

AN ABSTRACT OF THE THESIS OF

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Title: Dental Hygienists and Dietary Counseling: Extent and Quality.

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Nutrition and diet are significantly interrelated with oral health and disease. The control of diet and nutrient intake and good oral hygiene are important elements in the prevention and treatment of dental caries and periodontal disease. Prevention of dental disease is the major focus of dentistry today, and dietary counseling is considered to be a component of a comprehensive preventive dentistry service.

Dental hygienists are primarily responsible for the delivery of preventive dental health care, and thus may assume the role of dietary counselor in the dental practice. The role of the dental hygienist in dietary counseling was examined in this study. The purposes of the study were: (1) to identify the extent and quality of dietary counseling provided by the dental hygienist in dental practices, (2) to analyze factors that may influence the extent of dietary counseling by the dental hygienist, (i.e. practice constraints, attitude toward the role of nutrition in dental health, personal dietary practices), (3) to assess nutrition knowledge and confidence in dietary counseling skills of the dental hygienist, and (4) to determine the need to improve nutrition education in the dental hygiene curriculum.

A sample of 300 Oregon licensed dental hygienists was surveyed by mail in summer, 1989, to examine the extent (degree to which diet is assessed and dietary advice is given) and quality (degree to which assessment and dietary advice are research based) of dietary counseling in the dental practice.

Of the 212 respondents (72% adjusted response rate), 52% reported providing dietary counseling. Fifty-four percent reported providing counseling to fewer than 10% of their patients. Ninety-six percent respondents reported that they did not obtain dietary intake records; 82% did not evaluate their patients' diets for nutritional adequacy. Most respondents (92%) did not refer patients to a nutrition professional.

Attitude of the respondents was favorable toward the role of nutrition in dental health while confidence in their nutrition knowledge and dietary counseling skills was low. Scores for both variables nutrition knowledge and its application in dietary evaluation were low, suggesting that the quality of dietary counseling may be inadequate. Hypotheses testing found that nutrition knowledge significantly ($p = \leq .05$) affected the quality of dietary counseling.

Hypotheses testing also found significant positive relationships ($p = \leq .05$) between extent of dietary counseling and the dental hygienists' (1) attitude toward the relationship of nutrition and dental health, (2) confidence in nutrition knowledge and dietary counseling skills, and (3) personal dietary practices.

A significant ($p = \leq .05$) negative relationship was found between extent of dietary counseling and the dental hygienists' perception of practice constraints. Several practice constraints influenced the extent of dietary counseling, most notably lack of time (86%) and cost effectiveness (62%).

The results of this research indicate that the extent and quality of dietary counseling by dental hygienists are limited. Extent is affected by various practice

constraints and the dental hygienists' lack of confidence in nutrition knowledge and dietary counseling skills. Implications suggest that the dental hygiene curriculum is not adequately preparing dental hygienists in nutrition and dietary counseling.

Dental Hygienists and Dietary Counseling:
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DENTAL HYGIENISTS AND DIETARY COUNSELING: EXTENT AND QUALITY

INTRODUCTION

Dental diseases continue to affect a large proportion of Americans (1). The two most prevalent oral diseases are dental caries (tooth decay) and periodontal disease (diseases of the gums and other tissues supporting the teeth) (2). Although dental caries among children, as well as some forms of adult periodontal disease, appear to be declining, the overall prevalence of these conditions is still great and imposes a substantial burden on Americans. The costs of dental care were estimated at \$21.3 billion in 1985 (1).

Nutrition and diet are significantly interrelated with oral health and disease (1-13). It has been suggested that no other single factor, aside from microbial, can enhance or retard the oral disease process as much as the variation in the quality, quantity and frequency of food consumed in the diet (8). The importance of complex nutrient interactions in the development, maintenance, and resistance of oral tissues has been clearly demonstrated (10). Dental caries result from a complex interaction among three factors: tooth susceptibility, bacteria in plaque, and dietary environment (2). Periodontal disease is an infectious disease initiated by bacteria; however, other factors may be associated with the development of the disease, including poor nutrition (2). Based on current knowledge, both dental caries and periodontal disease can be prevented in most persons (2). The National Nutrition Consortium recognizes these two diseases as being "diet-related", meaning that control of nutrient intake is an important element in their prevention, treatment,

and/or maintenance (13). The consortium maintains that health care professionals often approach the management of diet-related diseases from their specific orientations and may overlook the role of nutrition and nutrition counseling in clinical management (13).

Dietary counseling is regarded as a component of a comprehensive approach to preventive dentistry (4,6,8,13-20). Although it is considered to be an effective component for optimum oral health, dietary counseling is the most neglected (4,6). One might surmise then, that to neglect nutrition with regard to oral health is to offer less than comprehensive care to the dental patient.

One of the primary responsibilities of the dental hygienist is to educate patients to prevent and control dental disease (8,16,21-35). The dental hygienist teaches, motivates, and guides the patient to cooperate in the daily performance of recommended plaque and diet control measures which are essential to the success and maintenance of all dental treatment (8,34). The "Standards of Applied Dental Hygiene Practice" (30) established by the American Dental Hygiene Association, in recognition of quality patient care, promotes a comprehensive preventive approach to patient management. Nutritional assessment and dietary counseling are essential components of comprehensive dental hygiene care (8,32,34,36).

While the role of diet and nutrition in dental health is supported in the literature, the extent of dietary counseling has not been examined closely. A review of the literature has revealed studies regarding nutrition knowledge and attitude focused primarily on the dentist. The literature is very limited with respect to the role of the dental hygienist in dietary counseling. Moreover, the nutrition education and diet counseling training of the dental hygienist has not been addressed. This study examined the factors associated with the dental hygienist's role in dietary counseling within the realm of preventive dentistry. The purposes of the study were

(1) to identify the extent and quality of dietary counseling provided by the dental hygienist in dental practices, (2) to analyze factors that may influence the extent of dietary counseling by the dental hygienist (i.e. dental practice constraints, attitudes, personal dietary practices), (3) to assess nutrition knowledge and confidence in dietary counseling skills of the dental hygienist, and (4) to determine the need to improve nutrition education in the dental hygiene curriculum.

Hypotheses

1. The extent of dietary counseling is related to the nutrition knowledge of the dental hygienist.
2. The quality of nutrition information imparted in dietary counseling is related to the nutrition knowledge of the dental hygienist.
3. The extent of dietary counseling is related to the degree of confidence in dietary counseling skills of the dental hygienist.
4. The extent of dietary counseling is related to the attitude of the dental hygienist toward the relationship between nutrition and dental health.
5. The extent of dietary counseling is related to the personal dietary practices of the dental hygienist.
6. The extent of dietary counseling is related to the practice constraints experienced by the dental hygienist.

Definitions

Dietary counseling:

Counseling of patients with diet-related diseases which includes: screening and assessment, intervention, assess-

ment of quality of nutritional services, data collection by recording and monitoring, and evaluation (13). Preventive or supportive nutritional guidance should prescribe a normal balanced, varied, and adequate diet which conforms to the USDA Daily Food Guide, the Recommended Dietary Allowances, the US Dietary Goals and Guidelines (18,37).

Extent: The degree to which the diet is assessed and advice is given regarding modification of dietary practices.

Quality: The degree to which dietary assessment and recommendations are research based as generally accepted by reputable nutrition authorities (i.e. Registered Dietitians).

REVIEW OF THE LITERATURE

Dietary Counseling in Preventive Dentistry

The major focus of dentistry today, and especially of the future, is the prevention of dental disease (3,11,15,18,38-44) and one of the components of preventive dental care is nutrition (8,16,18,30,31,39,45). Good oral hygiene with plaque control along with a proper diet and adequate nutrition are essential in the prevention of dental disease and constitute a total applied preventive dentistry service (5-8,16,18). The Council on Dental Health and Health Planning¹ of the American Dental Association places the prevention of dental disease and the total health care needs of Americans as its highest priority (7). Further, the Council in recognition of the role of good nutrition and proper diet in the maintenance of oral health, has established guidelines for dietary assessment in the dental office relative to the prevention and treatment of oral disease (7).

Dental professionals are responsible for informing their patients about the role of diet in health and disease (5,18). DePaola (37) maintained that it is clearly in the dentist's purview to recommend dietary and nutritional interventions concerned with the total diet of the patient since they impact the oral tissues in a number of ways. Nutrient imbalances during development and maintenance may affect the resistive capabilities of oral tissues to subsequent challenge (3,37,46). Prenatal and postnatal pre-eruptive development of teeth are quite susceptible to nutritional influence and may affect a tooth's ability to resist dental caries. Nutrition can influ-

¹Has since merged with the Council of Community Health, Hospital, Institution, and Medical Affairs.

ence periodontal health by affecting such factors as the immune and inflammatory process, bone metabolism, collagen metabolism, and epithelial barrier function (18,37). These factors can alter host susceptibility to periodontal disease or modulate its progress (3,37). The composition and consistency of the diet may contribute to microbial growth in the gingival crevice and plaque formation (18). The American Academy of Periodontology states "counseling on food selection and dietary habits can be a significant part of treatment and control of caries and periodontal disease" (47).

The Department of Health and Human Services places an emphasis on nutrition in preventive health care in its objectives for the nation (2). It states that by the year 1990, virtually all routine health contacts with health professionals should include some element of nutrition education and nutrition counseling (2). The most recent report on nutrition and health by the Surgeon General (1) urged that

the training of health professionals be improved to emphasize the basic principles of nutrition, the role of diet in health promotion and disease prevention, nutrition assessment methodologies and their interpretation, therapeutic aspects of dietary intervention, behavioral aspects of dietary counseling, and the role of dietitians and nutritionists in dietary counseling of patients.

The dental practice provides an opportunity for health screening and patient education regarding diet and nutrition (6,48,49). Generally, most patients are seen on a regular basis, more so than by other health care professionals (6,48). In contrast with other health professionals whose practices mainly involve ill persons, the dentist typically sees healthy patients. This enhances the opportunity for screening and education (6). In addition, the dental visit is not often of an emergency nature, therefore the patient may be in a disposition to discuss nutritional concerns (48).

The Council on Dental Health and Health Planning advised that routine dietary assessment for screening purposes would be appropriate on new and recall patients. (25). Although it may be desirable to conduct a diet counseling program

for every patient it is not practical according to Katz (4). Patients, who through the years have demonstrated little susceptibility to oral disease, may not need dietary change (4). Nizel pointed out that diet counseling will not succeed with every dental patient. Patients must also want information about their dental health and be willing to make changes in their oral hygiene and dietary habits (18). Patients who may benefit from dietary counseling include: Those who exhibit signs of or are at high risk for dental caries and periodontal disease; those who are receiving orthodontic or prosthodontic treatment; oral and periodontal surgery patients; or those who are just merely interested (4,18,50-52).

