Nutrition education of medical and dental students: innovation through curriculum integration

Riva Touger-Decker

ABSTRACT
Nutrition is a necessary component of education in the health professions. Although often underplayed, nutrition is an integral facet of dental education, particularly because the oral cavity is the entry point to the gastrointestinal tract. This article addresses the current status of nutrition education in medical and dental schools, including the common themes, strategies, and challenges of integrating nutrition education in this venue, particularly in dental schools. The survival and progression of nutrition as a component of medical and dental education depends to a large extent on the creativity and innovative strategies used by educators and administrators in medical and dental schools and in training programs. A forward-thinking attitude with a focus on the integration of nutrition topics throughout the 4 years of medical or dental school and subsequent training programs will increase the potential for a successful program. Am J Clin Nutr 2004;79:198–203.

KEY WORDS Nutrition education, curriculum, dental education, medical education

INTRODUCTION
The 12 previous recipients of this award have been involved in efforts to integrate or improve nutrition education in medical schools (1–4). In contrast, I am the first person to receive this award in recognition of my efforts to integrate nutrition in dental education. Nutrition is an integral and necessary component of dental education because the oral cavity is the entry point to the gastrointestinal tract (5). The current status of nutrition in medical and dental education and common themes, challenges, and strategies for integrating nutrition education in innovative ways are addressed in this article, although the emphasis is on the integration of nutrition in dental education. The goal of educators is to facilitate the growth and development of nutrition in these 2 health profession curricula, motivate those who face some of the challenges described, and encourage the growth of nutrition in medical and dental education.

INNOVATION THROUGH INTEGRATION
Innovation through integration is essential to “grow” nutrition in medical and dental curricula (4–7), to “survive” continual cuts in nutrition curricular time, to address the growing number of nutrition topics central to health care practice, and to demonstrate how nutrition is an integral component of health care. Although a dedicated course in nutrition is an important component of the medical and dental curricula, nutrition must also be integrated into courses throughout the 4 years of medical and dental school as well as in residency training. Innovation is critical to the survival of nutrition in the curricula. Innovative teaching strategies that involve the student in learning, create a link to personal as well as professional needs, and maintain the students’ interest will gain the support of students. An innovative nutrition curriculum that is ranked highly by students is more likely to be supported by academic administrations and less likely to be cut when curricular time is reduced.

In 2002, on receipt of this prestigious award, Kushner (1) addressed the question, “What can we do, as nutrition educators, to tip the balance of nutrition education so that it is introduced and enthusiastically embraced in medical schools, residencies and continuing education conferences?” This same question applies to nutrition in dental education. Innovative teaching strategies and the presentation of topics of interest to dental students increase the chance that nutrition education will be embraced. Involving students in the design of course content permits them to feel that they have a role in the course’s development and gives them some degree of ownership. However, there are still challenges and barriers to widespread integration and acceptance that must be overcome.

ROCKS AND CURRICULA
For a curriculum to grow (in depth and breadth) and develop (in quality), it needs to be dynamic, with continual adjustment to its...
content to include new research findings and to meet the changing needs of health professionals in training. However, all too often, curricula can be like rocks, which grow only by accretion. Realization of this analogy is based on the practice of continually adding new topics to a curriculum as they emerge, without reviewing, revising, and—at times—deleting outdated components of the curriculum. The analogy needs to move from rocks to plants, so that a curriculum can be seen as dynamic and growing, while it sheds off the old and no longer necessary components and adds new topics that change and shape its content. We need to “explore the sociology of change in academic institutions” (8) to determine how to grow the nutrition component of the curriculum in medical and dental schools.

Registered dietitians (RDs) and advocates in each dental and medical school can help (3, 4, 7, 9); innovative strategies that draw the attention of administrators and gain the support of students are important to creating a dynamic curriculum. Cutting-edge topics, such as complementary and alternative medicine, functional foods, weight management, and sports nutrition (5, 10), are of great interest to students and are important in 21st century medical practices. Self-assessments of diet and nutritional status provide students with a personal connection to what they are learning as well as hands-on practice of a new skill.

