools, which was a requirement for application. All of these medical schools encompassed multidisciplinary teams that included physicians, nutritionists, behavioral scientists, curriculum and evaluation specialists, World Wide Web experts, nurses, exercise scientists, and computer support staff. The number of entering medical students in 1999, the percentages that were women, and the percentages of nonwhite students are shown in Table 1.

**Type of medical school curricula**

As shown in Table 1, the medical schools that received NAAs incorporate various forms of curricular or educational approaches, including problem-based learning and case-based, competency-based, integrated, thematic, and World Wide Web–based teaching methods. Several of these schools are undergoing major curricular changes. For example, the University of Rochester has implemented a new medical school curriculum based on 6 major themes, one of which is nutrition. In addition, the University of Vermont and several other schools are implementing entirely new medical school curricula, affording an opportunity to address nutrition over 4 y. The heterogeneity of curricular types increases the likelihood that other medical schools will find curricula, modules, and tools developed and tested in the NAA Program that are compatible with their own needs.

**Levels of medical training**

As shown in Table 1, all of these medical schools provide some level of undergraduate medical education (UME) and graduate medical education (GME) to residents. Most of these schools also plan to provide postgraduate training for fellows and continuing medical education to practicing physicians.

**Training of other health professionals**

Some of the NAA Program recipients provide nutrition training on their campuses to students at health professional schools other than medical schools. Four of the recipients provide training in dental programs; 15 in dietetic programs; 14 in nursing programs to student interns, nurse practitioners, and staff nurses; 4 in pharmacy schools; 6 in physician assistant programs; and 5 in public health programs. Other areas in which nutrition training is provided include exercise physiology, physical education, and health ecology programs. Collaboration with other professional schools was encouraged in the request for applications.

**OVERCOMING COMMON BARRIERS TO NUTRITION EDUCATION FOR PHYSICIANS**

To identify problems that have stifled previous attempts at medical-nutrition education, the recipients reviewed and addressed some of the needs for and barriers to training physicians. An examination of these barriers by Winick (4), which was expanded on by Shils (29), provided a framework for illustrating how the recipients plan to improve nutrition education in medical curricula. Winick classified barriers as those within the professional realm of medicine, within the system of medical education, and in practice. The aims of the NAA Program address many of these barriers (Table 2). More recently, Walker (30), Lo (31), Armstrong and Koffman (32), Cooksey et al (33), Hark and Morrison (34), and Zeisel (35) described their programs and addressed how they have overcome these barriers. Specific examples of the NAA recipients’ activities to address some of the barriers in the field are provided in this section.

**Lack of a curricular guide**

The NAA recipients are addressing the need to develop a framework for knowledge, attitudes, and clinical practice skills that should be covered within UME, GME, and postgraduate physician training programs. The recipients developed a framework in which there is a hierarchy of increasing levels of nutrition knowledge, attitudes, and skills for training physicians. The first level includes the absolute essentials (a core) recommended for inclusion in all UME curricula. The next level includes materials and experiences recommended for undergraduate medical students who want more in-depth experiences and electives in nutrition. Further and more
The recipients are using the Guide defining the subject matter and skills physicians should master. This document, entitled *The Nutrition Curricular Guide for Training Physicians* (NAA Collaborative Group, unpublished report, 2001), includes 23 content areas that should be covered and learning objectives for knowledge, attitudes, and clinical practice skills. Each objective is recommended 1) as essential in UME, 2) as additional electives in UME, 3) for GME, or 4) for residents in post-GME, eg, specialists. Because medical schools have different curricular approaches, the *Guide* allows for the flexibility to choose whether the objectives are integrated, organized in separate modules, or incorporated in other approaches that fit a particular school (36–40). The *Guide* is an example of how the NAA Program’s organizational structure facilitated a collaborative project. The need for the *Guide* was identified by the Steering Committee and it was initially developed under the leadership of the Curriculum Committee. All 21 NAA recipients wrote and provided review comments for sections of the Guide, whereas only one recipient school edited and formatted the report to maintain consistency. For the final step, a modified Delphi technique, conducted by one of the NAA schools, was used to involve all 21 medical schools in categorizing each objective by the recommended levels of training followed by a process to prioritize each objective within categories. The recipients are using the *Guide* to implement a nutrition education program at their medical schools. In addition, the *Guide* is disseminated to other medical schools via several mechanisms, including presentations at national meetings and posting on the NHLBI’s NAA website (41).

