A Study of Nutrition in Entry-Level Dental Hygiene Education Programs

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Abstract: The aims of this study were to document the extent of nutritional content in U.S. dental hygiene program curricula; identify program directors’ opinions, perceptions, and barriers to expanding nutritional content; and evaluate if a proposed nutrition curriculum model would be beneficial. This mixed methods study involved quantitative and qualitative aspects. An invitation letter was sent to all 335 directors of entry-level U.S. dental hygiene programs. In response, 55 directors submitted nutrition course syllabi from their programs (16.4% of the total) for the quantitative analysis. In addition, 14 nutrition instructors and ten program directors were interviewed regarding their perceptions and opinions of nutrition education for dental hygiene students. All aspects of the content analysis results revealed that nutrition content in entry-level dental hygiene programs is diverse. Some programs did not include nutrition content, while others provided oral and systemic nutrition intervention subject matter. Some programs offered multiple clinical nutrition applications and patient contact opportunities while most required none. The interview results disclosed a variety of opinions and perceptions of dental hygienists’ role in nutrition. Several interviewees viewed dental hygienists’ role in nutrition to be an integral part of patient care, while others indicated no role or providing caries prevention counseling only. Although dental hygienists are expected to provide nutrition assessments and interventions, no standards or standardized competencies exist for nutrition in dental hygiene education. A standardized nutrition model could be beneficial for entry-level programs to ensure dental hygienists possess basic knowledge to perform nutrition assessments and intervention to address Healthy People 2020’s intervention initiatives.

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The Centers for Disease Control and Prevention (CDC) and the U.S. Burden of Disease Collaborators (USBDC) have reported that chronic diseases account for nearly 50% of the mortality and disabilities in the United States. Nutrition and lifestyle account for the etiology, treatment, and preventive measure for most of these diseases. To combat chronic diseases, didactic and clinical practice concepts that emphasize the role of nutrition in systemic and oral health are essential in the professional training of all health care providers. The Healthy People 2020 Partners in Prevention Initiative, the National Centers for Disease Prevention and Health Promotion, the Institute of Medicine’s Committee on Oral Health, the Bipartisan Policy Center, and the Academy of Nutrition and Dietetics (AND) implore all health care providers to participate in interdisciplinary collaboration and provide nutrition counseling to address the epidemic of nutrition- and lifestyle-related diseases in the United States. However, nutrition knowledge is not usually considered in most patient care plans throughout the health care system.

Nutrition deserves consideration in the dental hygiene care plan as an integral component of oral and general health. A diet consisting of fermentable carbohydrates, sugars, and processed foods contributes to dental diseases as well as chronic diseases such as diabetes and obesity. The presence of one chronic disease frequently indicates the risk for additional diseases, while the same intervention modalities can treat and reduce multiple chronic diseases and risk factors. Nutrition is considered an etiology and essential in the treatment for most chronic diseases. Some systemic diseases, infections, and nutrient deficiencies are manifested in the oral cavity;
therefore, dental hygienists with a comprehensive knowledge of nutrition are in a position to promote healthy patient outcomes.8,10,13-15

The National Dental Hygiene Research Agenda (NDHRA) promotes health promotion and disease prevention.9 NDHRA health services research recognizes dental hygienists as primary care providers, and the professional education and development section advocates evaluating education curricula and methods to certify and prepare students to meet the public’s oral health needs. The clinical dental hygiene care segment of the NDHRA endorses the dental hygiene process of care and accentuates the identification of patients at risk for oral and systemic diseases.

The Commission on Dental Accreditation (CODA) requires the inclusion of nutrition in dental hygiene curricula,16 but the American Dental Hygienists’ Association (ADHA) includes nutrition only in the assessment portion of the dental hygiene process of care.15 Nutrition is not included in the American Dental Education Association (ADEA) Competencies for Entry into the Allied Dental Professions, although the ADEA 2005 Compendium of Curriculum Guidelines includes minimum nutrition knowledge in dental hygiene education.17,18 Entry-level dental hygiene programs are accredited by CODA and defined as certificate, associate, and baccalaureate programs that prepare students for clinical dental hygiene practice.19 CODA, the ADHA, and ADEA do not specify competencies, standards, or recommendations to assess adequate knowledge of nutrition and the ability of entry-level dental hygiene students to perform nutrition assessments and interventions. Standards have not been developed to evaluate and measure essential nutrition knowledge, rendering students’ attainment of basic nutrition knowledge challenging to ascertain. As primary care providers, advocates for optimal health, and members of a multidisciplinary team of health care providers, dental hygienists should be able to assess patients’ diet risk and incorporate nutrition counseling into the dental hygiene process of care.