Role of the Dental and Nutrition Professional

The role of nutrition education for "well" patients is an important part of the duties of the dental health care team (53). Patients with dental caries, periodontal disease or mucosal problems, who are not medically compromised, can be counseled regarding diet by dental professionals according to Nizel (37). Nizel feels that preventive or supportive nutritional guidance is all that is needed by these patients and suggests that dentists and dental hygienists are adequately trained in this regard. However, Katz feels that an ability to detect nutritional imbalances and relate them to the patient's general health is not common among practicing dentists and auxiliaries. Further, he suggested that this facet of dietary counseling is not realistic and feasible in an average dental practice (4) but that the knowledge required for diet modification for caries prevention is well within their grasp (4). Although a degree is not necessary, some feel the dental professional should have advanced training in nutrition to have the confidence to counsel and to provide accurate information (50).

It is very important for the dental professional to recognize his or her limitations (15,37). Patients who are systemically or psychologically compromised, or whose nutritional problems are complex, must be referred to appropriately trained health professionals (3,13,37,54). The nutritionist or dietitian is a ready source of referral and may provide valuable assistance to the dental professional who feels inadequate or is inappropriately trained to perform dietary counseling (37). Thus working together, the dental and nutrition professional can provide the dental patient with a more comprehensive preventive health service (15).

Dental professionals should be aware of the role that dietitians or nutritionists can play in the nutrition education of their dental patients and be open toward mutual effort (11,13,15,37,55,56). It is recommended that this be included in the nutrition education of the dental professional (56). Patient referrals, professional consultations, multidisciplinary joint practices, and continuing education workshops and conferences have been suggested as opportunities for interaction between dietitians and dental professionals (14). Stager and Levine suggested that regular contact with a dietitian would enhance the nutrition knowledge of the dental practitioner (57).

The dietitian is viewed by the general public as the most appropriate health provider for such key nutrition services as nutrition assessment, provision of diet counseling, and prescription of diets (58). As such, dietitians have the expertise to facilitate successful dental health programs by counseling dental patients on dietary habits which promote overall good health as well as good dental health (59).

Few dietitians have been actively involved with dental practices (14,60). Stager and Levine (57) found that 72% of the dental practitioners in their survey had never consulted with a Registered Dietitian for advice or guidance. However, White-Graves and Schiller reported that many dentists are recognizing their own

limitations in providing adequate dietary counseling and beginning to use the skills of Registered Dietitians in their dental practices (59).

Elbon and Karp (60), in a short term pilot study, found that a dietitian can play an important role in the dental office. After direct contact with a dietitian in the dental office, the percentage of patients who thought that the dietitian's expertise was valuable and effective increased from 68% to 92% and among the dentist/staff members there was an increase of 80% to 91% (60). Laird et al. (53) suggested that the dental practice is a relatively unexplored environment for which nutritionists can develop innovative nutrition education techniques. They reported the use of a nutrition computer education program as a means of delivering nutrition education in the dental office reception area which was well received by the dental patients.

It is recommended that dietitians assume a role in training other health professionals on the fundamentals of nutrition science as well as providing dietary guidance in their clinical practices (13,55-57,61,62). A survey (14) of dietetic internship programs examined the emphasis being placed on the preparation of interns to function as members of the dental health care team. The results showed that 51% of the 85 programs surveyed included a unit of study in topics relating to nutrition and dental health. Considerable variation among the programs in hours of didactic instruction, use of instructors and selection of resource materials was reported. None of the programs identified the use of a dental office as a source of clinical experience.

Of the 49% who did not offer a separate unit of study, six programs indicated that it was planned for the future and 12 programs incorporated dental health to some extent in clinical areas or seminar-type sessions. Among the goals that Cutter suggested to provide guidance in the preparation of dietetic interns are to in-

clude practical experience with dental patients and establish a positive working contact with practitioners of dental care (14).

Nutrition Awareness of the Dental Patient

Despite the growing emphasis on delivering preventive nutrition information today, nutrition misinformation persists and many people do not have easy access to accurate information (53). Consumers are more health conscious today, recognizing that diet and other lifestyle factors have an impact on their health (54). They are beginning to ask questions about what they should eat to stay healthy (54). Amidst the confusing and conflicting messages about nutrition and health that abound (54), consumers want accurate information and sound nutritional advice (63,64) but have not yet learned to be discriminating about nutrition information (63). Patients, in seeking answers to nutritional problems, may approach the dental professional for advice and guidance in these matters (45). The public now expects more complete information in the fields of dentistry and nutrition (3).

Are dental patients receptive to dietary counseling provided by a dental professional? It has been shown that the general public does perceive the dentist's office as an appropriate setting to receive dietary information, and that they feel nutritional activities fall within the professional arena of the dentist (53,60). Research has also shown that the general public considers the dental profession as the most credible source for providing dental health information (65). Therefore, if the potential benefits of better oral health are recognized, the patient will be receptive to the dietary advice offered by the dental professional (4).

Several studies have found that the general public is aware that there is a relationship between diet and dental caries (65-67). However, many misconceptions about food selection and patterns of consumption with respect to their impact

on the caries process exist (65,67). Very little has been reported on public opinion regarding diet, nutrition and periodontal disease.

While the focus in the studies cited previously (66,67) was on diet and caries, the prevention of "gum disease" was addressed briefly. Both studies asked how important "avoiding between-meal sweets" was to "preventing gum disease" as well as "dental caries". Both surveys found a high percentage, 88% and 80% of the respondents, believed this dietary practice to be important for the prevention of dental caries and periodontal disease, respectively. While this practice is considered important to the prevention of dental caries, it is not held in the same regard with respect to periodontal disease (67). These surveys did not address important systemic nutritional factors associated with periodontal disease.

Extent of Dietary Counseling

Dietary counseling for patients with diet related diseases should include the following elements: screening and assessment, intervention, assessment of quality of nutrition services, data collection by recording and monitoring, and evaluation (3,13,19,37). The first stage recommended with any dietary counseling is to obtain a personal diet history of the patient (20). The advice given can then be directed to the individual's needs keeping, the information relevant, thus enhancing motivation (20). With this information, realistic goals for the patient can be set. The diet record can be repeated and used as a measure of behavior change (20).

Although self-reported dietary intake methodologies may have limitations with regard to precision and accuracy (68), they, nonetheless, can be of value if one bears in mind their limitations (69). A written account of the diet will induce reflection in the patient about his or her diet (20). It has been documented in a study of dental patients (52), that when asked, nearly all patients thought that they "ate very

well" or "had a balanced diet" but were surprised when an analysis revealed that their intake was inadequate.

It is well documented that knowledge acquisition concerning health behavior does not necessarily mean that appropriate behavior change will follow (20,70). Dietary counseling must involve discrete counseling skills, not only dissemination of information (13,20,70). Merely imparting dietary advice fails to identify with the patient's individual needs. Educational efforts will not succeed if they do not allow for individual differences in people (20). Thus, the recommendations given by the dietary counselor must be based upon a personalized assessment of a patient's particular needs and educational level (13,20,37). To make dietary changes, individuals must know what eating pattern is recommended, how it applies to their own needs and preferences, and how to make these changes (54).

In some circumstances, information-imparting techniques may be appropriate and useful. For those patients who have shown little susceptibility to oral disease, dietary change may not be needed (4). For these patients, general information regarding diet, nutrition and dental health may be presented. The approach may be at the chairside during routine oral hygiene treatment (20). It may be supplemented with audiovisual aids and/or literature. However, if a need for diet alteration is indicated, then additional counseling techniques should be incorporated (20).

The diet counseling program should be continually evaluated and modified to meet the changing needs of the patient (13). Consistent reinforcement is necessary to keep the patient's interest and obtain positive results (19). Regularly scheduled oral hygiene recall appointments can be utilized for long term reinforcement which can become a routine part of the patient's care (8,50).

Although the importance of dietary counseling in dentistry has been identified throughout the literature (3-6,10,14,15,18,32,37-39,45,48,60,71-75), many dental practices do not provide this service along with the other routine preventive measures. A survey by Stager and Levine (57) revealed that 81% of the dental practitioners questioned did not have nutrition counseling available in their practices. Almost all (98%) of 347 dentists who responded to a survey on preventive dentistry indicated that they practiced preventive dentistry, yet less than 20% performed any type of nutritional analysis of their patients (76).

In contrast, some dentists have been reported to incorporate extensive nutrition evaluation and counseling programs in their offices, some practices of which have been questioned (6). Dietary counseling with respect to dental caries occurs most frequently in dental practices as shown in two surveys of dental practitioners (65,77). These studies did not evaluate the scope of the dietary counseling activities provided, i.e. whether it involved merely imparting information or assisted the patient in dietary behavior change. Although many dentists believe that they or their staff offer effective patient education, frequently it is not of the type that will result in change of behavior, thus it may be ineffective (20). Furthermore, many dental professionals delude themselves into believing that they are applying adequate nutrition principles in patient care by merely advising the patient to restrict refined carbohydrate intake (78).

Although nutrition is important to the prevention of dental disease, dietary counseling is thought by some to be the most neglected preventive dentistry service (4,6). The literature offers possible clues as to why dietary counseling may not take place in some dental practices, including inadequate nutrition training, poor nutrition knowledge and negative attitude of the dentist.

Nutrition Training of the Dentist

It has been suggested that dentists have not been sufficiently trained in the science of nutrition and assessment (3,4,6,10,15,57,73,79). Dentists expressed their inadequacies in a study by Stager and Levine (57). It was found that only 30% of the dentists surveyed felt confident in their nutrition knowledge; 68% were uncertain or not confident in their nutrition expertise; and only 26% felt that dental schools provide a well-rounded education in nutrition (57).

Nutrition knowledge, attitude and the adequacy of nutrition education has been studied and reported in the literature for various health professionals (17,48,80-89). Practicing physicians reported feeling inadequate to treat patient's nutritional problems, and medical students repeatedly expressed the need for further instruction (90-92). In dentistry, the studies have focused on nutrition education in the dental schools and reveal a critical gap in the nutrition education of most dental health practitioners (6,10,17,45).

A survey of dental students at the Missouri-Kansas City School of Dentistry (6) showed a decrease in nutrition knowledge scores from the first to the fourth year rather than a reinforcement of learning. In a similar study (17), dental students at the University of Kentucky scored below the mean for undergraduate students who had completed a basic course in nutrition with a grade of "C". University of Melbourne dental students showed only moderate improvement in nutrition knowledge over their five year educational span and held on to many misconceptions regarding nutrition (45).

Moreover, the American Dental Association Special Committee on the Future of Dentistry reported a 40% reduction in clinical nutrition instruction in the dental schools between 1976 and 1981 (27). A 39% decline in the study of behav-

ioral principles applied to patient education and counseling has been reported as well (27).

