Position of the Academy of Nutrition and Dietetics: Oral Health and Nutrition

ABSTRACT

It is the position of the Academy of Nutrition and Dietetics that nutrition is an integral component of oral health. The Academy supports integration of oral health with nutrition services, education, and research. Collaboration between dietetics practitioners and oral health care professionals is recommended for oral health promotion and disease prevention and intervention. Scientific and epidemiological data suggest a lifelong synergy between diet, nutrition, and integrity of the oral cavity in health and disease. Oral health and nutrition have a multifaceted relationship. Oral infectious diseases, as well as acute, chronic, and systemic diseases with oral manifestations, impact an individual's functional ability to eat and their nutrition status. Likewise, nutrition and diet can affect the development and integrity of the oral cavity and progression of oral diseases. As knowledge of the link between oral and nutrition health increases, dietetics practitioners and oral health care professionals must learn to provide screening, education, and referrals as part of comprehensive client/patient care. The provision of medical nutrition therapy, including oral and overall health, is incorporated into the Standards of Practice for registered dietitians and dietetic technicians, registered. Inclusion of didactic and clinical practice concepts that illustrate the role of nutrition in oral health is essential in education programs for both professional groups. Collaborative endeavors between dietetics, dentistry, medicine, and allied health professionals in research, education, and delineation of practice roles are needed to ensure comprehensive health care. The multifaceted interactions between diet, nutrition, and oral health in practice, education, and research in both dietetics and dentistry merit continued, detailed delineation.
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POSITION STATEMENT

It is the position of the Academy of Nutrition and Dietetics that nutrition is an integral component of oral health. The Academy supports the integration of oral health with nutrition services, education, and research. Collaboration between dietetics practitioners and oral health care professionals is recommended for oral health promotion and disease prevention and intervention.

SCIENTIFIC AND EPIDEMIOLOGICAL data demonstrate a lifelong synergy between nutrition and the integrity of the oral cavity in health and disease.[1] Changes in the health care system toward patient/client- and population-centered health and an interprofessional team-based approach require collaboration among health professionals and emphasize the importance of evidence-based practice grounded in economic, sociological, and scientific evidence.[1,2] Partnerships among dietetics practitioners, oral health care professionals, and other health professionals need to be established, strengthened, and expanded to encourage effective, integrated, and comprehensive education, training, and practice across disciplines.[3] The relationships among oral, systemic, and nutritional health and diseases require the attention and consideration of all health professionals.

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RATIONALE

Oral health and nutrition have a synergistic multidirectional relationship. Oral infectious diseases, as well as acute, chronic, and terminal systemic diseases with oral manifestations impact functional ability to eat as well as diet and nutrition status. Likewise, nutrition and diet can affect the development and integrity of the oral cavity as well as the progression of oral diseases. The Institute of Medicine's "Improving Access to Oral Health Care for Vulnerable and Underserved Populations"[4] report highlights the importance of education and training of health professionals to "integrate oral health information with diet and lifestyle counseling"[5] and the role of a healthy diet for oral health. Similarly the World Health Organization addresses the roles and responsibilities of both dietetics practitioners and oral health care professionals in promoting oral health and the consideration of diet/nutrition in prevention of oral diseases.[6,7]

EMERGING SCIENCE AND EVIDENCE-BASED PRACTICE

Oral Infectious Diseases: Dental Caries and Periodontal Disease

Dental caries and periodontal disease are the most prevalent chronic, common, and transmissible infectious oral conditions in humans. Dental caries result from the interaction of specific bacterial and salivary constituents with dietary fermentable carbohydrates in biofilm adherent on the tooth surface.[8] An equilibrium between multifactorial pathological contributing factors (eg, bacteria and fermentable carbohydrates) and protective factors (eg, fluoride, oral hygiene, diet, and saliva) influence the dynamic demineraliza-

Dietary factors associated with increased risk

- Sugar-sweetened liquids, such as carbonated beverages, fruit drinks, energy drinks, and sweetened teas and coffees
- Sticky foods, such as raisins
- Slowly dissolving candies
- Sugary starchy snacks, such as cookies, cakes, etc
- Simple sugars, such as sucrose, honey, and molasses