To determine the quantity and quality of nutrition content currently taught, a study to determine the current status of nutrition in entry-level dental hygiene education programs was undertaken. The aim of this study was threefold: to document the extent of nutritional information included in dental hygiene program curricula; to identify program directors’ opinions, perceptions, and barriers to expanding nutritional content within the curriculum; and to determine if a need exists to propose a nutritional curriculum model to enhance nutrition content in entry-level dental hygiene programs.

Materials and Methods

The Idaho State University Human Subjects Committee approved this study (Study #4138) as exempt from review on August 13, 2014. This non-probability study used a mixed methods approach consisting of quantitative and qualitative methods. Variables considered included the quantity and quality of nutrition content and clinical applications as well as the potential need for a standardized nutrition curriculum for entry-level dental hygiene programs.

Program directors’ contact information was obtained from the ADHA website.20 In August 2014, an invitation letter was emailed to all 335 directors of entry-level dental hygiene programs in the United States to determine their interest in participating in this study. Program directors who did not respond to the first invitation were sent a second invitation two weeks later. Program directors were asked to share their nutrition course syllabi for a content analysis and were invited to participate in the qualitative portion of the study consisting of an interview to identify perceptions, opinions, and barriers regarding nutrition instruction in their programs. The principal investigator (DLJ) conducted each step independently. Training was conducted by two experts in qualitative studies and interviewing procedures.

To conduct the content analysis of the syllabi, we created a rubric based on a previous study21 and consultation with faculty experts at our institution. The rubric addressed nutrition content, learning methods and patient contact opportunities, syllabus content, online resources, course learning objectives, evidenced-based content, course assignment, and faculty knowledge. The content analysis focused on the nutrition content in the dental hygiene program and the frequency or opportunity for patient contact experiences.

A statistician and consultant in qualitative studies determined that six to 12 program directors and six to 12 nutrition instructors were a sufficient number to be interviewed to reach saturation in terms of responses. Therefore, the qualitative portion of this study used interviews with 11 nutrition instructors, three program directors who taught nutrition, and ten program directors who did not employ a stand-alone nutrition course instructor. Prior to the recorded tele-
phone interviews, an informed consent document and responses to demographic questions were obtained from the participants via email for descriptive statistical purposes. Interviewees were encouraged to dialogue without limitations. The interviews were conducted by phone during September and October 2014 at the convenience of the interviewees; each was approximately 30 minutes in length.

The inductive approach was used for the interviews based on the Thomas method, which permitted clarifying and condensing lengthy interviews into summaries and identifying similarities and themes within the research questions and findings. As Thomas recommended, the recorded, semistructured interviews were transcribed by the principal investigator and were reviewed several times for accuracy by a consultant with expertise in qualitative study design.

Results

The results are provided in two domains. The first domain was an analysis of the course syllabi, and the second consisted of an analysis of interviews providing a qualitative perspective.

Quantitative Analysis

The initial invitation to program directors yielded 55 nutrition course syllabi for the content analysis (16.4% of the total). Of the 55 syllabi, 51 were for stand-alone courses, and four were for lecture hours of nutrition content infused into a course such as preventive dentistry, dental health, or comprehensive care. Nutrition courses were not required as prerequisites at the institutions with infused nutrition content, and the credit hours varied. Of the courses offered in 51 dental hygiene programs, two of these courses were a one-credit course, 32 were two-credit courses, 14 were three-credit courses, and three offered four credits for their nutrition courses. One syllabus did not contain specific information to truly conduct an analysis of the content. Figure 1 summarizes the nutrition instructor credentials, which included dental hygienists, registered dietitians and dentists, those with baccalaureate to doctoral degrees in dental hygiene or dietetics, and some with degrees in both dental hygiene and dietetics.

Course learning objectives and assignments. The analysis of course learning objectives considered evaluated assignments and learning taxonomy (Table 1). Of the syllabi, 28 (51%) provided details on expectations of the assignment(s) as well as how the assignment(s) would be evaluated, while 18 (33%) syllabi identified measurable learning objectives. Five (9%) syllabi did not indicate measurable objectives, and four (7%) did not include course learning objectives.