COMMON THEMES, CHALLENGES, AND BARRIERS TO NUTRITION IN MEDICAL AND DENTAL EDUCATION

Common nutrition curriculum themes in medical and dental education include diet and nutrition screening, intervention, referral, diet orders, and education or counseling strategies. Historically, the focus of nutrition education in both medical and dental schools has been on disease management; however, consistent with the rest of health care today, the focus should be health promotion, disease prevention, and comprehensive care (3, 9–11). As such, there is sufficient evidence to support the need for competency in basic nutrition care by physicians and dentists. In contrast with physicians who typically see patients because of illness, dentists see patients regularly for health maintenance. These visits provide a unique opportunity to integrate lifestyle management, such as diet, as a component of oral hygiene education. Basic nutrition screening, education, and intervention by the medical or dental professional is a noninvasive, low-risk procedure with high potential benefit. However, low reimbursement, limited patient contact time, and lack of strong evidence-based practice outcomes have contributed to inconsistent integration of lifestyle management into practice by physicians and dentists (10).

Some challenges to the growth of nutrition in medical and dental education include the absence on faculty of an RD or other faculty member trained in nutrition; the difficulty of integrating nutrition education in all schools; the lack of resources, such as core curricula and clinical experience, guidelines, and protocols; the misperception that nutrition is not clinically relevant despite overwhelming evidence; and inconsistent screening, education, and referral methods (10). Bulimic curricula and budget cuts are problems faced by all health profession curricula, which challenge the ability of the curricula to grow like plants rather than by accretion, like rocks.

STATUS OF NUTRITION IN MEDICAL AND DENTAL EDUCATION

The number of required and elective courses in nutrition in US medical schools has increased gradually over time (10). As of 1997, the most recent published survey data, >20% of US medical schools had required courses and >40% had elective courses (10; Figure 1). In contrast, the percentage of schools with no required or elective courses had dropped to <3% (10). Torti et al. (12) in 1999, conducted an “Instructor Based Analysis” (12) of nutrition education in medical schools. The results of an evaluation of allopathic and osteopathic schools indicated that medical schools have an average of 18 h (range: 6–30) of nutrition education over their 4-y programs. Despite the growth of nutrition in medical education, medical school graduates continue to believe that their nutrition-related experiences (13) were inadequate to some degree (13). In 2002, 53.5% of medical school graduates thought that they received inadequate nutrition education in their medical school; this value is less than the percentages for 2001, when 56.3% of graduates thought that they received inadequate nutrition education (Figure 2). Another important concept, other than required compared with elective hours devoted to nutrition, is the number of hours of nutrition education in the curriculum. National statistics representing how nutrition is integrated over the 4 y of medical school are not available. At the New Jersey Medical School (Newark, NJ), a 23-h nutrition course has been required for second-year medical students since 1978. Although the content of the course has changed, the duration of the course

Figure 1. Hours of nutrition education over 4 y in US medical schools reported between 1995 and 1998 (10).
has stayed the same. Additional time dedicated to nutrition is being integrated into the first, third, and fourth years to create an integrated curriculum.

In medical education, several advances have helped to promote nutrition education in the curriculum. In 1997, the Nutrition Academic Award (NAA) Program (14, 15) was launched as a 5-y grant that is available to US allopathic and osteopathic medical schools. There are 21 NAA programs at US medical schools. “The National Heart, Lung, and Blood Institute [NHLBI] developed the award to encourage the development or enhancement of medical school curricula to increase opportunities for students, house staff, 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” (14). Funds received by recipients of these awards have supported the growth of nutrition education programs in 21 medical schools in the United States (15). Innovative teaching strategies developed for use in medical education, such as WAVE (Weight, Activity, Variety, Excess)—a nutrition education strategy (L Snetselaar, J Carson, K Gans, unpublished observations, 2003)—and REAP (Rapid Eating Assessment for Patients—an assessment tool (L Snetselaar, J Carson, K Gans, unpublished observations, 2003)—provide unique time-saving strategies for medical professionals to integrate nutrition in medical education and practice.

