ORAL HEALTH CURRICULUM IN ACCREDITED DIETETICS PROGRAMS

By

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Author Profile

Romi Konorty is a senior at the University of Arizona Honors College where she is pursuing a B.S. degree in Nutritional Sciences with a minor in Biochemistry. She is a pre-dental student and enjoys volunteering with the Community Foodbank of Southern Arizona, Habitat for Humanity, and until recently, the University of Arizona COVID Vaccine Point of Distribution. Romi is involved with many clubs and organizations at the University of Arizona including community service-based Links Junior Honorary, pre-dental club Delta Delta Sigma, and pre-professional health honor society Alpha Epsilon Delta. Following her undergraduate graduation, she will be attending the University of Southern California Herman Ostrow School of Dentistry to become a Doctor of Dental Surgery. Romi intends to work as an orthodontist with rural and underserved populations to improve the availability and access to care in these areas.

Abstract

The Accreditation Council for Education in Nutrition and Dietetics (ACEND) Accreditation Standards for Didactic Programs in Dietetics (DPD) outlines the required curricular topics and student knowledge competencies for accredited programs. Subjects that must be covered in DPD programs include medical nutrition therapy and the Nutrition Care Process; principles of food science, food safety, and food service management; and the roles of environment, food, nutrition, and lifestyle choices in health promotion and disease prevention.[1] There is no current requirement to specifically cover oral health in DPD programs; however, programs are given discretion to integrate relevant topics into their curriculum above and beyond the subjects required in the standards. A survey was designed to learn more about the curriculum dietetics students receive and to understand whether, when, and how oral health and hygiene concepts are addressed in ACEND accredited dietetics programs. The survey was emailed to dietetics educators, preceptors, support staff, and program directors of ACEND accredited programs and remained open for a period of two weeks. More than half of the respondents reported that they currently cover oral health topics in their curriculum and that nearly ninety percent feel that it is important for future dietetics professionals to be knowledgeable about oral health and hygiene topics. I argue that oral health and hygiene are vital topics that all nutrition students should be knowledgeable about and should be implemented in the knowledge competencies for ACEND accredited DPD programs.

Literature Review

Introduction

The relationship between oral health and nutrition status is well documented, specifically with regard to poor nutrition and oral issues and diseases.[2-4] While this relationship has been increasingly researched over the past couple of years, nutrition professionals may lack an adequate understanding about the association between nutrition and oral health as a result of the dietetics education they receive. Nutrition and dietetics professionals are well positioned to promote oral health and hygiene in their promotion of healthy diets and habits, to prevent the development of dental caries and oral diseases, as well as how poor oral health can cause an individual to have a poor nutritional status. To better understand the relationship between nutritional status and oral health, many smaller relationships between diet and the oral cavity must first be established.

The Relationship Between Diet and Gum & Oral Diseases

The pH of the mouth and an individual's diet affect the microbial flora present in the mouth. The oral microbial flora consists of many microorganisms with a predominance of bacteria and contributes to the overall health and status of the oral cavity.[2] Furthermore, the oral microbial flora can influence the occurrence of certain oral diseases such as gingivitis and periodontitis, and can even lead to conditions including oral squamous cell carcinoma.[3] The formation of the bacterial species in an individual's mouth begins as an infant, and so it is important to establish healthy and consistent surroundings and feeding patterns early on in life to promote healthy bacteria in the oral cavity. Adequate nutrition maintains and supports the proper bacterial species that are typically present in the mouth. Straying from the healthy balance of oral bacterial species can lead to defects in an individual's defenses to protect the oral cavity from diseases and damage.

Adequate nutrition is additionally imperative to replenish the cells and tissues of the oral epithelium, which may have been damaged by changes in the oral microbial flora.[3] These damages can include the development of oral diseases as well as tissue breakdown in the oral cavity resulting in cuts and scrapes. Healthy saliva, along with healthy and consistent oral microbial flora, play an important role in protecting individuals from oral diseases. Factors such as mineral, vitamin, and protein deficiencies influence the rate of salivary flow and the composition of saliva, in turn, affecting an individual's susceptibility to developing oral diseases.[5] Therefore, it is imperative to maintain healthy saliva to protect oneself from oral diseases.