Dietary factors associated with decreased risk

- Sugar-free chewing gum, mints, and candies
- Fresh fruits and vegetables
- High-quality protein foods, such as meats, eggs, cheese, fish, beans, and legumes
- Whole-grain, low-sugar breads and cereals

Eating patterns associated with increased risk

- Frequent and prolonged intake of foods rich in simple sugar
- Eating sticky, retentive foods alone
- Sipping sugar-sweetened beverages for prolonged periods

Eating patterns associated with decreased risk

- Space frequency of food and beverage intake at least 2 hours apart
- Select fresh, whole, unprocessed food to stimulate salivary output
- Chew sugarless gum for a brief period immediately after a meal or snack

Figure 1. Primary dietary factors and eating patterns associated with dental caries risk.

tion-remineralization of the tooth surface.[9] Plaque bacteria produce acids from the metabolism of fermentable carbohydrates that cause demineralization of tooth enamel and enzymes that attack the protein component of the tooth, resulting in decay. Decayed and painful teeth and non-normal oral tissues can inhibit mastication and can lead to tooth loss and dietary changes. Control of oral bacterial biofilm, use of dental sealants, fluoride therapy, and diet counseling are essential in caries prevention and management (Figure 1). Dental caries can be prevented by healthful dietary and good oral hygiene behaviors and exposure to fluoridated water and use of topical fluoride (ie, fluoridated toothpaste and fluoride varnish) along with routine preventive oral health care.[8,9]

Periodontal diseases range from mild forms, such as gingivitis, to severe forms of periodontitis that result in destruction of periodontal supportive tissue and ultimately tooth loss. It can be characterized by gingival bleeding and recession, formation of deep pockets between the gingiva and tooth, and loss of periodontal ligaments and bone structure that support teeth. This disease is initiated by oral bacterial plaque biofilm interactions leading to soft-tissue destruction associated with an abnormal inflammatory immune response.[10] Although the pathogenesis of periodontal disease involves bacteria and the host response to these bacterial byproducts (toxins and enzymes), local, systemic, and behavioral factors influence disease severity and progression. Systemic influences include types 1 and 2 diabetes mellitus, stress, cardiovascular disease, osteoporosis, host immune status, and pathogens associated with periodontal disease in the subgingival flora. Associated behavioral risk factors include poor oral hygiene, tobacco use, and diet.[11]

Periodontal disease can be associated with changes in immunological and hematological markers modulated by dietary factors (Figure 2).[12,13] It is thought that a consortium of microbiota play a role in periodontal disease. Chronic periodontal disease results in irreversible loss of bone and collagen. The mechanism of the relationships between periodontal disease and systemic disease are largely unknown; however, associations between periodontal health and systemic conditions that impact systemic health outcomes have been demonstrated.[14]

Figures 1 and 2 address dietary factors associated with dental caries and periodontal disease, respectively. Health professionals should consider these factors and develop a comprehensive interprofessional approach when addressing nutritional care and diet counseling from screening to assessment to intervention to monitoring to referral, as appropriate, to maximize patient/client care outcomes.[3]

Systemic Diseases

The associations between oral health and nutrition and diet in systemic diseases are illustrated with two examples where the relationships are most apparent and multifaceted. In other diseases, there are many associations often without proof of causality. Many systemic diseases, including type 1 and 2 diabetes, autoimmune disorders, and cardiovascular disease, have implications for oral health and diet and nutrition.

Oropharyngeal Cancer. Oropharyngeal cancers (OPCs) are among the eight most common cancers in the United States[15]; they are more common in African Americans and males than other ethnic/racial groups and women. The US survival rate of OPCs is approximately 50% (34% among African Americans). OPCs are associated with a high risk of second primary tumors in the oral cavity.[15] Relationships between OPCs and nutrition and diet are notable in both disease epidemiology and management.[16-18]