For the past 40 or more years, nutrition in dental education has faced challenges in addition to those previously cited. Poor integration of basic and applied clinical nutrition in the dental school curriculum, expansion beyond biochemistry, and a focus limited to diet and oral infectious diseases has hampered the growth of curriculum time for nutrition in dental education. As of 2003, there were 56 dental schools and 731 dental residency training programs in the United States. Over the past 25 y, the relative number of nutrition education hours in dental school has remained fairly constant at ~16 h (Figure 3), although there has been an increasing demonstration of the relation between nutrition and oral health as a component of systemic health (9, 16). The number of hours devoted to nutrition in dental education is low compared with the time dedicated to other curriculum areas (6, 7, 17, 18), despite the growing evidence of the role of nutrition in oral health and disease (5, 17). There is no optimal number of hours to be taught, but rather a recommended set of topics as outlined in Table 1. The topic listing in Table 1 is based on the American Dietetic Association’s position paper “Oral Health and Nutrition” (5), which was reviewed and approved by the American Dental Association. Funding sources such as the NAA Program in medicine have not been available for nutrition education in dentistry.

Studies exploring nutrition education in dental school have shown that clinical hours devoted to nutrition are greater than classroom hours. In a study I conducted in 1997 (9), 68% of US dental schools reported that dental students provided diet counseling relative to oral health. In those schools, 74% screened patients for nutrition risk, 63% assessed nutritional status, and 46.8% had an RD as a nutrition educator. A 2001 survey of US and Canadian dental schools found a decrease in these percentages: 41% of the schools reported that students provided diet counseling and 28% of dental schools responding to this survey reported having an RD on faculty to provide nutrition educa-

![Figure 2](https://academic.oup.com/ajcn/article-abstract/79/2/198/4690081/TOUGER-DECKER)

Figure 2. Percentage of medical school graduates who perceived their nutrition education to be adequate or inadequate (13).

![Figure 3](https://academic.oup.com/ajcn/article-abstract/79/2/198/4690081/TOUGER-DECKER)

Figure 3. Hours of required nutrition education over 4 y in US dental schools reported in the years 1985, 1990, and 1997 (9, 16). *Forty-seven percent of schools reported 10–19 h (range: 10–39 y).
TABLE 1
Recommendations for didactic and practice components of the dental school curriculum

| Predoctoral dental education | Didactic topics | Clinical experiences |
|-----------------------------|----------------|---------------------|
|                             | Nutritional biochemistry | Self evaluation of diet |
|                             | Nutrition and oral health throughout the life span | Training techniques for diet evaluation and education |
|                             | Diet education and intervention relative to oral health and disease | Nutrition risk screening and diet education relative to oral health of patients |
|                             | Effects of oral diseases, symptoms, and their treatments on diet and nutritional status | Consultation and supervised practice with registered dietitians and or dietetic technicians registered |
|                             | Diet and nutrition screening, education, and referral in dental practice | Graduate training programs |
|                             | Diet and nutrition concerns and management strategies of high-risk patients | Oral health and nutrition research |

Integration of nutrition screening and diet education into dental and oral disease specialties

Collaborative education endeavors on related topics with dietetics programs

Adapted from reference 5.

NUTRITION IN DENTAL EDUCATION: INNOVATION THROUGH INTEGRATION

Wessels (18) stated that “An understanding of nutritional concepts is fundamental to so many aspects of clinical (dental) practice.” Using an integrative approach to nutrition in dental education, one can design competencies in nutrition or educational competencies in nutrition that can be taught via lectures relevant to the subject matter in courses along with clinical applications in patient care (19). Examples include nutrition for bone and tooth development, diet management of oral infectious diseases, the pathology and oral manifestations of nutrient deficiencies, the role of nutrition in wound healing, and the relations of diet and nutritional status to oral and medical medicine. Although the fundamentals of macronutrients in human metabolism and body composition are taught in biochemistry courses, integration into the other basic courses—particularly clinical science courses—provides an orientation to nutrition, diet, and oral health in clinical practice. This strategy helps to demonstrate the integral nature of nutrition within basic and clinical science courses.