The relationship between nutrition and oral disease is commonly studied in the elderly, especially in institutionalized elders.[4,6] The relationship is rather complex and begins with an inadequate nutritional intake which contributes to the formation of dental caries.[6] The presence of caries then has the ability to influence salivary gland function, and when not regulated properly, can lead to the development of oral diseases. Institutionalized elders have less freedom in choosing the foods they consume as they are served mass-prepared meals. These meals oftentimes fail to provide the increased levels of nutrients that elders need for optimal health. For example, vitamin deficiencies can lead to a plethora of oral health issues, including the development of dental caries, periodontal disease, and even oral cancer.[4]

Nutritional consistency is likewise important in protecting individuals from the development of certain oral diseases, such as periodontal disease.[4] Nutritional consistency is defined as the consistent intake of necessary macronutrients and micronutrients to support normal bodily functions. If the nutrients required to promote good oral health and to protect the oral cavity from disease and/or decay are not consumed, an individual becomes at increased risk of developing oral diseases and possibly oral cancer.

The Relationship Between Diet and Dental Caries

The foods an individual consumes is composed of nutrients such as carbohydrates, fats, proteins, vitamins, and minerals. While many foods are packed with nutrients that help to sustain and support the functions of the oral cavity and its substituents, convenience foods, such as frozen and "fast food," tend to contain a higher percentage of ingredients that are not nutritious, such as trans fats, sugars, and chemicals. Diet plays a direct role in the development of dental caries and so a poor diet is associated with a higher risk of developing dental caries.[7]

Sugars, as well as fermentable carbohydrates, stimulate oral bacteria to produce acid, lowering the pH of the mouth which makes the teeth more susceptible to developing dental caries.[8] Additionally, nutrient composition and eating patterns affect the salivary composition and the bacteria present in the oral cavity, thus affecting the development of dental caries. An experimental study set over thirteen months observed the effects a poor diet has on the development of dental caries in children.[9] In the group of children who received a nutritious diet supplemented by fresh fruits and milk, sixty-three percent of the children developed no dental caries while twenty-three percent developed one and fourteen percent developed two or more caries. Conversely, in the group of children that received a nutrient-poor diet not supplemented by fresh produce and milk, forty percent of the children remained free from the development of dental caries while twenty-one percent developed one and thirty-seven percent developed two or more caries. This study provides evidence as to how a poor diet can put an individual at increased risk of developing dental caries.

Not only does poor nutrition affect the development of dental caries, but malnutrition does as well.[10] A longitudinal study conducted in Peru observed children from two daycare centers in a poor suburb to better understand the relationship between malnutrition and the development of dental caries. Many of the children in the study experienced poor nutrition due to the lack of nutritious food availability in the suburb. Examining the results of the study, the researchers discovered a significant association between early malnutrition and increased dental caries in children.

The Relationship Between Salivary Composition/Oral Bacteria and the Gut Microbiome

The saliva contains oral bacteria which function to keep the oral cavity healthy and to protect it from oral diseases.[11] The transfer of oral bacteria to the stomach occurs through swallowing saliva as well as through the consumption of food when a bolus is formed. These swallowed oral bacteria then enter the gut and can disturb the gut microbiota. The oral microbiota and the gut microbiota overlap in the frequency and function of certain bacteria present in both the oral cavity and the gut, but some oral bacteria that is not typically found in the gut can be very harmful to the microbiome.

Dead bacteria from the oral cavity that has been swallowed to the gut may stimulate several pathogens and create a new phenotype through increased cytotoxicity and the upregulation of certain bacterial genes.[11] The presence of dead bacteria and unbelonging bacteria from the mouth in the gut microbiome can cause gastrointestinal issues and disorders. To protect the gut microbiome from unwelcomed bacterial species, it is imperative to practice good oral hygiene. Good oral hygiene fosters the normal oral bacteria that should be present in the mouth and helps fight off harmful bacteria that can harm both the oral cavity and the gut.