The taxonomy of objectives was evaluated and revealed that 21 (38%) syllabi listed at least three high-level learning objectives, while 24 (44%) syllabi listed primarily low-level learning objectives combined with one or two high-level objectives. Six (11%) exhibited only low-level learning objectives, and four (7%) did not identify any learning objectives. The variability of the taxonomy levels indicates an inconsistency in the learning objectives required in the entry-level dental hygiene programs evaluated.

Alignment of the assignments to the learning objectives and the resources were also explored. Among these syllabi, 37 (67%) had course assignments that discussed the purpose of the assignments, activities, and/or projects related to the learning objectives and used current resources. Seven (13%) syllabi contained a discussion of the purpose of the assignments related to learning objectives but did not use the most current resources. Four (7%) syllabi presented an unclear purpose, and seven (13%) did not include or identify any specific assignments. Course assignments varied and included self-analyzed diet diaries, food label analysis, media credibility, case scenarios, and nutrition or caries counseling.

Nutrition content. The nutrition content analysis focused on clarity, relevant and current resources, elements of basic and advanced nutrition, and incorporation of the AND process of care. The analyzed nutrition content indicated the majority (62%) of the 55 syllabi were presented in a uniform and clear sequence. One (2%) syllabus did not contain nutrition content, and 20 (36%) syllabi portrayed limited clarity.

Relevant resources were referenced and presented current information in 28 (51%) of the syllabi analyzed. However, 24 (44%) did not use the most current resources for nutrition and health when referring to the U.S. Department of Agriculture (USDA) Food Pyramid that was replaced by ChooseMyPlate in 2009 and revised in 2010. Three (5%) course syllabi did not list any resources.

The next area assessed if the syllabi included elements such as nutrient functions, diseases, deficiencies, relationships to oral and systemic health, and clinical nutrition assessment and counseling. Ten (18%) syllabi included elements of applied nutrition,
and 41 (75%) added oral and systemic relationships to nutrient deficiencies and nutrition related diseases. One course (2%) indicated nutrition content consisting of only protein, fats, and carbohydrates, and three (5%) course syllabi did not list nutrition content.

The AND organization recommends the evidence-based nutrition process of care consist of assessment, diagnosis, intervention, and monitoring/evaluation. The process of care is intended to be repeated at every patient appointment and includes a review of the health history, interdisciplinary consultations, screenings, and referrals. Of the 55 syllabi reviewed, only one (2%) stand-alone nutrition course incorporated the AND process of care. Three (5%) courses integrated nutrition assessments but no other elements of the AND process of care, and 49 (89%) courses did not incorporate the AND process of care in any form. Two (4%) course syllabi did not contain any AND content.

Learning methods and applied contact opportunities. Learning methods and applied patient contact opportunities/nutrition counseling in a clinical setting were evaluated in each syllabus. Only one (2%) nutrition course encouraged nutrition assessments on every patient and required a comprehensive nutrition care plan for one patient each semester for three semesters. Of the 55 nutrition courses, 43 (78%) syllabi included experiences in application of knowledge, such as a self or classmate analysis. However, 11 (20%) syllabi did not include patient contact or an opportunity for the application of nutritional interventions.

Qualitative Analysis

For the qualitative portion of this study, 24 individuals agreed to be interviewed. Of those, 11 were nutrition instructors, three had a dual role of program director and nutrition instructor, and ten were program directors whose programs did not have a stand-alone nutrition course. All 14 nutrition instructors (including program directors who taught nutrition) were female, while 12 program directors were female and two were male. The average age of the interviewees was 53 years. The majority of instructors and program directors reported having complete autonomy in teaching the nutrition course.

Table 2 contains a sample of the questions asked during the interview, with common responses summarized. From those questions, the following themes emerged: current nutrition content, necessary content, patient contact opportunities, topics not addressed, key elements that could contribute to patient health, barriers, and opinions of an ideal content model. The emergent themes and representative interview responses provide insights into those teaching nutrition courses.