Integration helps to build an interconnected web, linking basic and clinical sciences and demonstrating progression from knowledge to clinical application. Use of images in courses (4), a strategy proven successful in medical nutrition education, can be used for nutrition-related case scenarios in dental education. The first 2 y of dental school consist primarily of didactic courses, including basic and clinical sciences; during the third and fourth years, the focus is on clinical application, with most of the time spent in clinic rotations and other time on clinically relevant didactic courses. Images can be readily used in the didactic and clinical courses to help demonstrate the clinical application of concepts. Integration of clinical nutrition cases in seminars during the third- and fourth-year clinical experiences helps students make the leap from the classroom to the patient care setting. Using a scenario of a young woman with bulimia, perhaps with the availability of audiotape and digital photos of the oral cavity, one can address eating disorders, tooth erosion, and interviewing topics. A scenario of a patient with pemphigus vulgaris (an autoimmune disease characterized by blistering of the skin and mucous membranes) would provide opportunities to discuss oral manifestations of systemic disease, drug-nutrient interactions, and functional and sensory limitations of the oral cavity relative to diet. At the New Jersey Dental School, we have implemented several of these strategies as well as those subsequently described (Table 2). Clinical teaching of nutrition and oral health through the use of actual patients in a clinical or patient care setting is an excellent strategy for linking didactic knowledge with clinical skill building. RDs specialized in dental or medical education and trained dental or medical faculty with nutrition knowledge and skills are critical players in these scenarios. Although case scenarios provide classroom or didactic examples, nothing can replace “live learning” in the patient care unit.

Successful innovative strategies include the use of problem-based learning seminars, Web-based applications, and CD-ROM programs (20–22). Web-based assignments and posting of lectures on classroom websites provide increased exposure of the material to students (20). Students process Web-based materials differently. Web-based teaching has been shown to lead to increased cognitive processing by the learner and more specific, targeted components (20). A wealth of Web-based
programs are available from federal and well-reputed academic sites. These programs provide the opportunity to create personally relevant components for students, such as self-assessment of weight, diet, and oral systemic health, which allow for the application of health information to the learner’s personal lifestyle. Several of these programs have been well accepted by students. An assignment for third-year dental students—which involved the use of federally supported websites to conduct a nutrient analysis of one’s own diet (Interactive Healthy Eating Index; 23), to calculate one’s own body mass index (24), and to plan a healthy menu to achieve a desirable body weight (25)—is increasingly requested by students in the second-year program. As a result of this assignment, students learn the fundamentals of weight assessment and menu planning that they can carry into their clinical experiences with patients. Students are now requesting this assignment because it helps them to assess their own nutritional status and receive professional feedback (instructor evaluation). Once students see the personal relevance and value of assignments such as these, they are more interested and willing to apply them in their clinical practice.

**THE FUTURE**

Is nutrition in medical and dental education to be like plants—dynamic, shedding, and growing—or like rocks, growing by accretion, getting heavier every year? Working collaboratively, academicians, clinicians, and administrators can create new opportunities. In the ideal educational arena, we would see RDs and dentist or physician nutrition advocates (experts) in all dental and medical schools and on accreditation boards. Although the NAA programs are nearing the end of their cycle, they have provided a unique opportunity for the development of state-of-the-art nutrition programs in medical schools. Similar grants to build nutrition curricula in dental schools and a forum for creating and sharing model curricula would provide the infrastructure to grow and develop nutrition curricula in dental schools. Clinical pathways, models, and guides for nutrition education in both medical and dental schools are needed (4, 5). Opportunities for collaboration across all 3 disciplines—dietetics, dentistry, and medicine—exist. Core curricula that can be shared across the disciplines are needed. To create that future, we need to “not go where the path may lead, go instead where there is no path and leave a trail” (Ralph Waldo Emerson). Nutrition educators in medical and dental education can create and leave that trail.

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