An experimental animal study provided insight as to how certain oral bacteria can alter the gut microbiome. The periodontal pathogen *Porphyromonas gingivalis* induced oral dysbiosis, increasing the diversity of the oral microbiome allowing for the colonization and overgrowth of harmful bacterial species.[12] *P. gingivalis*, once traveled down to the gut, also induced cecal dysbiosis, disturbing and dysregulating the normal bacterial species present in the gut microbiome. This study provides an example of how certain oral bacterial species can harm the gut microbiome upon entering it.

The Relationship Between Dentition and Malnutrition

Malnutrition is associated with many dental issues, including the development of dental caries and oral disease. The study conducted with school-age children in Peru showed a significant association between early malnutrition and increased dental caries.[10] This is due to the fact that nutrition plays a role in the formation of dentition. Adequate nutrition will create healthy teeth by providing the nutrients the teeth need to develop and grow. Malnutrition, especially early malnutrition, results in a lack of the nutrients necessary to grow and foster healthy dentition.

A longitudinal study in the Bolivian Amazon discovered that early childhood malnutrition affects the formation and development of adult teeth. The findings of the study suggest that the enamel defects observed in the subjects are at least partly, if not fully, developmental in nature and must have been caused before the age of 5, prior to when the teeth erupted and were exposed to the oral cavity.[13] Such enamel defects appeared as having an "orange peel texture" and/or having a significant central depression in the tooth. The peak age at which enamel defects form is from around 24-36 months,[14] and so it is vital to establish healthy eating patterns and to provide young children with the nutrients they need to support tooth growth and development.

Poor nutrition status not only affects the formation and development of the tooth but it also influences and can significantly delay the eruption time.[14] In fact, maternal caloric consumption during pregnancy is closely associated with the timing of the eruption of primary teeth. Higher birthweight is associated with increased maternal caloric intake. Higher birthweight babies are more likely to experience more erupted teeth at any age in childhood compared to lighter babies at birth.[15] While it has been established that adequate nutrition is imperative for infants and young children to form and support healthy teeth, the importance of adequate nutrition for good dentition begins when the child is the womb.

Methods

A survey of dietetics educators was created via Qualtrics to learn more about the curriculum dietetics students receive in ACEND accredited dietetics programs. The survey, as well as the protocol for the survey, was reviewed and approved by the University of Arizona IRB under the IRB ID "STUDY00000350." Closed-ended questions focused on whether and when oral health and hygiene concepts are addressed in accredited dietetics programs, and open-ended questions focused on how these concepts are currently integrated as well as suggested areas of the curriculum where they could be implemented. The survey was open to dietetics educators, administrators, preceptors, student support staff, and ACEND accredited dietetics program directors across the U.S. whose contact information was obtained on the public ACEND directors' website, as well as through the national Nutrition and Dietetics Educators and Preceptors (NDEP) Council listserv from an emailed link. A total of 584 ACEND accredited program directors received the survey, and an unknown number of educators received the survey through the NDEP mailing list. A total of 109 responses were recorded from program directors and NDEP listserv members. The survey remained open on Qualtrics for a period of two weeks and once the survey period closed, the investigator analyzed the data and interpreted the findings. Qualitative data was analyzed using a grounded theory approach and inductive coding. See appendix A for the survey questions.