Current nutrition content. Though varied in content, all the nutrition instructors interviewed said they felt the students received adequate quantity and quality of nutrition content for entry-level dental hygiene students. “We focus on the basics of nutrition and how it affects oral health,” stated one instructor. “The course is tailor-made for the dental hygienist as it relates to decay and periodontal disease,” said another. Faculty members who taught nutrition viewed
Table 1. Nutrition syllabus content analysis rubric

<table>
<thead>
<tr>
<th>Category</th>
<th>0 None</th>
<th>1 Minimal</th>
<th>2 Average</th>
<th>3 Greater Than Average</th>
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<tbody>
<tr>
<td>Course learning objectives and assignments</td>
<td>4 (7%) course objectives were not included.</td>
<td>5 (9%) objectives listed, but not measurable.</td>
<td>18 (33%) identified measurable learning objectives.</td>
<td>28 (51%) provided detailed assignments and evaluations.</td>
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<td>7 (13%) did not contain course assignments.</td>
<td>6 (11%) exhibited only low-level learning objectives.</td>
<td>24 (44%) listed primarily low-level learning objectives combined with one or two high-level objectives.</td>
<td>21 (38%) listed at least three high-level learning objectives.</td>
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<td>Nutrition content</td>
<td>1 (2%) did not contain nutrition content.</td>
<td>8 (15%) the content was not clearly stated.</td>
<td>12 (22%) offered limited clarity in content.</td>
<td>34 (62%) presented material in a uniform and clear method.</td>
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<td></td>
<td>3 (5%) did not list any resources.</td>
<td>24 (44%) did not use the most current resources for nutrition and health when referring to the USDA Food Pyramid.</td>
<td>10 (18%) included applied nutrition elements.</td>
<td>28 (51%) referenced relevant resources and presented current information.</td>
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<td>3 (5%) did not list the nutrition content.</td>
<td>3 (5%) integrated nutrition assessments and no other elements of the AND process of care.</td>
<td>41 (75%) included applied nutrition elements and oral/systemic relationships to nutrient deficiencies and diseases.</td>
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<td></td>
<td>2 (4%) did not contain AND content.</td>
<td>1 (2%) indicated nutrition consisting of only protein, fats, and carbohydrates.</td>
<td>1 (2%) incorporated the entire AND process of care.</td>
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<td>Nutrition learning methods and patient contact opportunities</td>
<td>11 (21%) did not include application experiences.</td>
<td>43 (78%) included minimal application experiences.</td>
<td>1 (2%) required comprehensive nutrition care plan for one patient each semester for 3 semesters.</td>
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AND=Academy of Nutrition and Dietetics
USDA=U.S. Department of Agriculture
Table 2. Questions used in interviews and common responses