The results of these and other studies indicate that some dental schools have failed in many respects to provide an adequate, comprehensive nutrition education program (10). Nutrition education has not been able to compete with other dental subject areas within the limited curricular time constraints of the dental schools (48,93). In addition, there is a shortage of educators employed in the dental schools who are appropriately trained in nutrition science (3).

Knowledge and Attitude of the Dentist

The knowledge acquired and the attitudes formed by the dental student toward nutrition will be carried with him or her into professional practice (6). This can ultimately influence the quality of preventive dental care delivered to patients (6) and perhaps whether or not dietary counseling is offered. Inadequate training in nutrition may contribute to the opinion of some dentists that dietary counseling is not important or economically feasible (37,57). Some dental practitioners feel that nutrition is confusing, frustrating and not realistic for private dental practice (4,94). These attitudes may reflect a lack of understanding of the objectives of a dietary counseling service (4), including how to define a nutrition problem, who to counsel, or when to refer a patient (72).

Although some dentists may provide excellent nutrition advice to their patients, researchers believe that much misinformation is being disseminated (65). Inconsistencies in attitudes between dental researchers and practicing dentists regarding diet and dental health are significant (65). Some dentists have been involved with questionable nutrition practices (3,11). As a substitute for dietary counseling, the patient may be given a prescription for nutritional supplements or

offered unscientific advice (73). Assessment of nutrient status by controversial methods (e.g. hair analysis, kinesiology) had gained popularity in the past (3,37,61,74), which suggests that some dentists have difficulty in discerning nutrition fact from fiction (11). This may have contributed to the negative attitude held by some toward nutrition in dentistry (37).

On the other hand, some dentists do base their advice on sound nutrition principles but often stress a simplistic approach to a complex issue (65). Often times they limit their counseling to the restriction of refined carbohydrates (10,65,74) rather than addressing overall nutritional adequacy (74). Dietary counseling requires careful consideration of multiple interdependent factors in relation to dental health which may exceed the limits of the dentist's nutrition training (59).

Controversy that has been associated with the concept of nutrition in oral health/disease may have contributed to the negative attitude of some dental practitioners (3,75,95). In the past few decades conflicting evidence from poorly controlled studies and inadequate experimental design have clouded the role of nutrition, particularly in periodontal disease (3,37,95). The present tendency is to either deny or to overstate the importance of nutrition (95). Some feel that the present state of knowledge is not adequate to provide the answers to nutritionally conscious patients (37).

The Dental Hygienist and Dietary Counseling

Prevention of dental disease is one of the basic tenets of dental hygiene practice (28). Dental hygienists are primarily responsible for the delivery of preventive dental health care. The growing knowledge and awareness of the relationship between good dietary habits and the prevention of disease have brought nutritional assessment and dietary counseling into focus as essential components of den-

tal hygiene care (36). Dental hygienists see their patients on a more frequent and regular basis than most health care providers (36). This places them in a position to detect dietary deficiencies and to educate and assist the patient in adopting dietary changes (36,78).

The hygienist's role in patient education and motivation has gained increasing emphasis (96). Studies have found that patients generally view the role of the dental hygienist as one which includes patient education along with the other traditional dental hygiene functions (25,96). Dental hygienists were selected as the preferred provider of patient education in the dental office in a survey by Kvitz (25). No studies were found in the literature which addressed patient acceptance of the dental hygienist with respect to dietary counseling specifically. However, considering the favorable attitude of patients toward the dental hygienist's role as patient educator, one might expect patient acceptance of dietary counseling, provided that the patient understands the relationship between nutrition, diet and their oral health.

The Baylor College of Medicine Preventive/Task Matrix (The Baylor Model) categorizes the dental hygienist's role in preventive dentistry (Figure 1) (8). The model incorporates nutrition into three levels of prevention. Primary prevention of oral disease begins with establishing a data base which includes nutritional/dietary assessment (8). Assessment can serve as a means for identifying patients for whom simple dietary counseling is necessary and those patients who may need referral to a dietitian or physician. It may also identify those patients who do not need diet modifications (36). Dietary counseling is a component of the secondary level of prevention which includes clinical services designed for control and elimination of the disease process. The tertiary level involves the maintenance phase which includes assessment, reinforcement and education (8). This phase of

prevention can be woven into the periodic recall appointment where the patient returns on a routine basis, i.e. every 6 months (8,36).

Dental hygienist activities	Level of prevention		
	Primary	Secondary	Tertiary
H & P	<ul style="list-style-type: none"> • Patient history • Patient knowledge of prevention • Nutritional data • Diagnostic impressions 	<ul style="list-style-type: none"> • Oral examinations • Head and neck examination • Radiographs • Health screening 	<ul style="list-style-type: none"> • Periodic evaluation • Patient reinforcement
Dx	<ul style="list-style-type: none"> • Initial discussion between hygienist and the dental practitioner 	<ul style="list-style-type: none"> • Presentation of data to dental practitioner 	<ul style="list-style-type: none"> • Patient progress data presented to dental practitioner
Rx _p	<ul style="list-style-type: none"> • Traditional patient education 	<ul style="list-style-type: none"> • Calculus and plaque removal • Application of topical fluoride • Dietary counseling • Pit and fissure sealant 	<ul style="list-style-type: none"> • Extension of therapy • Care and maintenance of oral appliance(s) • Rehabilitation counseling

H & P = History and physical data gathering activities, including laboratory data.
 Dx = Case presentation with risk appraisal and prognosis made by dental practitioner.
 Rx_p = Dentist-prescribed preventive measures conducted by dental hygienist.

Figure 1. The Baylor Model illustrating a preventive/task matrix adapted to illustrate the role of the dental hygienist in preventive dentistry. (From: Hefley, D. C., Thomson, W. A., Holcomb, J. D., and Roush, R. E.: The Hygienists's Role in Primary, Secondary and Tertiary Prevention of Dental Disease. Dent Hyg Jan:35, 1981.)

Although the role of the dental hygienist in preventive dentistry is well documented (8,16,21-31), the literature only superficially addresses the dental hygienist with respect to nutrition and dietary counseling.

Knowledge and Attitude of the Dental Hygienist

Nutrition knowledge or the adequacy of nutrition training of the dental hygienist has not been reported in the literature. Attitudes of dental hygienists with respect to their role in preventive dentistry have been reported in the literature but not with specific regard to dietary counseling in the dental practice. Holcomb et al. (28) examined dental hygienists' beliefs regarding health promotion/disease prevention. The study found that dental hygienists perceive themselves as important providers of health promotion and disease prevention services regarding dental health, and are considered to be good health role models. Among the behaviors believed to be most important was eating a balanced diet which indicates a positive attitude toward nutrition. It is important for the dental hygienist to have a positive attitude to be an effective dietary counselor (19).

Gilpin (24) studied the preventive orientation of dental hygienists and found a positive correlation between their personal preventive behavior (e.g. diet, exercise, use of seat belts, smoking) and their professional preventive behavior (e.g. taking health histories, periodontal probing, nutrition education, oral screenings). It was also shown that dental hygienists who have a greater professional preventive orientation will spend more time on patient education (24).

Frequency and Barriers to Performance of Dietary Counseling

The frequency of dietary counseling performed by dental hygienists in the dental practice has been reported in two studies. A survey examining career satisfaction of Colorado dental hygienists found that while 86% of the respondents had training in dietary counseling, only 29% of them reported that they routinely performed this service (97). In a survey of Iowa licensed dental hygienists, 40% of the

respondents reported providing nutrition education always/usually, 47% sometimes and 13% seldom/never (24). Neither of these studies described the extent of counseling activities involved, the content of nutritional information, nor did they assess the quality of the counseling service.

Barriers to performance of various preventive/diagnostic procedures by dental hygienists in the dental practice have been reported in the literature (16,98,99). Among the most often cited were "employing-dentist resistance" and "lack of time".

Darby (16) pointed out that the functional role of the dental hygienist in practice depends solely on the judgement of the employing-dentist. Dental hygienists frequently remark that they are not given adequate time in the dental practice to render the type of services many patients need and they are prepared to provide (16,99). She further suggested that the dental hygienist has had little opportunity to determine the type of preventive oral care that is required yet dental hygienists receive significantly more education and experience in preventive care than do dental students (16). A University of Washington survey (16) found that only 1.8% of total instructional time was spent on preventive dentistry in the dental curriculum. The number of didactic clock hours spent in nutrition was significantly different between the dental hygiene curriculum (40 hours) and the dental school curriculum (10 hours). The study did not, however, discern the quality of nutrition education in either curricula. Comparatively, the Oregon Health Sciences University dental hygiene students receive more didactic clock hours of nutrition instruction (24 hours) than do the dental students (17 hours) (100,101).

Confidence in one's skills may be a predictor of behavior according to the constructs of the social learning theory (SLT) (102). Thus, lack of confidence in dietary counseling skills may be a barrier to the dental hygienists' performance of this procedure in the dental practice. Concepts of SLT have been used to explain pa-

tient counseling behaviors of health professionals with regard to health promotion and disease prevention (102). Mullen et al. (102) surveyed dental hygienists among other allied health professionals and found some significant relationships with respect to self-efficacy and their perceived counseling skills. Self-efficacy was found to be associated with self-reported counseling activity. A study of dietetic practitioners by Martin et al. (103) concluded that the practitioner's confidence in his or her counseling skills was correlated with the intensity or extent of their counseling efforts.

The social learning theory describes the concept of self-efficacy as beliefs about one's capabilities of performing specific behaviors in particular situations (102,104-106). Conceptually, expectations of personal mastery affect initiation of a behavior. People are more likely to engage in a behavior when they judge themselves capable of handling the situation (105,106). Expectation alone, however, will not produce desired performance if the component capabilities or incentives are lacking (106).

Development of Dietary Counseling Skills

What then influences one's confidence in knowledge and skills? What can be done to foster a high degree of confidence? According to Bandura, efficacy expectations are learned from four major sources. These sources are: performance accomplishments, vicarious experience, verbal persuasion, and physiological state or emotional arousal (104,106). Performance accomplishments are attained through personal experience and are the most influential. Successive mastery over tasks required to engage in a behavior helps an individual to develop and refine his or her skills (104).

Knowledge of what one should do is not enough to master a skill (107). The social learning theory suggested that the acquisition of skills requires practice and feedback (107,108). Insufficient practice was cited as one reason for which dietitians failed to transfer their learned skills from the training to the non-training environment (109,110). Mullen et al. suggested building self-efficacy through skills training that emphasize role playing and practice on the job (102).

Lowenstein et al. (109) also suggested that the acquisition of skills is facilitated by the application of knowledge in real-life situations. Clinical experience is a major component of the dental hygiene curriculum. Therefore, this is an ideal setting to develop dietary counseling skills through practice (36). Woodall (36) recommended that the dental hygiene curriculum should include supervised clinical experience with a range of patient cases. During each clinical rotation, students should have the opportunity to apply all previous nutrition classroom learning to patient care (3).