Results

From the 584 program directors who received the survey via email in addition to the unknown number of NDEP listserv members, 109 total responses were recorded. Of the respondents, 39 (35.8%) are involved in Didactic Programs in Dietetics (DPD), 40 (36.7%) are involved in a Dietetic Internships (DI), 4 (3.7%) are involved in Coordinated Bachelor's Programs in Dietetics, 10 (9.2%) are involved in Coordinated Master's Programs in Dietetics, 9 (8.2%) are involved in Future Education Model Graduate Programs, 5 (4.6%) are involved in MS/DI, and 2 (1.8%) are involved in Nutrition and Dietetic Technician Programs (figure 1.1). When asked if participants personally teach about oral health topics in their ACEND accredited dietetics programs, 51.4% responded yes (figure 1.2). There were varying levels of comfort with teaching topics related to oral health in nutrition classes, as can be seen in the chart below (figure 1.3). Additionally, 56.9% of respondents believe that receiving oral health related education is very important for future dietetics professionals. Many respondents (58.4%) are very receptive of integrating oral health topics into their nutrition curriculum for future lesson plans.

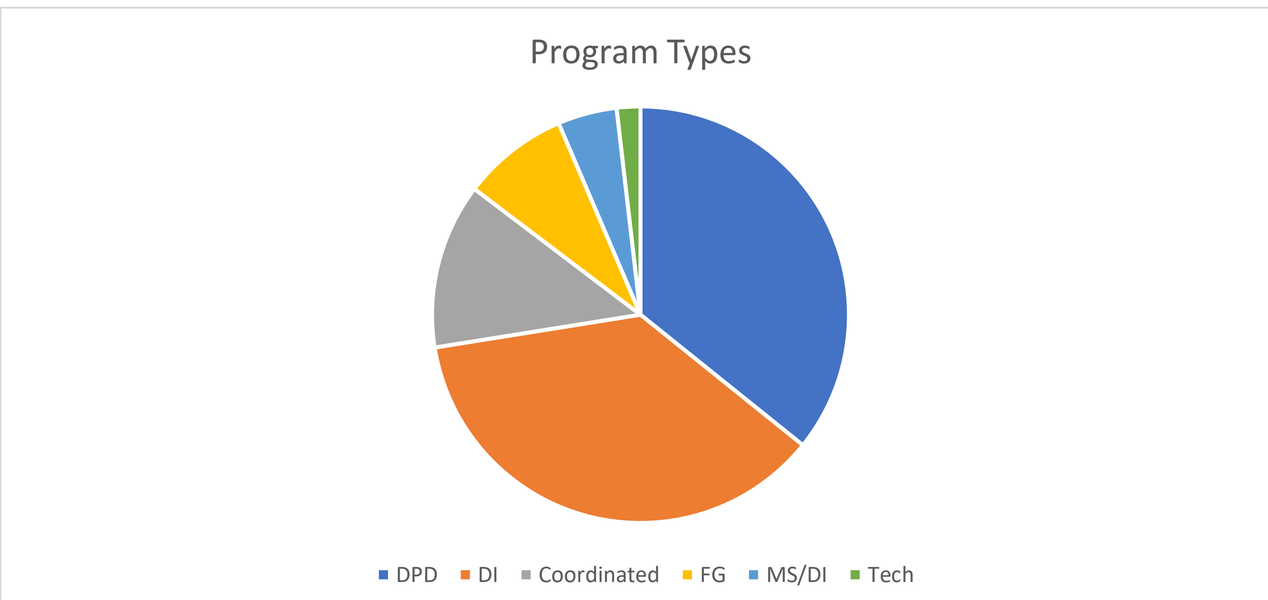

Figure 1.1: A visual breakdown of the different types of dietetics programs survey respondents are involved in.