The most consistent findings with regard to incidence of OPCs[16] are the protective effects of high fruit and vegetable consumption. Relationships have been demonstrated in cross-sectional studies between quantities of fruits and vegetables consumed and vitamin C, folate, and carotenoid intake; and significant inverse relationships between consumption of these nutrients and OPC development have been identified. Pavia and colleagues[16] conducted a meta-analysis and, of the 16 studies that met the inclusion criteria, a significant inverse relationship between fruit (particularly citrus) and vegetable consumption and risk of OPC was demonstrated. The lack of biomarkers to measure intermediate outcomes and a paucity of randomized, controlled, clinical trials on the role of individual mi-

Dietary factor	Impact of inadequate intake on disease risk
Protein	Compromised or impaired response to infection and wound healing of oral soft tissue. Compromised antibacterial properties of saliva.
n-3 Fatty acids Vitamins A, C, E Copper Iron Zinc Non-nutrient antioxidants	Depressed anti-inflammatory and immune response of oral soft tissue.
Vitamins D, K Calcium Boron	Inadequate jaw bone density and strength to anchor tooth structure.

Figure 2. Dietary factors possibly modulating immunologic and structural markers of periodontal disease.

Component	Nutrition risk symptoms	Nutrient implications
Face	Malar pigmentation (dark skin over cheeks and under eyes) Bitemporal wasting Pale	Niacin, B vitamins, riboflavin, and vitamin B-6 Protein deficiency Inadequate iron
Lips	Cheilosis (red/swelling) Angular fissures	Inadequate niacin and riboflavin Inadequate niacin, vitamin B-6, riboflavin, and iron
Gingiva	Spongy, bleeding, abnormal redness	Inadequate vitamin C
Tongue	a. Glossitis (red, raw, fissured) b. Pale, atrophic, smooth/slick (filiform papillary atrophy) c. Magenta color	Inadequate folate, niacin, riboflavin, iron, vitamins B-6 and B-12 Inadequate iron, vitamin B-12, niacin, and folate Inadequate riboflavin

Figure 3. Identification of nutrient deficits in the oral cavity.

cronutrients in food or supplement form support the need for prospective studies to determine biomarkers and examine the role of select foods and nutrients in cancer prevention and management.

Cancer therapies include single or combined use of radiation, chemotherapy, and surgery, all of which can cause oral complications that compromise an individual's appetite and intake and, consequently, nutritional status.[17] Radiation to the oropharyngeal area can cause tooth loss, caries, painful stomatitis, xerostomia, fibrosis of the muscles of mastication, and loss of taste. Surgical resections and reconstruction, depending on the extent and severity, can cause temporary and permanent alterations in masticatory and swallowing function and significantly increase energy and nutrient needs for healing.[18] Chemotherapy regimes can affect the integrity of the oral cavity and subsequent ability to eat and drink. Oral toxicities related to cancer treatments can be multiple and include mucositis, mucosal sensitivity, altered taste, xerostomia, thickened secretions, and dysphagia; they can be acute or late in development during or after cancer treatment.[17] A comprehensive nutrition assessment performed by a registered dietitian (RD) includes nutrition-focused physical examination or assessment of oral sensory and functional abilities, nutrition-related quality of life, appetite, and nutrient needs.[19] A team-based approach to OPC management is supported by the National Comprehensive Cancer Network and includes RDs, physicians, oral health care professionals, speech and language pathologists, and nurses specializing in cancer management.[20] Enteral tube feedings might be necessary to manage and prevent malnutrition after reconstructive surgery or during radiation therapy to prevent malnutrition and dehydration.

Eating Disorders

Eating disorders, notably bulimia and anorexia, can impact the integrity of the oral cavity. Oral manifestations include perimylolysis (enamel loss), caries, oral mucosal lesions, peri-oral stomatitis, altered salivary function, dental sensitivity, and parotid gland swelling.[21] Characteristic oral manifestations of bulimic episodes are the result of increased insult of acidic gastrointestinal contents from purging leading to tooth erosion of the lingual and occlusal surfaces on maxillary teeth.[22,23] Enlarged parotid glands result from increased saliva production, often proportional to the vomiting episodes. The combination of frequent consumption of fermentable carbohydrates followed by vomiting results in constant exposure of the mouth to acid from food, fluid, vomit, or all three. Individuals with such habits are at greater risk of tooth erosion and decay than those without these behaviors.[23] Individuals with anorexia are at risk of xerostomia as a result of select medications either by prescription (antidepressants) or self-selected (diuretics), as well as oral manifestations of nutrient deficiencies (see Figure 3, which provides an overview of oral manifestations of nutrient deficiencies for health professionals to consider when conducting a physical examination). For additional information on eating disorders, see the Academy's position "Nutrition Intervention in the Treatment of Eating Disorders."[24]