<table>
<thead>
<tr>
<th>Questions for nutrition instructors (n=11)</th>
<th>Questions by Group</th>
<th>Summary of Responses</th>
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<tbody>
<tr>
<td>1. Please share your opinion and perceptions of the quality and quantity of nutrition courses presented to the dental hygiene students at the institution you teach.</td>
<td>1. Though the content varied, all the nutrition instructors felt the students received adequate quality and quantity of nutrition content for dental hygiene students.</td>
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<tr>
<td>2. In your opinion, can you describe the necessary nutrition content needed, and is your program meeting these needs?</td>
<td>2. Basic nutrition and enough knowledge to provide clinical applications for patients such as nutrition assessments and interventions. Most felt their program was meeting these needs.</td>
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<tr>
<td>3. How many applied clinical nutrition applications or patient contact opportunities do the students experience?</td>
<td>3. Six of the 11 required one nutrition application or patient contact experience.</td>
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<tr>
<td>4. Are there any topics not addressed?</td>
<td>4. Nutrition counseling, addressing nutrition myths and fads, analyzing evidence, biochemistry, nutrient disorders, when to refer, and cultural/ethical diversity.</td>
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<tr>
<td>5. What topics are emphasized in your course?</td>
<td>5. The USDA ChooseMyPlate was the most common topic emphasized.</td>
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<tr>
<td>6. What are the key elements that prepare your students to contribute to and benefit the patients they serve?</td>
<td>6. Some type of application project such as a self-analysis, practice counseling with classmates, or a case study.</td>
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<tr>
<td>7. What (if any) are the barriers to expanding nutrition content in the dental hygiene program?</td>
<td>7. Associate degree program credit limitations and an overcrowded curriculum were followed by the lack of students’ knowledge of general biochemistry and biology.</td>
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<tr>
<td>8. What would be an ideal standard nutrition content model for entry-level dental hygiene education programs?</td>
<td>8. Nutrition knowledge to provide nutrition counseling, when and where to refer, biochemistry, and a basic nutrition course followed by a nutrition course for dental hygiene.</td>
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<table>
<thead>
<tr>
<th>Questions for program directors who teach nutrition (n=3)</th>
<th>Questions by Group</th>
<th>Summary of Responses</th>
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<tbody>
<tr>
<td>1. What is your opinion of the role dental hygienists should play in providing nutrition education counseling?</td>
<td>1. Two of the three felt the role is important for oral and systemic health.</td>
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<tr>
<td>2. Please share your opinion and perceptions of the quality and quantity of nutrition courses for dental hygiene students at your institution.</td>
<td>2. All felt the quality and quantity were adequate for their course.</td>
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<tr>
<td>3. How is nutrition incorporated throughout the dental hygiene education program?</td>
<td>3. All answers varied from only nutrition course to incorporating knowledge in the clinical setting.</td>
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<td>4. What is the nutrition content needed, and is your program meeting these needs?</td>
<td>4. All felt their program was meeting the nutritional needs.</td>
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<tr>
<td>5. How many applied clinical application or patient contact opportunities are the students provided?</td>
<td>5. One to four, including practice analysis with a fellow student.</td>
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<tr>
<td>6. Are there any topics not addressed?</td>
<td>6. Two stated all topics necessary were included, and one felt knowledge of vitamins and lifestyle was missed.</td>
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<td>7. What topics are emphasized in your course?</td>
<td>7. Most used the food pyramid.</td>
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<tr>
<td>8. What are the key elements that prepare your students to contribute to and benefit the patients they serve?</td>
<td>8. The personal diet diary analysis.</td>
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<tr>
<td>9. What would you consider the benefits of adding nutrition throughout the curriculum?</td>
<td>9. Additional patient contact opportunities.</td>
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Questions for directors of programs without a stand-alone nutrition course (n=10)

1. What is your opinion of the role dental hygienists should serve in providing nutrition education counseling?

2. Is there a required prerequisite nutrition course?

3. How is nutrition incorporated throughout the dental hygiene education program?

4. What would you consider as benefits of adding a stand-alone nutrition course to the program?

5. What are the barriers (if any) to adding a nutrition course in your program?

6. What would be an ideal standard for nutrition content in dental hygiene education programs?

10. What are the barriers (if any) to expanding the nutrition content in the dental hygiene curriculum?

11. What would be an ideal standard for a nutrition content model in dental hygiene education program?

10. Overcrowded curriculum and the credit limitations of an associate program were the consensus.

11. Opinions varied and consisted of a two-credit course; every patient to receive an analysis; and a course taught by a registered dietitian followed by an additional course taught by a dental hygienist for clinical application.

1. Responses varied from no role to oral and systemic health counseling.

2. Five stated a basic nutrition course was a required prerequisite course.

3. Nutrition is infused into other courses (e.g., clinical and prevention courses) and may include a prerequisite course.

4. Half indicated there would be no benefit; the other half felt a stand-alone course would benefit student knowledge. No one indicated patient outcomes would be enhanced.

5. All commented on the overcrowded curriculum.

6. Half stated a stand-alone course would be ideal, and others felt they were not qualified to answer this question.
of nutrition instructors. In contrast, all the program directors teaching nutrition felt all necessary topics were covered in their courses.

Key elements that were mentioned as preparing students to benefit and enhance the health of patients they serve involved the case studies and a type of application experience in which a self- or patient analysis was conducted. Typical comments were “going through the motions of the case study forces them to talk to patients about nutrition” and “the students learn how to provide a dietary analysis.”

**Barriers to expanding nutrition content.** Credit limit requirements, overcrowded curriculum, and lack of qualified instructors were the most common barriers mentioned to expanding nutrition content in the interviewees’ dental hygiene programs. “There is other content that is considered more important and the institution is requiring credit hours to be cut,” explained a program director teaching nutrition. Another barrier mentioned was a lack of general science and basic nutrition knowledge. One nutrition instructor stated, “Students will say ‘I didn’t know that oil goes in the fat group’ or they don’t understand that an apple is a fruit. There is no time to review the very basic information.”