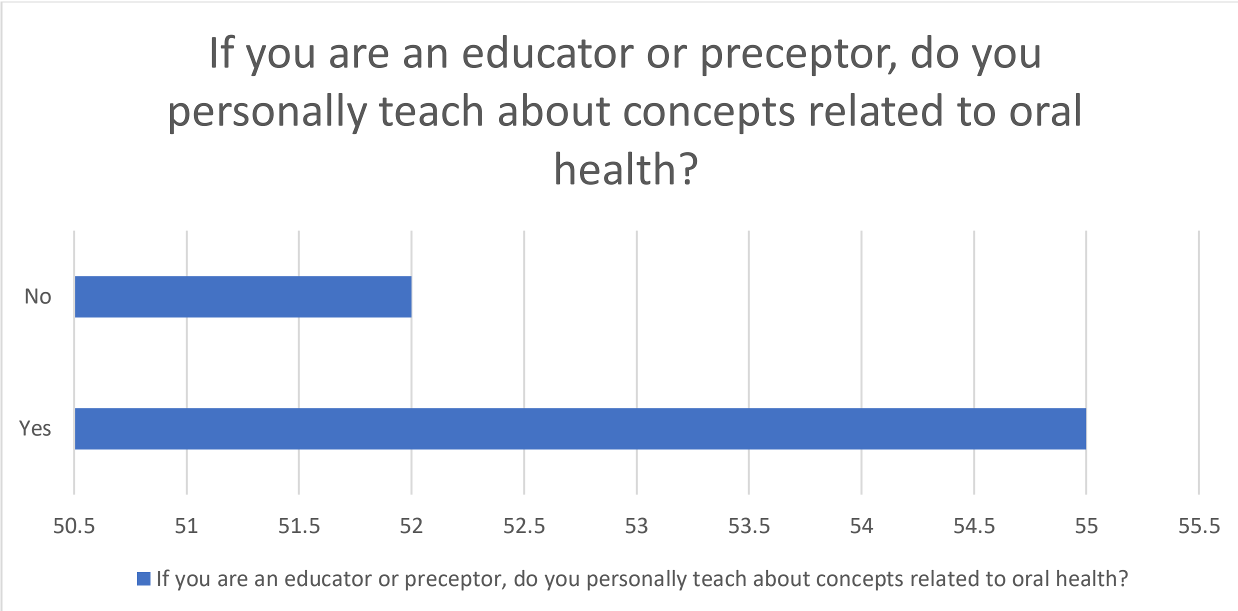

Figure 1.2: The number of survey respondents who teach about oral health related concepts in their dietetics curriculum compared to the number of respondents who do not.

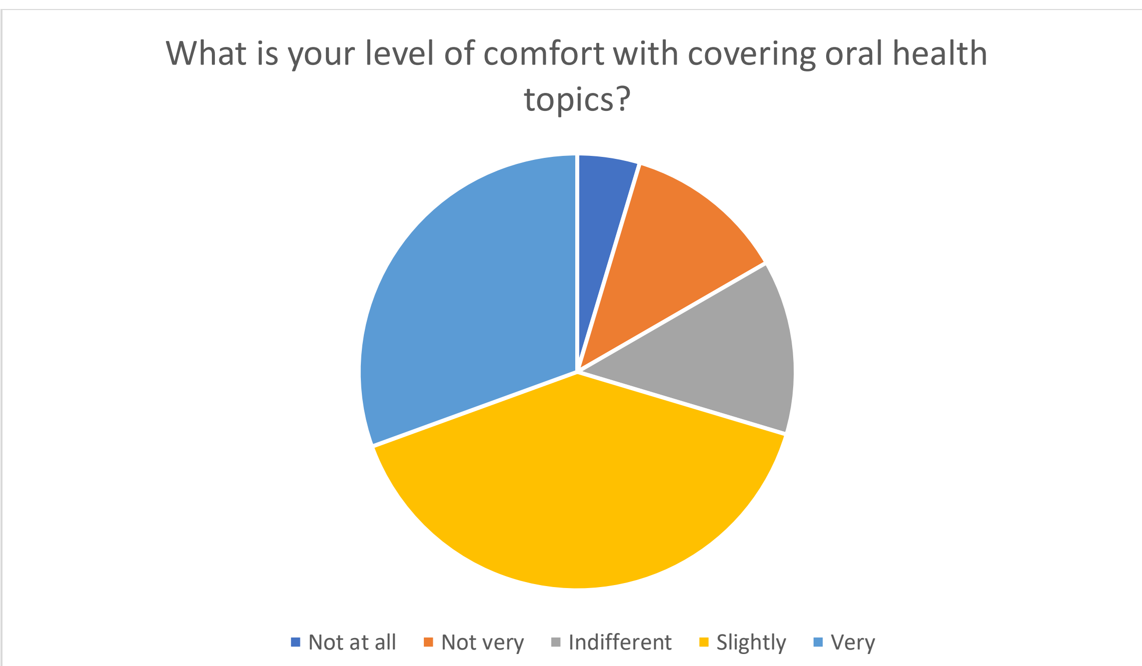

Figure 1.3: Survey respondents' comfort level with covering oral health topics in dietetics curriculum.