Nutrient Deficiencies and Excesses

Oral soft tissues are among the first tissues in the body to develop clinical manifestations of nutrient deficiencies because of the 3- to 7-day turnover time of most oral mucosal cells. Notably, water-soluble vitamins (eg, vitamin C and B vitamins), protein, and iron

deficiencies can be seen in the oral soft tissues. However, clinical signs alone are not diagnostic of a deficiency; a detailed health and diet history and clinical examination is needed, along with diagnostic tests, to make a differential diagnosis (Figure 3). Similarly, nutrient excesses can also impact oral soft and hard tissues; for example, toxicity of vitamin A can impair oral mucosal epithelium development.

Tooth Loss, Dentures, and Implants

Tooth loss and replacement with dentures, either partial or full, can impact functional ability to bite, chew, and swallow food, ultimately impacting diet quality and nutritional status. Eating abilities with dentures are not equivalent to natural teeth; the majority of published research[25-27] has demonstrated poor nutrient composition and eating-related quality of life in individuals with dentures as compared to those with natural teeth. The potential for these deficits to result in malnutrition, particularly among elderly people, who represent the largest cohort of denture wearers, is high. Removable dentures can be partial (replacing a few teeth) or full (replacing either the maxillary and or mandibular arch of teeth); chewing capacity with regular dentures is only approximately 20% to 25% of natural teeth.[27] Individuals with full dentures tend to bite and chew larger-sized particles of food and avoid some fresh fruits and vegetables that are challenging to masticate.[25]

Dental implants are metal posts surgically implanted into the jaw and allowed to "osseointegrate"; they are then covered with a tooth crown to simulate a natural tooth. Unlike dentures, they are designed to be permanent and might not be associated with the eating difficulties often seen in individuals with dentures. Implant-supported dentures use several implants to support full maxillary and or mandibular dentures and reduce some of the movement challenges associated with traditional dentures. Awad and colleagues[26] found that implant-supported dentures more positively impact biting and chewing ability as compared to regular dentures.[26] However, changes in nutrition status were not identified.

Prudent measures for intervention include counseling individuals with dentures to use their knife and fork as their teeth to cut food into smaller sizes for biting and chewing ease and to moisten tough-to-chew foods. These measures can help facilitate eating pleasure and ultimately improve diet quality and nutritional status.

SPECIAL POPULATIONS AFFECTED BY ORAL HEALTH ISSUES

Older Adults

Individuals age 65 years and older are the fastest growing group in the United States today[28]; in 2008, those aged 65 years and older represented 13% of the US population. This proportion is anticipated to increase to approximately 20% by 2030. Approximately one third have untreated dental caries, 40% have periodontal disease, and those living in poverty are twice as likely to be edentulous when compared to those with higher incomes.[28] Approximately 25% of those 65 years and older have no natural teeth.[28] Hamasha and colleagues reported a 10% to 40% incidence of root caries, or exposed root surfaces with loss of periodontal attachment, among an elderly cohort in Iowa.[29] Older adults experience higher rates of chronic diseases, take more medications associated with increased risk for xerostomia and oral conditions, and are more likely to pay out of pocket for dental care.[28]

Diet and nutrition intervention for older adults with compromised oral integrity must target individual needs based on concurrent systemic diseases and disabilities and associated oral manifestations relative to the disease and disability and its treatment(s). It is incumbent upon dietetics practitioners to address oral health as part of nutrition and diet screening, assessment, intervention, and monitoring of older adults in particular, given their greater risk of compromised dentition and chronic disease as compared to younger counterparts.[29]