In a study by Boyer and Neilsen (111) which examined clinical experience in dental hygiene programs, it was found that the frequency of nutrition counseling performed by students varied among programs, but as a rule did occur much less than other traditional clinical services. The dental hygiene directors also ranked the level of importance and degree of difficulty of 14 clinical services. On a scale of 1 to 14, nutrition counseling with respect to importance ranked 11th, and difficulty ranked 9th. One conclusion of the study was that frequency of the service was related to the perceived importance of the service by the program director (111).

Perhaps the perception of importance or relevance of nutrition on the part of the educators or educational setting consequently influences the perception of its importance by the student (91,107). Danish et al. (107) suggested that a trainee's perception of the relevance of a skill in the training clinic environment is important

to maintaining the skills learned. This perhaps relates to the development of skills as well. A survey of medical students showed perception of nutrition to be influenced by how seriously nutrition is treated by faculty and whether clinical faculty appreciate and utilize nutrition in patient care (91). Inadequate individual feedback and inadequate reinforcement of nutritional skills during the educational process was found to be a determinant in the lack of self-reported counseling skills among residency trained physicians (112).

Tilliss and Cross-Poline (98) pointed out that the intent of the dental hygiene educational process is to help the students understand the importance and necessity of performing dental hygiene procedures with the goal of performing them successfully and routinely when they enter practice. They, too, supported frequent clinical practice of these procedures as being necessary to emphasize their importance to help attain this goal.

In terms of difficulty, Boyer and Neilsen (111) found that services considered not very difficult were practiced more than services considered more difficult to perform. Nutrition counseling ranked moderately difficult on the scale as previously noted. According to the social learning theory, the more complex the behavior, the more skills the individual will need to perform the behavior at an acceptable level of efficiency (108). Therefore, nutrition counseling, perceived as relatively difficult, needs to be performed more frequently to develop the requisite skills.

Clinical experience should include all phases of dietary counseling, including nutritional assessment, food intake evaluation, and patient communication (3). Behavioral counseling skills are essential to the success of patient management in dietary counseling (70). The effectiveness of teaching these skills can be strengthened with prerequisite knowledge in the behavioral sciences. Bunker et al. (113) suggested that it may be necessary to examine the adequacy of student preparation

in this area as it serves as a critical foundation for developing the skills necessary to influence disease prevention behaviors in patients. Boyer and Neilsen proposed that preventive clinical techniques and psycho-behavioral approaches to preventive health behaviors are not receiving adequate curriculum content and practice time (111).

METHODS

Development of the Questionnaire

A questionnaire was developed to determine the extent and quality of dietary counseling performed by dental hygienists in dental practices and to identify factors which affect the extent. The questionnaire was developed based on Dillman's (114) methods and in consultation with the Oregon State University Survey Research Center.

The questionnaire solicited information on: (1) extent of dietary counseling performed by dental hygienists, (2) their attitude toward nutrition and dental health, (3) their confidence in their nutrition knowledge and dietary counseling skills, (4) their perception of practice constraints as barriers to dietary counseling, (5) the quality of nutrition information they impart in dietary counseling, (6) their knowledge of nutrition, and (7) their personal dietary practices. Additional information was sought on the types of nutrition topics discussed in the dental practice and the types of patients who are receiving dietary counseling. The questionnaire also assessed continuing education activities of dental hygienists and nutrition resources utilized. Selected demographics were obtained as well. Space was provided at the end of the questionnaire for additional comments. A copy of the questionnaire is found in Appendix A.

Extent

The questions (Q-1a,b,c,d,e) developed to elicit extent of dietary counseling were based on a nutrition program model, designed for the dental office by Kravitz,

Pollack and Muller (3). The model outlined a series of activities to be used as a guide to evaluate a patient's nutritional status and to counsel a dental patient regarding his/her dietary habits.

The respondents were asked how often they perform five dietary counseling tasks: (1a) Ask a patient to record his/her food intake; (1b) evaluate a patient's diet for nutritional adequacy; (1c) give a patient information related to the foods he/she eats; (1d) recommend dietary modifications based on the patient's present diet; and (1e) follow up on suggestions after initial recommendations are made.

Frequency was measured by responses on a four-point Likert scale from (1) often, (2) sometimes, to (3) seldom or (4) never. A summation of all items ($Q-1a + b + c + d + e$), divided by the number of responses answered, produced an average for each respondent. Upon the advice of the statistician, if there were two or more missing responses, not enough information was provided and the respondent was given a score of zero. The respondents' scores were averaged to obtain a mean score for extent for the population. The lower the score, the greater the extent of dietary counseling.

An additional question (Q-1f) was added to determine how often the respondents utilize the referral services of a nutrition professional. The results of this question were not tabulated in the score for extent.

Attitude

Attitude toward nutrition and dental health was measured from the following three statements (Q-18a,d,h): (18a) Proper nutrition is as important as proper oral hygiene in the prevention of dental disease; (18d) dietary counseling should be a component of a comprehensive preventive dentistry service; and (18h) it is a responsibility of the dental hygienist to provide dietary counseling to his/her patients.

These three attitude statements were developed from those found in the literature (6,84). As none of these prior studies examined the attitude of dental hygienists, selected statements were reworded to include the subjects of this study.

A four-point Likert scale was used ranging from (1) strongly agree to (4) strongly disagree. For each respondent, the scores were summed ($Q-18a + d + h$) and divided by the number of responses answered to produce an average score. If one or more responses were missing, a score of zero was assigned. The respondents' means were averaged to obtain a mean score for attitude for the population. A low score indicates a favorable attitude toward nutrition and dental health.

Confidence

Confidence in nutrition knowledge and dietary counseling skills was measured from the following statements (Q-18c,f,i,k): (18c) Patients often ask me questions about nutrition that I feel unprepared to answer; (18f) I feel very confident in recommending dietary modifications to my patients; (18i) I developed adequate dietary counseling skills through my dental hygiene curriculum; and (18k) I feel very confident in my knowledge of nutrition. These four statements were also generated from the literature as were the items related to attitude above.

Scoring was done with the four-point Likert scale ranging from (1) strongly agree to (4) strongly disagree. Q-18c was worded negatively; therefore, the scores were reversed and recoded ($SA = 4, SD = 1$). The scores were summed ($Q-18c + f + i + k$) and divided by the number of responses answered to obtain an average score for each respondent. If two or more responses were missing, a score of zero was given. The respondents' scores were averaged and a mean score was obtained for confidence for the population. A low score indicated a high level of confidence in nutrition knowledge and acceptable dietary counseling skills.

Practice Constraints

Five items (Q-18b,e,g,j,l) were developed to measure the impact of practice constraints on the extent of dietary counseling: (18b) Our dental practice supports the concept of dietary counseling; (18e) dietary counseling is not cost effective in our dental practice; (18g) the lack of insurance reimbursement is a major obstacle to dietary counseling; (18j) dietary counseling is not likely to be well received by our dental patients; and (18l) dietary counseling fits well into the patient scheduling routine of our dental practice.

Three of these statements (Q-18e,g,j) were modified from a study which surveyed dental hygienists about health promotion beliefs (28). The other two statements were developed based on frequently identified practice constraints in the literature.

A four-point Likert scale was used ranging from (1) strongly agree to (4) strongly disagree. Two questions (Q-18b,l) were reversed and recoded ($SA = 4$, $SD = 1$). The scores for all five items were summed ($Q-18b + e + g + j + l$) and divided by the number of responses answered, to obtain an average score for each respondent. If two or more responses were missing, a score of zero was assigned. The respondents' scores were averaged and mean was obtained for practice constraints for the population. The lower the score, the greater the practice constraints.

Quality

To assess the quality of dietary counseling given by dental hygienists, a sample day's diet was constructed (Appendix A). Five questions (Q-13 to Q-17) pertaining to the diet were developed, based upon recommendations as generally accepted by reputable nutrition authorities (i.e. Registered Dietitians). The questions were designed to assess the dental hygienist's ability to: recognize accept-

able/unacceptable aspects of the diet, make appropriate dietary recommendations, and apply basic nutrition knowledge. Questions regarding nutrients particularly important to the health of the oral tissues as well as basic nutrition principles were used.

The sample diet and questions were reviewed by four faculty members in the Department of Nutrition and Food Management at Oregon State University. Revisions were made based on their recommendations. A score of 1 was assigned for each correct answer for each of the five questions. Incorrect and missing answers were assigned a zero. A total score was obtained for each respondent by summing the correct responses and dividing by the number answered. The possible range of individual scores was from 0 to 5. The respondents' scores were averaged and a mean was obtained for quality for the population. The higher the score, the higher the quality of information imparted in dietary counseling.

Knowledge

Nutrition knowledge was assessed in Q-8 to Q-12 (Appendix A). Four of the questions (Q-8,9,11,12) were selected from "Dental Hygiene National Board Review" and one (Q-10) from the 1983 Dental Hygiene National Board exam. Dental hygiene sources were utilized to ensure an appropriate assessment of knowledge gained through a dental hygiene curriculum. The questions were reviewed by the above mentioned O.S.U. nutrition faculty. Q-10 was modified based on recommendation of the expert reviewers. Fundamental principles of diet and oral health as well as basic nutrition questions were selected. Scoring for knowledge questions was the same as previously described for quality. The higher score, the higher degree of nutrition knowledge.

Personal Dietary Practices

In keeping with the questionnaire format, a set of key questions (Q-7a,b,c,d,e) was designed to solicit information regarding the respondent's personal dietary habits (Appendix A). After a review of the literature and perusal of various dietary intake methods, the measure for personal dietary habits was constructed. The literature revealed that all current dietary intake methodologies have inherent weaknesses (68), therefore the objectives of the study should determine the method used. Upon examination of existing methods, none was deemed appropriate for the time constraints of this type of self-administered questionnaire.

Content of the questions was based on the *Dietary Guidelines for Americans* issued by the U.S. Department of Agriculture and the U.S. Department of Health and Human Services and supported by the *Surgeon General's Report on Nutrition and Health* (1). Although the guidelines are limited by lack of specifics (115), they do provide some basis for dietary evaluation.

Respondents were asked to indicate if they (1) often, (2) sometimes, (3) seldom, or (4) never follow each practice. The scores were summed (Q-7a + b + c + d + e) and divided by the number of responses answered, and an average score was obtained for each respondent. If two or more responses were missing a score of zero was given. The respondents' scores were averaged and a mean score was obtained for dietary practices for the population. A lower score indicated positive dietary habits.