The open-ended survey questions had a significantly lower response rate than the multiple-choice questions did. When asked "in what class or rotation do you teach about oral health concepts? (if applicable)", 59 responses were recorded. This lower response rate is likely due to the nature of the question, which only applies to some educators. The other two open-ended questions, which were applicable to all respondents, had a higher response rate. There were 84 respondents who indicated that they are aware of other educators who cover oral health topics in their classes/rotations.

The highest number of open-ended responses, 89, were recorded when asked "If oral health were to be integrated or addressed more frequently in your curriculum, which classes/rotations/experiences do you think would be appropriate? How would you envision that happening in your program? Do you have any ideas about activities, courses, rotations, or other opportunities for this to occur? Please provide details." While there were less responses than with multiple choice questions, the details provided in the open-ended responses make these responses just as valuable. One respondent suggested that "dietetic students could shadow [a] dental hygienist or a dentist to see firsthand nutrition concerns observed routinely in oral health." The most common responses resulted in 4 main categories: clinical – key words also included medical nutrition therapy (MNT), nutrition-focused physical exam (NFPE), nutrition assessment, and nutrition care process; lifecycle – key words also included lifespan, childhood, and geriatric; community nutrition – key words also included nutrition education and public health; and introductory nutrition – key words also included nutrition 101 and nutrition foundations. The responses indicate that 50 respondents believe clinical nutrition classes/rotations are the most appropriate place for oral health and hygiene concepts to be implemented, while 26 respondents believe that lifecycle courses are best, 14 believe that community nutrition outreach is most appropriate, and 9 believe that introductory nutrition classes make most sense.

Discussion

Most survey respondents (89.0%) believe that knowledge related to oral health is important for future dietetics professionals to possess, and even more respondents (93.5%) reported that they are receptive to integrating oral health topics into their dietetics curriculum in the future if a professional development oral health education is received. However, only 55 (50.4%) of survey respondents currently teach about oral health related concepts in dietetics curriculum. These findings provide a compelling justification for Didactic Programs in Dietetics to explore opportunities to incorporate oral health concepts into dietetics curricula and pursue opportunities to provide educators with professional development opportunities related to oral health to increase their comfort level with teaching on oral health topics.

Survey respondents (74%) are moderately comfortable with teaching about oral health topics, indicating that there is already a good basis of oral health coverage in dietetics curriculum. However, only half (51.4%) of respondents teach about oral health topics. This may be due to certain dietetics courses not having any perceived relation to oral health topics or a lack of understanding on how to incorporate these topics into the curriculum. This gap in comfort with teaching and applying oral health concepts in dietetics presents the opportunity for an interdisciplinary approach to oral health topics in dietetics curriculum. Dietetics educators collaborate with oral health professionals to increase knowledge regarding the relationship between nutrition and oral health and hygiene in the future. Program directors could invite local dentists, orthodontists, endodontists, etc. to host a talk to increase oral health knowledge for dietetics students. Furthermore, certain programs may think about adding oral health topics into existing courses or hosting collaborative symposiums with oral health professionals as part of their dietetics curriculum. Additionally, ACEND could pursue efforts to integrative oral health and hygiene concepts into DPD knowledge requirements (KRDNs) to include oral health knowledge so that all future dietetics professionals will receive this important education.