**Credibility of nutrition science**

Another barrier to effective nutrition education is the common misperception that nutrition is not clinically relevant and therefore not necessary to master within the course of study for the Doctorate of Medicine degree. The NAA Program, however, responds to the substantial and growing evidence that documents the important role of nutrition in health. The NAA recipients have an opportunity to contribute to the development of science-based test questions for the US Medical Licensing Examination. The NAA also serves to organize and support a team of faculty, including the designation of new faculty to serve as credible nutrition educators at each medical school. At some schools, the NAA recipients have developed a strong multidisciplinary nutrition faculty that previously acted independently or, at times, even competitively in clinical and research roles. Other health care professionals, including dietitians, pharmacologists, nurses, nurse practitioners, physician assistants, health educators, psychologists, medical educators, and exercise scientists, have joined physician recipients of the NAA in the effort to maximize educational inputs and results.

**Lack of standardized nutrition assessment methods**

Another barrier to effective nutrition education is the absence of routine nutritional assessment in the current clinical setting. The NAA recipients are engaged in developing and testing patient-directed materials to help address the issues of obtaining anthropometric, clinical, biochemical, and dietary intake data. The time-consuming nature of nutritional counseling can be facilitated by the development of simple self-assessment tools, either to improve the physician’s efficiency with face-to-face interventions with patients (42) or to better determine when it is appropriate to refer patients to dietitians. Such tools will help to determine when it is appropriate to refer patients to Web-based materials for self-instruction. This process further assists students and physicians who lack confidence in their behavior modification skills by providing a system for decision-making and credible alternatives. Development of skill-building strategies should further enhance training in nutrition counseling through the use of standardized patient and videotaped patient interviews.

**Lack of innovative teaching tools**

A major emphasis of the NAA Program is to develop and share innovative education materials, tools, and teaching strategies. For example, problems with limited classroom time or lack of faculty are being addressed by the development or use of educational materials on compact disc, on videotape, on intranets, in software programs, or on the World Wide Web to provide self-instruction to the student. The 21 NAA recipients collectively provide access to creative educational materials and formats, such as problem-based learning cases, case-based learning exercises, scripts for standardized patients, and other strategies for training. A major emphasis is the development of effective approaches to encourage physicians to incorporate major clinical guidelines into their routine practice. Another important part of the tool development is creative new evaluative instruments to assess trainee knowledge, attitudes, and practice skills in a standardized fashion, thereby making it possible for the best intervention components to be identified and shared with other medical schools. One of the first instruments developed and validated through factor analysis is the Nutrition in Patient Care...
Survey. This survey polls medical students and residents about their attitudes on the role of nutrition in patient care (43).

At the culmination of the 5-y grant period (in either 2003 and 2005), there will be a network of public and privately funded medical schools that have implemented a nutrition curriculum and tested new teaching strategies. In addition, the NAA recipients will be available to serve as models, advisors, and consultants to other medical and health professional schools to help ensure that all trainees receive high-quality instruction in human nutrition.

COLLABORATION AND DISSEMINATION

Another major aim of the NAA Program shown in Table 2 is to establish relationships with other professional societies, organizations, and consortia that also are working in the area of physician training in nutrition. These include the ASCN; the Intersociety Professional Nutrition Education Consortium; the American Society for Nutritional Sciences; the Council on Medical Education of the American Medical Association; the Association of American Medical Colleges; the Council on Nutrition, Physical Activity, and Metabolism of the American Heart Association; the Nutrition Section of the American Public Health Association; the American Dietetic Association; the Association of Teachers of Preventive Medicine; the Society of Teachers of Family Medicine; and other relevant groups. The NAA recipients plan to coordinate their efforts with other organizations to enhance the role of nutrition in clinical practice. These organizations, information provided by the NHLBI website, individual medical school websites, presentations, and publications are important components of the strategy to disseminate materials to a broader audience of nutrition educators.

SUMMARY

The NAA Program was initiated as a dynamic effort to improve the knowledge, attitudes, and clinical practice skills of physicians and other health professionals in the field of human nutrition, with an emphasis on implementing clinical guidelines into practice. A network of 21 US medical schools received 5-y grants to develop, implement, evaluate, and disseminate model nutrition curricula for training medical students and residents. The NAA Program constitutes a major new effort in the new century to help address a long-standing problem of deficiencies in physician training in nutrition. These include the ASCN; the Intersociety Professional Nutrition Education Consortium; the American Society for Nutritional Sciences; the Council on Medical Education of the American Medical Association; the Association of American Medical Colleges; the Council on Nutrition, Physical Activity, and Metabolism of the American Heart Association; the Nutrition Section of the American Public Health Association; the American Dietetic Association; the Association of Teachers of Preventive Medicine; the Society of Teachers of Family Medicine; and other relevant groups. The NAA recipients plan to coordinate their efforts with other organizations to enhance the role of nutrition in clinical practice. These organizations, information provided by the NHLBI website, individual medical school websites, presentations, and publications are important components of the strategy to disseminate materials to a broader audience of nutrition educators.

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