Pregnant Women, Infants, and Children

Recent trends in the increased prevalence of dental caries among children suggest the need for more comprehensive measures because this is a preventable disease.[30] Prenatal interventions to reduce oral bacterial levels in pregnant women thought to be transmissible from mothers to infants via saliva have included use of fluoride products or xylitol gum, but have been limited in number and have not fully explored the role of dietary sugar intake as a modulating factor.[31] The prevalence of dental caries in the primary teeth of children aged 2 to 4 years increased from 18% in 1988 to 1994 to 24% in 1999 to 2004, with significantly more caries reported among non-Hispanic black and Mexican-American children than among non-Hispanic white children. During this time period, caries prevalence in primary teeth of 6- to 8-year-olds increased among non-Hispanic black and Mexican-American children, but not non-Hispanic white children. Caries in permanent teeth declined among older children and adolescents. Greater attention to the oral health of young children is clearly needed if Healthy People 2020 oral health objectives are to be met.[32,33]

Other oral health challenges can arise relative to chronic and acute diseases, neurological, mental and physical disabilities, or trauma. Nutrition care approaches should integrate oral health screening as a component of nutrition assessment and monitoring and address oral health as part of counseling for all infants, children, and adolescents, including those with special health care needs.

ROLES AND RESPONSIBILITIES IN EDUCATION

The changing social and economic realities of today's health care system impact preparation and training of health professionals.[5,34] The importance of interprofessional core competencies in education and training relative to oral health, nutrition, diet, and lifestyle are underscored in the Institute of Medicine report "Improving Access to Oral Health Care for Vulnerable and Underserved Populations,"[5] which includes four core competencies in terms of recognition or oral disease risk as part of assessments, provision of educational information on oral health, integration of oral health with diet counseling, and referrals as appropriate to oral health care professionals.[5]

Dental education, like dietetics education, is exploring changes needed to focus on prevention, patient-centered evidenced-based care, and interprofessional education, while keeping pace

Dietetics education

1. **Baccalaureate program**
   a. **Didactic topics**
      - Oral anatomy and physiology
      - Oral manifestations of systemic diseases
      - Oral sequellae of medications, chemo-, and radiation therapies
      - Primary diseases of the oral cavity and their effects on taste, smell, and mastication

   b. **Clinical experiences**
      - Field visits to dental schools/clinics
      - Work oral health care professionals in clinical/community settings
      - Oral health screening questions as a component of nutrition screening and assessment activities

2. **Supervised practice (preprofessional) activities/competencies**
   - Complete rotations in dental school and community dental clinics
     - Complete nutrition screening and diet counseling relative to oral health
   - Throughout rotations integrate oral health into nutrition care process tasks
     - Screening, assessment, intervention, monitoring
   - Participate in oral health and nutrition research
   - Perform basic nutrition-focused physical assessment, including oral and cranial nerve screening
   - Design diet and nutrition care plans for patients with compromised oral health

3. **Graduate education**
   - Design, conduct, and participate in oral health and nutrition research
   - Perform nutrition-focused physical assessment examinations, including intra-/extraoral screening and cranial nerve examinations
   - As appropriate, partner with dental students/oral health care professionals in patient/client experiences

4. **Continuing professional education**
   - Collaboration between dietetics practitioners and oral health care professionals in case presentations, multidisciplinary care meetings, conferences about diseases and the life span, interprofessional seminars, and publications
   - Training opportunities using different media, eg, distance learning, CD-ROMs, videotapes

Dental education

1. **Predoctoral program**
   a. **Didactic topics**
      - Nutritional biochemistry
      - Nutrition and oral health throughout the life span
      - Diet education and intervention relative to oral health/disease
      - Effect(s) of oral disease(s), symptomatology, and their treatment(s) on diet and nutrition status
      - The relationship between diet/nutrition and oral health in acute and chronic diseases and disorders
      - Diet/nutrition screening, education, and referral in dental practice
      - Diet/nutrition risk factors and management strategies of high-risk patients

   b. **Clinical and research experiences**
      - Complete self-evaluation of diet
      - Integrate basic diet education relative to oral health into patient education
      - Provide diet and nutrition risk screening relative to oral health to patients
      - Consult with registered dietitians and or dietetic technicians, registered about diet evaluation and education
      - Participate in oral health and nutrition/diet research
      - Complete rotations with dietetics students in supervised practice rotations