Two additional questions (Q-7f,g) addressed the usage of vitamin/mineral supplements and the reading of labels. The question on the use of vitamin/mineral supplements was included to ascertain the respondent's ability to discriminate be-

tween effective and ineffective (103,116) health measures. The practice of reading labels was included as a positive health measure (1).

Topics of Discussion

To further explore the nature of dietary counseling in dental practices, Q-5 (a through j) assessed the frequency with which specific topics are discussed in the dental practice (Appendix A). The respondents were asked to indicate if they (1) often, (2) sometimes, (3) seldom, or (4) never discuss selected topics with their patients. The topics were selected from the "Curricular Guidelines on Biochemistry and Nutrition for Dental Hygienists" (117) developed by the sections on Biochemistry and Nutrition and Dental Hygiene Education of the American Association of Dental Schools (AADS). The responses were tabulated to obtain frequencies for each of these topics of discussion.

Types of Patients Counseled

To add to the profile of dietary counseling in dental practices, Q-6 (a through e) was included to identify the types of patients who are most often recipients of dietary counseling (Appendix A). The respondents were to indicate if they (1) often, (2) sometimes, (3) seldom or (4) never provide dietary counseling to each type of patient listed. The responses were tabulated to obtain frequencies on each of the five types of patients who receive counseling by the respondents.

Continuing Education and Resources

Three questions (Q-23,23a,24) were included to identify the dental hygienist's interest and behavior with respect to keeping current in nutrition (Appendix A). The respondents were asked to list any nutrition related continuing education

courses/seminars attended within the last three years, and if not attended, to indicate the reason(s) why. An open ended question asked the respondents to list any resources utilized to stay current in nutrition. Frequencies were obtained for attendance and reasons for nonattendance.

Demographics

And finally, to obtain a description of the responding dental hygienists, the following demographic information was sought (Q-19 through Q-22): Dental hygiene school and year of graduation, highest academic degree earned, the number and type(s) of dental practice(s) of employment, and the county in which their dental practice was located (Appendix A).

Testing Questionnaire for Validity

Prior to the study, the questionnaire was reviewed for content validity by two experts associated with nutrition education and research from Oregon State University and three experts in dental hygiene education and practice at Oregon Institute of Technology. It was then pilot tested with a group of six practicing dental hygienists in the community of Klamath Falls to determine face validity. The group was observed during administration of the questionnaire to obtain verbal as well as nonverbal feedback regarding its ease of use and format.

Following minor revisions, the questionnaire was pilot tested with a group of 20 practicing dental hygienists attending the 1989 annual Oregon Dental Convention. The participants completed the questionnaire independently and were provided a stamped self-addressed envelope for its return. Fifteen individuals (75%) returned the completed questionnaire.

The finalized questionnaire was approved by the Oregon State University Human Subjects Committee.

Selection of the Sample

A comprehensive alphabetical list of Oregon licensed dental hygienists, current for 1989, was obtained from the Oregon Board of Dentistry. From a total population of 1440, a sample of 300 licensed dental hygienists was randomly selected as advised by the O.S.U. Survey Research Center.

Administration of the Questionnaire

A letter was included on the cover of the questionnaire which requested the subject's participation in the study. Questionnaires, with stamped self-addressed envelopes, were mailed summer, 1989, to the sample population of 300. Each questionnaire was coded with an identification number to maintain confidentiality of information while facilitating follow-up mailings. As the Dillman method suggests, a postcard reminder was mailed one week later to all subjects. Two weeks later, non-respondents received a follow up letter and duplicate questionnaire.

Statistical Analysis

Data were analyzed with an Oregon State University statistics consultant using the Statistical Package for Social Sciences (SPSS) (118). A frequency distribution was computed for each question. Further descriptive statistics (mean, standard deviation, and range) were computed for selected variables. To test the hypotheses, appropriate statistical tests were performed. They included Pearson product-moment correlations, scatter plots, one-way analysis of variance

(ANOVA), and chi square (Table 1). In addition to hypotheses testing, further statistical analysis examined the relationships among a variety of other variables (Table 2).

Statistical tests were conducted at the five percent ($p \geq .05$) significance level. Reported frequencies were adjusted to eliminate missing responses from the total.

Table 1. Statistics used for hypotheses testing.

hypothesis	statistical method	dependent variable	independent variable
Hyp 1	ANOVA Pearson r correlation	extent	knowledge
Hyp 2	Pearson r correlation Chi Square	quality	knowledge
Hyp 3	ANOVA Pearson r correlation	extent	confidence
Hyp 4	ANOVA Pearson r correlation	extent	attitude
Hyp 5	ANOVA Pearson r correlation	extent	diet practices
Hyp 6	ANOVA Pearson r correlation	extent	practice constraints

ANOVA = analysis of variance			

Table 2. Statistical analysis of additional variables.

statistical method	dependent variable	independent variable
Analysis of variance (ANOVA)	extent	school of graduation year of graduation
	confidence	school of graduation year of graduation
Pearson r correlation	confidence	year of graduation
Chi square	confidence	knowledge
	quality	confidence
	knowledge	school of graduation year of graduation
	quality	school of graduation year of graduation
	continuing education	year of graduation

RESULTS AND DISCUSSION

Response to Questionnaires

Of the 300 questionnaires sent, 212 were completed and returned. Five additional questionnaires were returned by the post office as "undeliverable". The adjusted response rate was 72%.

Demographics

The educational background of the respondents was reported to be as follows: 51% held an associate degree; 42% held a bachelor's degree, 9% held a master's degree, and 5% held a certificate. The year of graduation from dental hygiene school ranged from 1956 to 1989. Eleven percent of the respondents graduated between 1956 and 1969; 43% graduated between 1970 and 1979; and 44% graduated between 1980 and 1989. All of the five Oregon dental hygiene schools were identified as a school of graduation (Table 3). The remaining respondents (17%) reported graduation from a school outside of Oregon.

Sixty-seven percent of the responding dental hygienists were employed in one dental practice, 21% in two dental practices, 5% in three dental practices; and 6% were not employed in a dental practice at the time and answered the questions based on past experience. Most of the respondents (87%) were employed in private practice, 7% in a periodontal practice, and 2% in a pedodontic practice (dentistry for children). Respondents were employed in dental practices located throughout the state of Oregon. All 36 Oregon counties were represented with the

Table 3. Percentages of respondents graduated from Oregon and out-of-state dental hygiene schools (n = 210).

	number	percent
Oregon schools:		
Oregon Health Sciences University	71	34
Lane Community College	38	18
Portland Community College	29	14
Mt. Hood Community College	23	11
Oregon Institute of Technology	13	6
Out-of-state schools:	36	17

largest percent of respondents employed in the metropolitan areas: 26% (n = 54) Multnomah, 13% (n = 27) Washington, 13% (n = 27) Lane, 9% (n = 19) Clackamas, and 8% (n = 16) Marion. The cell sizes of the remaining counties were too small to do statistical testing and comparisons by counties. Six percent (n = 13) of the respondents, although licensed in Oregon, were residents outside of the state. Some of these practiced in the Vancouver/Portland area, others have recently moved but still retain an Oregon license. Of these out of state respondents, 72% were trained in Oregon dental hygiene schools.

Extent of Dietary Counseling

To identify extent of dietary counseling, the respondents were asked (Q-1a,b,c,d,e) how often they perform five dietary counseling tasks (Table 4). The majority (96%) of respondents reported that they seldom/never ask a patient to record his/her food intake. Most (77%) never do, while only 3% do so often/sometimes. Most of the respondents (82%) seldom/never evaluate a patient's diet for nutritional adequacy although 64% often/sometimes give a patient information

related to the foods he/she eats and 58% often/sometimes make dietary recommendations based on a patient's present diet.

Table 4. Extent of dietary counseling by dental hygienists.

dietary counseling task	n	often no. % ^a	sometimes no. % ^a	seldom no. % ^a	never no. % ^a
Ask a patient to record his/her food intake for a given period of time.	208	2 1	5 2	40 19	161 77
Evaluate a patient's diet for nutritional adequacy.	208	8 4	30 14	81 39	89 43
Give a patient information related to the foods he/she eats.	208	29 14	103 50	43 21	33 16
Recommend dietary modifications based on the patient's present diet.	211	19 9	103 49	69 33	20 10
Follow-up on suggestions after initial recommendations are made.	211	12 6	74 35	66 31	59 28
Refer patients to nutrition professionals, i.e. Registered Dietitian.	211	2 1	15 7	27 13	167 79

^aRatings: 1 = often; 2 = sometimes; 3 = seldom; 4 = never.

These responses seem to indicate that some informal discussion of diet may take place based upon a verbal account of the patient's dietary habits. Perhaps general information regarding diet and nutrition is imparted with no attempt to elicit a dietary behavioral change in the patient's diet.

It is interesting to note that a large percentage of the respondents do not ask patients to record their diet, yet they say they do evaluate and give information re-

lated to the patient's diet. If these dental hygienists are not utilizing some form of diet intake methodology, it is not apparent that the diet information given is being tailored to the specific needs of the patient.

After initial dietary recommendations are made, 41% often/sometimes do a follow up with their patients. The nature of the follow up was not indicated, i.e. whether it might be an informal discussion at a subsequent appointment or a scheduled diet evaluation. Fifty-nine percent seldom/never follow up which suggests that dietary behavior change is not likely to occur or to be reinforced.

Respondents were asked (Q-1f) how often patients were referred to a nutrition professional (i.e. Registered Dietitian). Ninety-two percent never/seldom refer patients to a nutrition professional and only 8% do so often/sometimes. This response is consistent with what has been reported in the literature (14,60).

The mean score for extent (Q-1a,b,c,d,e) was 2.9 ± 0.6 ranging from 1.4-4.0; $n = 211$. This suggests that dietary counseling occurs in the dental practice to a very limited extent. Further, since such a high percentage (96%) do not utilize a patient food intake record, it may be questionable as to the value of the dietary counseling reportedly taking place in terms of behavior change.

Other questions further analyzed the extent of dietary counseling. In Q-2 respondents were asked how often their patients sought dietary or nutrition information from them. As reported by 56% of the respondents, their patients seldom/never ask them questions regarding diet or nutrition, while 44% reported that their patients often/sometimes do.

The results of this study seem to indicate that the majority of dental patients do not initiate discussion of nutrition or diet in their dental office. Although many consumers are interested in nutrition and diet, perhaps they do not associate dental treatment with dietary advice because it has been neglected (4,6) in the dental prac-

tice. Contrary to these findings, Stager and Levine (57) found a higher percentage of patients asked nutrition-related questions. Eighty-nine percent of the dentists in their survey reported that one or more questions were asked of them each week.