**Opinions of an ideal nutrition content model.** When asked what an ideal nutrition education content model would include, the nutrition instructors responded with common opinions such as “the students should be able to analyze patient needs and distinguish between myths and supportive science” and “ideally I would like to see a basic nutrition course, then an advanced nutrition course related to dental hygiene patient care.” Some program directors without a stand-alone nutrition course said they felt a stand-alone course would be ideal. “If I could design a perfect program, I would have a stand-alone nutrition course” was a representative comment from this group. Others felt the ideal nutrition content would encompass the knowledge of “how nutrition can cause a cavity and affect periodontal disease.”

**Discussion**

Our nutrition syllabi content analysis and review of the interview transcripts revealed some trends in nutrition content in these entry-level dental hygiene education programs. Nutrition content is required by CODA; however, there is no standard against which to measure essential content to provide nutritional counseling to dental hygiene patients. The dental hygiene programs included in this study were creatively including nutrition content without exceeding their institutions’ credit limitations and adding to an already overcrowded curriculum. One program studied did not include nutrition content in the curriculum. Most programs had nutrition content that varied in scope and depth. Among the courses analyzed, 98% did not consider the AND patient care recommendations, and 71% did not specify any applied patient contact opportunities, indicating that nutrition counseling and interventions were either not encouraged or not measured.

Perceptions of basic or applied nutrition content varied widely among these participants with no agreement on the essential elements of a nutrition course for entry-level dental hygiene students. Although the ADHA scope of practice includes nutrition assessments, the majority of these program directors said they believe dental hygienists’ role as nutrition educators should be none or minimal, while the nutrition instructors and one program director said they believe the role is integral to oral and whole health.

To address the Healthy People 2020 nutrition initiatives and the encouragement for nutrition interventions by all health care providers, the development of a minimum nutrition content model may be relevant for entry-level dental hygiene programs. A study of essential content for nutrition intervention therapy provided to patients by dental hygienists may enhance clinical oral and whole health patient outcomes. In addition, in consideration of credit limitations and overcrowded curricula as well as changes in public health needs, a study conducted in collaboration with the ADHA and CODA could determine a need to augment nutrition content in entry-level dental hygiene programs to emulate other health care providers such as physical therapists and nurses. Another future study would be to identify knowledge, confidence, and competence of practicing dental hygienists to apply nutritional interventions as part of patient assessment.

Interdisciplinary collaboration was not indicated in the syllabi analyzed. The AND specifically endorses adopting interdisciplinary competencies for dental/dental hygiene and dietetic students. Successful interdisciplinary collaborative education models are currently used in medical school settings for medical and dietetic students. When developing an education model for dental hygiene students, we recommend consideration of evidence-based interdisciplinary collaboration.
Our review of the literature indicates nutrition education for dental hygiene students may be lacking since only one reference was found. Our literature review found no other nutrition education directed specifically to dental hygiene students. A search of the nursing literature identified the most recent nutrition education content survey as being published in 1987. Current nutrition models all pertained to medical education and identified a gap in nutrition knowledge for other health care providers.

This study was not without limitations. The study used a non-probability sample, and course syllabi were voluntarily obtained, so the results cannot be generalized and bias may have occurred in sample selections. There was also no indication of what type of program the syllabi came from (length of program, degree- or certificate-granting, public vs. private, etc.), so no relationship between program type and nutritional content in curricula could be analyzed. This study may not reflect all programs that offer a nutrition course, but it included a convenience sample of nutrition instructors from entry-level dental hygiene programs.

Conclusion

This study found variation in nutrition education among U.S. dental hygiene programs, suggesting that dental hygiene students may or may not have comprehensive knowledge and application experiences in providing nutrition counseling for patients nor proficiency in knowing when a referral should be initiated. The program directors’ opinions and perceptions of dental hygienists’ role in providing nutrition interventions and the essential nutrition content were diverse. We recommend a standardized nutrition model for entry-level dental hygiene education to include concepts of basic nutrition, dietary analyses, oral manifestations of nutrient deficiencies and chronic diseases, nutrition counseling in the clinical setting, and how to refer to the appropriate care provider. Without a standard of nutrition knowledge for dental hygiene students, clinical dental hygienists may be challenged to provide comprehensive nutritional interventions for their patients.

REFERENCES