2. **Graduate programs**
   - Design, conduct, and participate in oral health and nutrition research
   - Integrate nutrition screening and diet education into OHCP[a] practice and curricula
   - Complete collaborative education endeavors on related topics with dietetics programs

3. **Continuing professional education**
   - Collaboration between dietetics practitioners and oral health care professionals in case presentations, multidisciplinary care meetings, conferences, about diseases and the lifespan multidisciplinary seminars, and publications
   - Training opportunities using different media, eg, distance learning, CD-ROMs, videotapes

Figure 4. Didactic and practice components of a curriculum model for dietetics and dental education programs. [a]OHCP=oral health care professional.

with advances in technology, genetics, and genomics.[35,36] DePaola[35] called for a "revitalization of dental education;" similarly, dietetics education and training likewise stands to benefit by revitalization, with a focus on interprofessional education and training relative to oral health and disease. Knowledge of the synergy between oral health and diet and nutrition should be promoted in health-education programs and practice.[5-7,37] Approaches to interprofessional education are described in Figure 4, and are consistent with the recommendations of the Institute of Medicine and others.[38-42]

Included in the International Dietetic and Nutrition Terminology[19] are diag-

Dietetics Practitioner

Clinical Setting

- Include oral health screening as a component of nutrition care process (screening, nutrition assessment, intervention, and monitoring)
- Recognize oral manifestations of systemic diseases and provide patients with guidelines to maximize oral intake
- Confer with and refer patients (via consults) to oral health care professionals for management of oral diseases and or risk factors for oral diseases
- Consult with oral health care professionals in interpretation of oral-nutrition assessment findings and planning in the long-term care setting

Community Setting

- Establish partnerships with oral health care professional in community and private practice settings
- Develop and implement collaborative oral health and nutrition screening/education programs in schools, worksites, community events, and health maintenance organizations
- Promote collaborative education and practice regarding nutrition and oral health among dietetics practitioners and dental professionals
- Develop diet and nutrition-education messages that encourage oral health
- Promote oral health in school and community nutrition programs

Research Setting

- Promote collaborative nutrition and oral health research initiatives
- Design, conduct, and participate in nutrition/diet components of oral health research initiatives
- Identify and support integration of oral health issues (eg, screening, disease, management, education) as a component of nutrition research

Oral Health Care Professional

Clinical Setting

- Include diet screening, education, and referral for oral infectious disease prevention/control, optimal masticatory function and management of other oral diseases/treatments as a component of comprehensive dental care
- Collaborate with dietetics practitioners in delivery of oral health care in long-term care settings
- Provide diet and nutrition guidelines for health promotion and disease prevention to patients and provide guidelines for diet to maximize oral intake
- Consult with and refer patients (via consult) to dietetics practitioners for management of nutrition risk factors and diet because of compromised oral health (eg, caries, immunosuppressive disorders, xerostomia, diabetes, oral surgery, cancer)
- Consult with medical and dental professionals as a functioning member of an interdisciplinary health care team to address associations between oral and general health promotion

Community Setting

- Establish partnerships with dietetics practitioners in community and private practice settings to promote nutrition/diet screening and education in dental practice
- Develop and implement collaborative oral health and nutrition screening/education initiatives in schools, worksites, and health care organizations
- Promote collaborative education on nutrition and oral health among dietetics practitioners and dental professionals
- Develop oral health messages that integrate nutrition and diet education for interdisciplinary health care teams in health centers
- Promote diet and nutrition as a component of school and community oral health programs

Research Setting

- Promote collaborative oral health and nutrition research initiatives
- Design, conduct, and participate in oral health component of nutrition/diet research initiatives
- Identify and support integration of nutrition topics as a component of oral health research as appropriate

Figure 5. Dietetics practitioners and oral health care professional role modeling to achieve effective integration of oral health and nutrition service in health promotion and disease prevention and intervention.