Question 3 asked for the percentage of patients receiving dietary advice in their dental practice. Over half (55%) of the respondents reported that dietary advice is given to less than 10% of their patients. Twenty-nine percent reported that dietary advice is given to 10%-25% of their patients, 9% of the respondents reported from 26%-50%, and 5% reported giving advice to 51%-76% of their patients. As stated previously, not all patients may need dietary change, therefore dietary counseling would not be warranted. It is difficult to interpret the extent of counseling in terms of the percentage of patients counseled as it may be dependent upon the overall make-up and dental status of the patients associated with the dental practice.

Who provides dietary counseling in the dental practice? As shown in Q-4, 52% of the respondents reported that dietary counseling is provided by the dental hygienist, 41% by the dentist, 16% by the dental assistant, 2% by a Registered Dietitian, and 5% by an other such as a physician or, in one case, the dental office receptionist. Some of the responses included more than one type of dental or other professional.

Attitude

Three attitudinal statements (Q-18a,d,h) were intended to evaluate the respondent's views toward the importance of nutrition to dental health, the role of dietary counseling in preventive dentistry and the role of the dental hygienist as a dietary counselor. The responding dental hygienists expressed favorable attitudes toward nutrition and dietary counseling (Table 5). Most (89%) agreed that nutri-

tion is important to dental health and 86% agreed that dietary counseling should be a component of a preventive dentistry service.

Table 5. Attitude of dental hygienists toward nutrition and dietary counseling.

attitude statement	n	SA no. % ^a		A no. % ^a		D no. % ^a		SD no. % ^a	
Proper nutrition is as important as oral hygiene in the prevention of dental disease.	208	67	32	119	57	21	10	1	1
Dietary counseling should be a component of a comprehensive preventive dentistry service	207	32	16	145	70	30	15	0	0
It is a responsibility of the dental hygienist to provide dietary counseling to his/her patients.	203	11	5	106	52	78	38	8	4
^a Ratings: 1 = strongly agree (SA); 2 = agree (A); 3 = disagree (D); 4 = strongly disagree (SD).									

While most feel that dietary counseling is important, fewer respondents (57%) agreed that it is a responsibility of the dental hygienist to provide this service to his/her patients. This last statement may have had differing interpretations among the respondents. It may have been interpreted by some that dietary counseling is not necessarily a "responsibility" of the dental hygienist as is plaque control counseling. Or perhaps they interpreted it to mean that someone other than the dental hygienist should perform or is responsible for this task.

The mean for attitude (Q-18a,d,h) was 2.1 ± 0.5 ranging from 1.0-3.3; n = 211. This would indicate that dental hygienists regard nutrition and the provision of dietary counseling as being important to their patient's dental health.

Confidence

Four statements (Q-18c,f,i,k) were included in the study to assess the degree of confidence in the respondent's nutrition knowledge and dietary counseling skills. The responses suggest that confidence is lacking in both respects (Table 6).

Table 6. Confidence in nutrition knowledge and dietary counseling skills of dental hygienists.

confidence statement	n	SA no. %	A no. %	D no. %	SD no. %
Patients often ask me questions about nutrition that I feel unprepared to answer.	204	5 3 ^b	69 34 ^b	121 60 ^b	9 4 ^b
I feel very confident in recommending dietary modifications to my patients	204	9 4 ^a	79 39 ^a	102 50 ^a	14 7 ^a
I developed adequate counseling skills through my dental hygiene curriculum.	205	9 4 ^a	73 36 ^a	104 51 ^a	19 9 ^a
I feel very confident in my knowledge of nutrition.	201	8 4 ^a	52 26 ^a	128 64 ^a	13 7 ^a

^aRatings: 1 = strongly agree (SA); 2 = agree (A); 3 = disagree (D); 4 = strongly disagree (SD).

^bReverse ratings: 1 = SD; 2 = D; 3 = A; 4 = SA.

The majority of respondents (71%) reported that they do not feel very confident in their knowledge of nutrition. Over half (60%) disagreed that they had developed adequate dietary counseling skills in their dental hygiene curriculum. And nearly the same number of respondents (57%) did not feel confident in making di-

etary recommendations, which may indeed result from poorly developed skills and lack of confidence in knowledge (102,104-106).

Contrasting results occurred in response to the statement (Q-18c), "Patients often ask me questions about nutrition that I feel unprepared to answer". There were only 36% of the respondents in agreement with the statement which indicates low confidence, while the 64% in disagreement would appear confident. However, in light of the other three responses, it may be that the meaning of the statement had been misconstrued. While the intent of the statement was to elicit the respondent's preparedness to answer nutrition questions, some may have interpreted it to mean that patients "do not often ask" questions about nutrition. Or perhaps they feel confident with the level of nutrition questions asked by their patients.

Confidence (Q-18c,f,i,k) scored a mean of 2.6 ± 0.5 , ranging from 1.0-4.0; $n = 211$. This response suggests that the respondents are not highly confident in their knowledge of nutrition and dietary counseling skills.

The self-efficacy concept of the social learning theory may apply to the dietary counseling activities, or lack thereof, by the dental hygienist. According to this theory dietary counseling is not likely to be performed by dental hygienists who do not have confidence in their skills.

Pearson r correlation showed a weak significant negative correlation ($r = -.12$, $p = .05$, $n = 204$) between the year of graduation from the dental hygiene program with his or her level of confidence. This means that the more recently graduated, the higher the degree of confidence in nutrition knowledge and dietary counseling skills. This may suggest that dental hygienists lose confidence in their nutrition knowledge and dietary counseling skills in the dental practice setting and/or perhaps nutrition education in the dental hygiene program has improved in comparison to the earlier years. Even with a basic understanding of nutrition, the

health professional needs to build upon and update that knowledge (119). Unfortunately, the results of a study by Hull and Darby (120) revealed that the older dental hygienist is less active in continuing education. It therefore seems less likely that these past graduates will increase confidence in nutrition knowledge through this means.

No significant relationship was found between the dental hygiene program from which the respondents graduated and their confidence in nutrition knowledge and dietary counseling skills.

Practice Constraints

Questions 18b,e,g,j,l were used as a measure to identify practice constraints or barriers to performing dietary counseling in the dental practice (Table 7).

Most (86%) disagreed with Q-18l, "dietary counseling fits well into the patient scheduling routine of our dental practice". More than likely this translates into lack of time for the procedure. Lack of time was found to be the most predominant barrier to performance of selected preventive/diagnostic procedures by dental hygienists in the dental practice study by Tilliss and Cross-Poline (98). Woodall suggested that time constraints cause some dental hygienists to treat their patients according to the time allocated rather than to the patient's needs (99). Thus, if time is not allowed in the practice for dietary counseling, it will not be offered even though warranted in the care of a patient.

In response to Q-18e, "dietary counseling is not cost effective in our dental practice", 62% of the respondents agreed. Therefore, cost effectiveness can be considered a practice constraint. This view was shared by half the respondents in a study by Holcomb et al. (28) who agreed that health promotion activities in the dental practice are costly in terms of time spent by themselves and other practice staff.

Table 7. Practice constraints which influence the extent of dietary counseling by dental hygienists.

practice constraints	n	SA		A		D		SD	
		no.	%	no.	%	no.	%	no.	%
Our dental practice supports the concept of dietary counseling.	202	11	5 ^b	106	53 ^b	77	38 ^b	8	4 ^b
Dietary counseling is not cost effective in our dental practice	205	22	11 ^a	104	51 ^a	72	35 ^a	7	3 ^a
The lack of insurance reimbursement is a major obstacle to dietary counseling.	197	23	12 ^a	85	43 ^a	69	35 ^a	20	10 ^a
Dietary counseling is not likely to be well received by our dental patients.	202	7	4 ^a	77	38 ^a	114	56 ^a	4	2 ^a
Dietary counseling fits well into the patient scheduling routine of our dental practice	206	2	1 ^b	28	14 ^b	131	64 ^b	45	22 ^b
^a Ratings: 1 = strongly agree (SA); 2 = agree (A); 3 = disagree (D); 4 = strongly disagree (SD). ^b Reverse ratings: 1 = SD; 2 = D; 3 = A; 4 = SA.									

The literature supports an opposing view as well (4,12,18,60). In fact, dietary counseling is considered to be quite profitable by some (121).

Lack of insurance reimbursement was found to be a practice constraint.

Q-18g, "the lack of insurance reimbursement is a major obstacle to dietary counseling", brought agreement by 55% of the respondents. It is interesting to note that 7% (n = 197) did not respond to the statement. Perhaps the respondents are not familiar with the insurance reimbursement policies in their dental practices. Ap-

proximately half of the respondents in Holcomb's study (28) also found the lack of insurance reimbursement to be a major obstacle to the provision of educational services in the dental practice.

Over half (58%) of the respondents agreed with Q-18b, "our dental practice supports the concept of dietary counseling". Therefore, this is not perceived by them to be a practice constraint. Forty-two percent, on the other hand, do find this to be a barrier. This statement was an attempt to find out if the employing dentist was an obstacle to the inclusion of dietary counseling in the practice. The employing dentist largely determines the functional role of the dental hygienist in the practice (16). Employer resistance has been identified as a barrier to performance of several preventive/diagnostic procedures, including formal preventive programs (98).

Q-18j, "dietary counseling is not likely to be well received by our dental patients" brought disagreement by 58% of the respondents which indicates that patient acceptance is not a practice constraint in their practices. For those who agreed with the statement (42%), patient acceptance was identified as a barrier to performance. Since this is a perception on the part of the respondent, actual patient acceptance may differ in either regard. If it is a service that is not even offered, how would one know if patients would be receptive to it? It may be even less of a barrier than some would think. Research has shown that patients find the dental office an acceptable place to receive dietary counseling (53,60).

The mean score for practice constraints (Q-18b,e,g,j,l) was 2.4 ± 0.4 , ranging from 1.0-3.5; $n = 208$. This would indicate that there are practice constraints in many dental practices which act as barriers to performing dietary counseling.

Quality

To assess the quality (Q-13 to Q-17) of dietary counseling given by dental hygienists, an example of a day's diet was provided and the respondents were instructed to select the most appropriate statement and/or recommendation (Table 8).

Table 8. Percentages of correct and incorrect responses of dental hygienists to quality of dietary counseling questions.

question	n	correct responses no. %		incorrect responses no. %		number that did not answer
Vitamin A/C source in the diet.	209	186	89	23	11	3
Best source of iron in the diet.	206	164	80	42	20	6
Dietary calcium recommendations.	200	137	69	63	32	12
Four food groups recommendations.	204	147	72	32	28	8
U.S. dietary goals	208	64	31	144	69	4

Respondents were asked to assess the diet in terms of vitamin A/C sources: 89% answered correctly (Q-13). The best source of iron in the diet was identified by 80% of the respondents (Q-14). Seventy-two percent of the respondents were able to evaluate the correct number of servings from the basic food four groups (Q-16). The respondents were asked to make a dietary recommendation given the milligrams of calcium (339 mg) that the diet provided (Q-15). The correct choice was made by 69% of the respondents. And finally, the respondents were asked to

evaluate the diet in terms of the U.S. dietary goals (Q-17). Only 31% of the respondents answered this question correctly. The poor response to this question seems to indicate that the respondents are not keeping current with important dietary recommendations as suggested in the most recent *Surgeon General's Report on Nutrition and Health* (1).