The free-response questions likely had a lower response rate than the multiple-choice questions because they require more thought and effort to respond. This may have deterred survey respondents from answering these questions who were in a rush or who did not want to commit extra time to developing and typing their own response. Due to the lower response rate of these questions, especially the wide array of answers received for how to integrate oral health topics into dietetics courses, more research needs to be done to determine how to incorporate these topics most effectively into dietetics curriculum.

Respondents were asked to explain in which courses or how they might imagine oral health and hygiene concepts being integrated into dietetics curriculum and the 2 most common responses had to do with clinical experience/MNT and lifecycle topics. Many responses explained how oral health relates to clinical rotations with patients and one suggested that “a rotation with a dentist would be helpful in D1 [first year] rotations.” Responses also touched on how these ideas fit into MNT, which is a nutritional diagnosis from a registered dietitian nutritionist (RDN) who helps provide counseling and techniques of nutritional therapy to a patient. One respondent said that “we look at oral health with all our patients and it is always a concern” and others feel that personal oral health and hygiene “affect the MNT of many diseases and conditions.” Clinical experience/MNT was likely suggested the most as the most appropriate place to discuss oral health topics as it focuses on patient-centered care and treatment and provides the opportunity to see firsthand how oral health and hygiene may affect nutritional status, as well as vice versa.

Additionally, survey respondents felt that lifecycle courses were an appropriate place to integrate oral health concepts, such as “to discuss childhood through adulthood oral health” and to examine how “childhood nutrition [affects] dentition and overall oral health for the later years.” Most responses touched on how lifecycle nutrition discusses nutrition from gestation to adulthood and how oral health would fit in here as it could be seen how nutrition over a long period of time affects not only the development of the oral cavity but also oral health in adulthood.

Conclusion

There is no current requirement to cover oral health topics in DPD programs, but many dietetics program directors, educators, and support staff believe this knowledge is important for future professionals to have. For this reason, there is a compelling justification for oral health and hygiene concepts to be added to the required curricular topics and student knowledge competencies for future programs. Not everyone may be receptive to integrating oral health topics into dietetics curriculum due to personal knowledge and comfort teaching about oral health and hygiene. This integration of topics is not meant to mirror the education future dentists and dental assistants will be receiving or be nearly as in depth as it might appear; it is intended to educate dietetics professionals about the relation of nutrition and the oral cavity (as outlined in the literature review above) so that they are equipped to provide the highest level of care to their patients, and are knowledgeable about the value of interdisciplinary relationships and collaborations with dental professionals for promoting nutrition and health.

This survey highlighted the current understanding of the importance that dietetics educators, preceptors, support staff, and program directors of ACEND accredited programs believe oral health and hygiene concepts have in a dietetics education. This survey was unique in that it addressed personal understanding as well as the perceived importance for future dietetics professionals of these topics.

The power to make the change to include oral health and hygiene concepts into dietetics curriculum now lies in hands of each ACEND accredited DPD program. With increasing awareness of the importance of these topics for future dietetics professionals, ACEND may consider updating the required curricular topics and student knowledge competencies in the coming years to include oral health and hygiene concepts.

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Appendix A

Survey questions:

1. What is your name?
2. What is your email address?
3. Are you currently a dietetics educator, administrator, preceptor, or student support staff for an ACEND accredited dietetics program?
4. If yes, what type of program?
5. What is the name of your institution? (Name of community college, university, hospital, etc.)
6. If you are an educator or preceptor, do you personally teach about concepts related to oral health?
7. If yes, in what class or rotation do you teach about oral health concepts? (Please provide full course number and title)
8. Are you aware of any other dietetics educators who may be teaching about concepts related to oral health? Please provide more details.
9.
    a. What is your comfort with covering oral health topics?
    b. How important do you believe knowledge related to oral health is for future dietetics professionals?
    c. How receptive are you of integrating topics of oral health into your curriculum?
10. If oral health were to be integrated or addressed more frequently in your curriculum, which classes/rotations/experiences do you think would be appropriate? How would you envision that happening in your program? Do you have any ideas about activities, courses, rotations, or other opportunities for this to occur? Please provide details.