nostic codes that address the integrity and functions of the oral cavity; hence, dietetics practitioners in clinical practice are expected to include oral health as a component of their nutrition-focused physical examination, counseling, and monitoring of individuals.[43-45] The nutrition-focused physical examination refers to measurement of body composition and vital signs; inspection for clinical manifestations of nutrient deficiencies; and abdominal, dermatologic, head, neck, oral cavity, and cranial nerve screening examinations conducted by the RD as part of nutrition assessment.[46] However, neither oral health screening or nutrition-focused physical examination are cited as specific competencies or criteria in the Accreditation Commission for Education in Nutrition and Dietetics'[43] education standards for entry-level practice. In addition, RDs in the United States have reported a lack of education and training on oral health screening as part of NFPE.[44] Using the approaches described in Figure 4 for integrating oral health and disease concepts into dietetics education and training,[45,46] oral health assessment and NFPE can be addressed. The outcomes of NFPE of the oral cavity for entry-level training should include recognition and detection of nutrition/diet-related risk factors (eg, non-normal conditions of the hard and soft tissue affecting ability to eat or drink) to incorporate into nutrition interventions or referrals.[46] Competencies in oral screening (head, neck, intra/extra oral assessment and cranial nerves) are needed for students in the preprofessional setting in conjunction with the International Dietetic and Nutrition Terminology diagnostic codes and related defining characteristics.

ROLES AND RESPONSIBILITIES IN PRACTICE

As delineated in Figure 5, collaborative efforts between oral health care professionals and dietetics practitioners can foster successful strategies related to oral health and nutrition. Interprofessional and interdependent teams and approaches to practice[3] in client care (clinical, community, public health), education, and research are essential to strengthen the bridge between the oral cavity and diet/nutrition in all three areas.

Oral health is a component of dietetics practice in clinical, community, and public health settings for individuals and groups. The Standards of Professional Performance and the Standards of Practice for dietetics practice in various areas outlines specific components of practice.[47] For dietetics practitioners, the International Dietetic and Nutrition Terminology includes diagnostic terms related to oral health conditions to facilitate dietetics practitioners identifying non-normal oral conditions and providing referrals and education appropriate to any practice setting. Those without formal training in nutrition-focused physical examination or assessment of the oral cavity can seek continuing professional education on this topic or partner with an oral health care professional for hands-on training to develop competency and proficiency.

Similarly, oral health care professionals can address diet and nutrition as a component of oral health assessments and integrate diet into educational dialogues. In individuals with oral conditions impacting eating ability or nutrition status, oral health care professionals can provide baseline intervention to determine diet/nutrition risk, educate patients on diet relative to oral health, and, when in-depth nutrition evaluation and diet counseling is needed, refer patients to an RD for medical nutrition therapy. This interprofessional, collaborative approach between oral health and dietetics practice is applicable in community and public health settings in which endeavors and strategies to providing care for large groups are designed; the end result is comprehensive care. Dietetics practitioners and oral health care professionals within their practices can provide baseline screening, intervention within their scopes of practice, and referral to the respective disciplines as appropriate for more in-depth nutrition or oral health care.

ROLES AND RESPONSIBILITIES IN RESEARCH

Research on the impact of changes in the oral integrity or treatment on diet/nutrition status and vice versa is critical to ensure health promotion, disease prevention and intervention, and comprehensive health care. Although there are cross-sectional studies demonstrating associations, studies are needed that demonstrate the effect of oral conditions and treatments on diet/nutrition status and the reverse, effect of diet/nutrition status on oral integrity.[48] The determination of biomarkers and behavioral and outcomes markers are needed along with translational and outcomes research to explore and demonstrate relationships between nutrition, diet, and oral health and disease, as well as the impact of each on the other in prevention and intervention.[35,49] Additional research is merited to determine optimal diet management for individuals after dental implants, prosthetic devices, and other reconstructive surgery, and outcomes markers to determine the role of diet and nutrition in oral health care; such study outcomes will help to advance both professions.

SUMMARY

The integration of oral health and nutrition health promotion and disease management, including screening, assessment, education, and counseling as part of treatment provided by dietetics practitioners and oral health professionals supports collaborative, comprehensive, and cost-effective care. Health professions organizations can seek avenues and mechanisms to support consumer health education that includes oral health and nutrition tailored to the needs of all populations. Dissemination of nutrition and oral health resources can enhance opportunities for collaborative research and education that will be robust and in sync with national agendas to improve the health of the nation.

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