The mean score for quality was 3.4 ± 1.1 , within a range of 0.0-5.0; $n = 212$. The intent of these questions was to assess the application of nutrition knowledge in a dietary counseling session in the dental practice. These results indicate that the quality of dietary information given by the respondents may be less than desirable. Noted as well is the large standard deviation and wide range of scores indicating a good deal of variability in the respondents' answers. Also noted, each question was left unanswered by some respondents (Table 6), especially questions Q-14 to Q-16. The inability to respond may be construed as uncertainty in their knowledge as these questions were checked for validity in the pretest.

Knowledge

Nutrition knowledge of the responding dental hygienists was assessed through Q-8 to Q-12 (Table 9). As might be expected, the respondents scored highest on questions directly related to carbohydrate intake, fluoride, and dental caries. Almost all (97%) of the respondents chose the correct dietary recommendation for caries reduction (Q-12). A large percentage (91%) correctly chose fluoride as the nutrient having the greatest effect on caries resistance (Q-11). Three-fourths (75%) of the respondents chose the correct response regarding calcium dietary deficiencies and bone calcium concentrations (Q-9).

Table 9. Percentages of correct and incorrect responses of dental hygienists to nutrition knowledge questions.

question	n	correct responses		incorrect responses		number that did not answer
		no.	%	no.	%	
Vitamin C and iron absorption.	189	83	44	106	56	23
Effects of dietary deficiency of calcium.	208	155	75	53	26	4
Vitamin C/protein and periodontium maintenance.	205	108	53	97	47	7
Fluoride and caries resistance.	208	189	91	19	9	4
Dietary recommendations for caries reduction.	212	205	97	7	3	0

The respondents did not score well on the question relating protein and vitamin C to periodontium maintenance (Q-10). Only 53% answered correctly that vitamin C and protein were related to wound healing and collagen synthesis. A very low percentage (44%) of the respondents knew that vitamin C enhanced iron absorption (Q-8). Another 11% did not answer the question, indicating a high degree of uncertainty in their knowledge.

The mean score for knowledge (Q-8 through Q-12) was 3.5 ± 1.0 , with a range of 0.0-5.0; $n = 212$. Several unanswered questions among the respondents and the large standard deviation may be an indication of a wide range in their level of nutrition knowledge.

The high level of knowledge shown in the questions concerning fluoride, refined carbohydrates and caries reflects very fundamental dental health principles which are emphasized throughout dental hygiene education (33,36,122). On the

other hand, scores on basic nutrition knowledge questions overall were much lower. Further, approximately 71% of the respondents in the previous section on confidence reported that they did not feel confident in their knowledge of nutrition. Statistical analysis (chi-square) did not, however, show a significant relationship between confidence and knowledge.

Personal Dietary Practices

Respondents were asked (Q-7a,b,c,d,e) how often they follow the recommendations set forth in the *Dietary Guidelines for Americans*, though not identified as such (Table 10). The respondents reported that they often/sometimes practice the following: 99% include a variety of foods in their diet; 98% avoid too much fat and cholesterol; 99% eat foods with adequate starch and fiber; 96% try to avoid too much sugar; and 93% maintain a desirable weight. These results would suggest that dental hygienists are aware and do follow the dietary guidelines, however, these are self-reported results and were not observed in any way.

This finding is supported by a survey of dental hygienists (28) in which the respondents rated selected health promotion/disease prevention behaviors as being important, including: Eating a balance diet, controlling weight, minimizing sugar intake, exercising three times/week, avoiding high cholesterol foods, and decreasing salt consumption.

From the inquiry of vitamin/mineral supplement usage, it was found that 63% of the respondents often/sometimes take a supplement. Since it is generally regarded as being nonessential for the average healthy person (1,103,116,123), the response indicates that many of the respondents are practicing an ineffective health behavior. Respondents in Holcomb's (28) study rated this behavior as being important as well. Neither study determined whether the supplement(s) meet or exceed

Table 10. Personal dietary practices of dental hygienists.

dietary practice	n	often no. % ^a	sometimes no. % ^a	seldom no. % ^a	never no. % ^a
Eat a variety of foods.	212	196 93	12 6	1 1	1
Avoid too much fat and cholesterol.	212	148 71	57 27	4 2	1 1
Eat foods with adequate starch and fiber.	209	166 79	42 20	1 1	0 0
Avoid too much sugar.	210	122 58	80 38	5 2	3 1
Maintain desirable weight.	207	125 60	69 33	11 5	2 1
Take a daily vitamin and/or mineral supplement.	210	93 44	41 19	48 23	28 13
Read labels.	210	166 79	31 15	8 4	5 2
^a Ratings: 1 = strongly agree (SA); 2 = agree (A); 3 = disagree (D); 4 = strongly disagree (SD).					

the RDA's nor did they identify the specific nutrient(s) supplemented. The practice of vitamin supplementation among female registered nurses was studied by Willitt et al. (116) and supports these findings. Frequent use of preparations in doses substantially higher than those generally accepted as necessary for good health was found to occur in this group.

Consistent with the other positive health practices, most of the respondents (94%) reported that they often/sometimes read labels.

Topics of Discussion

Question 5 asked the respondents how often they discussed a variety of nutrition topics with their patients (Table 11). The topics regarding nutrition in oral health and disease were discussed often/sometimes as follows: diet and caries,

93%; nutrition and periodontal disease, 72%; nutrition and wound healing, 64%; and development of oral structures, 31%. The patient make-up of the dental practice may have a bearing on the frequency of specific topics discussed, i.e. nutrition and oral development may not be appropriate for a practice whose patients are mostly senior citizens.

Table 11. Nutrition topics which dental hygienists discussed with patients.

topic	n	often no. %	sometimes no. %	seldom no. %	never no. %
Diet and caries.	210	108 51	88 42	13 6	1 1
Nutrition and periodontal disease.	209	47 23	103 49	47 23	12 6
Nutrition and tissue healing.	208	51 25	82 39	61 29	14 7
Nutrition and development of oral structures.	210	15 7	50 24	95 45	50 24
Basic four food groups.	209	8 4	21 10	89 43	91 44
Dietary Guidelines for Americans.	208	5 2	15 7	68 33	120 58
Nutrient functions in the body.	209	8 4	56 27	77 37	68 33
Use of vitamin/mineral supplements.	208	25 12	70 34	77 37	36 17
RDAs.	208	3 1	14 7	71 34	120 58
Nutrition labeling.	208	10 5	37 18	75 36	86 41

Topics that are seldom/never discussed by the majority of respondents include general nutrition/dietary information, with the following frequencies: basic four food groups, 87%; *Dietary Guidelines for Americans*, 91%; recommended die-

tary allowances, 92%; nutrient functions in the body, 70%; and nutrition labeling, 77%.

Just under half (46%) of the respondents often/sometimes discuss the use of vitamin/mineral supplements with their patients. While vitamin/mineral supplementation is desirable in some instances (18), it is generally accepted that nutrient needs are better met through adjusting the diet (123). It appears that the respondents discuss vitamin/mineral supplementation more often than they discuss topics pertaining to food selection. This indicates that some respondents may be promoting inappropriate health practices.

By comparing the frequencies of the nutrition and oral health related topics with the general nutrition topics, a major discrepancy is found. These general nutrition topics are considered important in the dental practice as a framework upon which to build an acceptable dietary counseling service (18). The results further suggest that in the course of the dental treatment, some discussion is taking place relating the patient's health or disease status with diet and nutrition. But it is not likely that an evaluation of the patient's diet is occurring or that recommendations are being given based on these accepted dietary recommendations.

A comparison was made between general and periodontal practices, with regard to the topics nutrition and periodontal disease and nutrition and tissue healing. While the periodontal practice specifically treats patients with periodontal conditions, results showed that the periodontal practice discussed these topics less often than the general practice (Table 12). The literature supports the concept that nutrition plays a significant role in periodontal health/disease and wound healing (18,95). Dietary counseling is a recommended procedure in the treatment of periodontal disease (18,47). Nizel (18) suggested that the potential benefits are great enough that dietary counseling should be as much a routine periodontal preventive

procedure as are instructions in plaque control. It does not appear that the dental profession, especially the periodontal specialist, is following these recommendations.

Table 12. Percentages of selected topics which dental hygienists discussed in general vs. periodontal dental practices.

topic	n	often no. %	sometimes no. %	seldom no. %	never no. %
<u>General practice:</u>					
Nutrition and periodontal disease.	181	42 23	92 51	39 22	8 4
Nutrition and tissue healing.	180	46 26	74 41	50 28	10 6
<u>Periodontal practice:</u>					
Nutrition and periodontal disease.	15	3 20	6 40	4 27	2 13
Nutrition and tissue healing.	15	3 20	5 33	5 33	2 13

Types of Patients

Question 6 identified the frequencies with which dietary counseling is provided to a variety of patients (Table 13). Dietary counseling is provided often/sometimes as follows: 73% of the respondents provide dietary counseling to parents about their child's nutritional concerns; 67% counsel children; 67% counsel pregnant women; 53% counsel adults; and 54% counsel seniors.

Children and their parents receive dietary counseling most often. This may relate to the high frequency of discussion of diet and caries. It is important to include the parent in the dietary counseling session as parents act as role models of eating behavior for their children (124). Also, research has shown that interven-

Table 13. Types of patients receiving dietary counseling by dental hygienists.

dietary counseling task	n	often no. %	sometimes no. %	seldom no. %	never no. %
Children	207	47 23	92 44	45 22	11 11
Parents about their child's nutritional concerns	209	50 24	102 49	37 17	20 10
Pregnant women	208	44 21	95 46	44 21	25 12
Adults	207	16 8	93 45	73 35	25 12
Seniors	206	20 10	90 44	67 33	29 14

tions that influence family attitudes and habits are more likely to impact on health behavior changes (124).

While nearly 70% of the respondents counsel pregnant women, the topic of nutrition and oral development is not often discussed. Nutritional stress during critical developmental periods may decrease the ultimate resistance of the oral tissues to challenge. The prevention of disease and maintenance of oral health are intimately dependent on the nutrient supply during development (46). Most pediatricians do not provide any information on the oral development of the child (12). Appropriate dietary counseling which provides the expectant mother with this significant information can contribute to optimal oral tissue development.

There appears to be very little difference in dietary counseling activity between adults and seniors. The oral health of the elderly is affected by their nutritional status and dietary intake in a number of ways (18,125-127). Nutrient deficiency is not uncommon in the elderly patient (18,126). Providing dietary counseling to the elderly patient is considered by Nizel (18) an indispensable part of total dental care and supportive management. The overall make up of the patients of

the dental practice may again have a bearing on these frequencies, i.e. a practice catering to children compared to a general practice with more senior citizens as patients.

Continuing Education

Of the 208 individuals who responded to Q-23, (n = 161), 77% reported that they did attend a nutrition related course within the last three years; only 37 of them listed the course topic(s). The courses attended covered a variety of topics (Appendix B). While most of the topics appear to be valid it is noted that some of the respondents attended courses offered by individuals with questionable qualifications as nutritionists.

Of the 47 respondents (22%) who had not participated in nutrition continuing education, reasons for nonattendance were given as follows: 72% cited lack of available nutrition continuing education courses; 30% reported that they would rather spend their time and money on other more important topics; 22% felt that they kept current enough through reading; and 2% did not find nutrition to be important to patient care.

Question 24f was open ended and allowed the respondents to specify their own reasons for nonattendance. The question brought a response from 21 individuals and a variety of reasons were cited. Among those mentioned were: course location/distance from home; objection to "mainstream" nutrition information; no time for "any" continuing education; going through a career change; nutrition courses are boring; and employer as obstacle--employer won't pay for them, employer won't allow time off from work for courses not deemed necessary, employer dictates which courses attended, and employer would rather pay for courses that will help production, improve skills. These responses are consistent with what has

been reported in the literature as factors affecting any continuing education participation by dental hygienists (128).

Dental hygienists are strongly urged by the American Dental Hygiene Association to keep up-to-date in their professional growth through continuing education (128). Attendance in nutrition continuing education courses would serve the dental hygienist and dental hygiene profession consistent with the following suggested purposes of continuing education (128): (1) avoiding professional obsolescence and staying abreast of new developments; (2) repairing deficiencies; (3) maintaining or improving competence; (4) serving society through improvement of quality of care; and (5) satisfying personal needs.

Interest in nutrition continuing education courses was rated high by dental hygienists in studies by Mullen et al. (102) and Body (128). Gilpin (27) found that the more hours of continuing education dental hygienists attend, the more professionally preventive they tended to be. She further suggested that this may be an effective vehicle in educating dental hygienists about their expanding roles as preventive oral health professionals. Perhaps nutrition continuing education courses designed for the dental hygienist would be of interest and make an important contribution to the profession.

Nutrition Resources

Question 25 asked for resources utilized by the respondents to keep current in nutrition. Responses were obtained from 83% ($n = 176$) of the individuals, while the remaining 17% ($n = 36$) left it blank. The resources listed by the respondents are identified in Appendix C. Because of the open way in which the question was worded, the responses were not conclusive. In many cases the respondents simply indicated that they utilized a "magazine" or "journal" without identifying it by name.

Appendix C is a tabulation of how frequently a type of resource was identified as such or by name.

Respondents Comments

The respondents had an opportunity to comment at the end of the survey (Q-27). Out of the 38% ($n = 80$) of the respondents who chose to comment, the majority ($n = 57$) of responses reflected a positive attitude toward the importance of dietary counseling in the dental practice, while a few ($n = 10$) may be viewed as negative. The attitude of the remaining respondents ($n = 13$) was not readily apparent by their general comments. Selected comments which reflect many of the comments made by the respondents are found in Appendix D. Two of the comments clearly indicate that some questionable or inappropriate practices in dietary counseling may take place in dental practices.

Testing of Hypotheses

Hypothesis 1: The extent of dietary counseling is related to the nutrition knowledge of the dental hygienist.

Statistical analysis failed to show a significant relationship between extent of dietary counseling and knowledge.

Hypothesis 2: The quality of nutrition information in dietary counseling is related to the nutrition knowledge of the dental hygienist.

Pearson r correlation did show a significant, but weak, positive relationship between the variables, quality and knowledge ($p = .003$, $r = .19$, $n = 211$). This suggests that a proper knowledge base better prepares one to make practical applications based on accurate scientific information. A basic understanding of nutrition

should be gained through the preparatory science courses (3). Basic sciences must be included in or be prerequisite to the dental hygiene curriculum based on the Accreditation Standards for Dental Hygiene Education Programs (129). It is recommended that nutrition be integrated throughout these basic science courses (3). A more comprehensive knowledge of nutrition could be gained in the dental hygiene curriculum with emphasis in practical applications through clinical experience (3,36). The bottom line is to be able to translate that knowledge into sound nutritional guidance for the dental patient (45). This scientific approach to nutrition education should place dental hygienists in a position to discriminate between qualified and unqualified sources of nutritional information (1).

Hypothesis 3: The extent of dietary counseling is related to the degree of confidence in dietary counseling skills of the dental hygienist.

Assuming that the scoring for the variable, extent, is regarded as categorical, a one-way ANOVA was conducted to compare extent with confidence. There was a significant relationship ($p = .004$, $n = 210$). However, multiple comparison tests (Student-Newman-Keuls Procedure) did not produce useful statistical information due to unequal cell sizes.

Assuming that the scoring for the variable, extent, is regarded as integral, a Pearson r correlation coefficient was calculated which showed a significant positive correlation ($p = .000$, $r = .31$, $n = 210$).

Both tests suggest that the confidence of the dental hygienist in his or her nutrition knowledge and dietary counseling skills has an impact on extent.

Hypothesis 4: The extent of dietary counseling is related to the attitude of the dental hygienist toward the relationship between nutrition and dental health.

Assuming that the scoring for the variable, extent, is regarded as categorical, a one-way ANOVA was conducted which showed a significant relationship between extent and attitude ($p = .000$, $n = 210$). Multiple comparison tests (Newman-Keuls Procedure) did not produce useful statistical information due to unequal cell sizes. The trend was noted, however, that extent increases as attitude increases. Assuming that the scoring for the variable extent is regarded as integral, a Pearson r correlation coefficient was calculated. Results showed a significant positive correlation ($p = .000$, $r = .40$, $n = 210$) between extent and attitude.

Both tests suggest extent of dietary counseling in the dental practice is influenced by the attitude of the dental hygienist. Dentists' attitude toward blood pressure measurement was found to be strongly associated with its related practice in the dental office (130). It was shown that the educational preparation of the dentists specific to high blood pressure significantly influenced their attitudes and practices of measuring blood pressure. This suggests that attitudes developed by the dental hygienist toward nutrition and dental health and dietary counseling in the dental hygiene curriculum may influence the subsequent practice of dietary counseling in the dental practice.

Hypothesis 5: The extent of dietary counseling is related to the personal dietary practices of the dental hygienist.

Assuming that the scoring for the variable, extent, is regarded as integral, Pearson r correlation was calculated. A significant, though weak, positive relationship exists between extent and dietary practices ($p = .003$, $r = .19$, $n = 210$). Based on the assumption that extent is categorical, a one-way ANOVA was conducted but did not find a significant relationship.

It is believed that personal health habits influence counseling activities with patients (28,131). A study of practicing physicians suggests that their personal

health habits strongly influence their practices in counseling of patients about health habits (132). The results of this study, though weak, seem to suggest the same in regard to dietary counseling.

Hypothesis 6: The extent of dietary counseling is related to the practice constraints experienced by the dental hygienist.

Assuming that the scoring for the variable, extent, is regarded as categorical, a one-way ANOVA was conducted to compare extent with practice constraints. A significant relationship was found ($p = .002$, $n = 208$).

Assuming that the scoring for the variable, extent, is integral, a Pearson r correlation coefficient was calculated which showed a significant negative correlation ($p = .000$, $r = -.29$, $n = 208$).

Both of these tests suggest that the extent of dietary counseling is impacted by a number of practice constraints which act as barriers to performance.

Implications

The results of this study indicate that dietary counseling is not often a service that is provided in the prevention and treatment of dental disease. It appears that in most instances a general discussion of diet takes place without actual assessment of the patient's diet and that recommendations given are not based on individual needs. Such dietary advice which fails to identify with the patient's needs may be ineffective in terms of behavior change. If the patient's present diet has a deleterious effect on his or her oral health then a behavior change would be desirable. In addition, the importance of diet and nutrition to oral health is not likely to be realized by the patient if dietary counseling is not a part of his or her dental care. The dentist and dental hygienist who do not include dietary counseling for the preven-

tion or treatment of dental disease fail to provide comprehensive treatment for optimum oral health.

The dental hygienist is the one who most often assumes the role of patient educator in the dental practice and thus is the most appropriate dental professional to provide dietary counseling. However, is the dental hygienist adequately trained to do this? Implications from this study suggest that the dental hygiene curriculum is not adequately preparing dental hygiene students in nutrition and dietary counseling. Results indicate a weak basic knowledge of nutrition. Further, results indicate that many dental hygienists do not have the background to make sound practical applications of nutrition in dietary counseling. They also indicated that they did not develop adequate dietary counseling skills in their dental hygiene curriculum. The degree of nutrition training that the dental hygienist receives in school will be reflected later in his or her practice (3).

The constructs from the social learning theory (SLT) may be applicable to the dietary counseling activities, or lack thereof, by the dental hygienist. According to this theory, dietary counseling is not likely to be performed by dental hygienists who do not have confidence in their skills. It is important to note that many of the dental hygienists responding reported that they are not confident in their nutrition knowledge and dietary counseling skills. This apparent lack of confidence would seem then to be an important limiting factor and should be addressed.

It would appear that there is a lack of emphasis in the dental hygiene curriculum on nutrition and dietary counseling and insufficient practice of the procedure in the clinical setting. This does not enable the student to acquire adequate skills to develop the confidence required to perform this service.

Students must first understand that nutrition and diet are important to their patient's oral health. Students will then consider dietary counseling a necessary

component of the dental hygiene care they provide to their patients in school and later in the dental practice. This can be accomplished through emphasis of nutrition throughout the dental hygiene curriculum, but particularly in the dental hygiene clinic. Students should be encouraged to apply their nutrition knowledge to assess and counsel their patients. Practice must also include techniques in patient communication. To be effective in dietary counseling, students must acquire both behavioral as well as technical counseling skills.

Results from this study also indicate a lack of current nutrition knowledge. The science of nutrition is dynamic and practicing dental hygienists need to attend continuing education courses to keep abreast of the latest developments. Nutrition continuing education courses with an application to dentistry can serve an important function for dental hygienists who need updating and for those who have not had the benefit of prior training in this area.

One of the most prominent barriers to performance of dietary counseling in the dental practice is "lack of time" as indicated in the results and frequently expressed in the respondents' comments. Changes have to be made in the dental practice to allow opportunities to provide dietary counseling. Time for counseling must be made, rather than trying to squeeze this service into the routine appointment time. For those patients who require a dietary change, dietary counseling based on the patient's needs will be most effective and those needs should dictate time allocations.

It would seem that if nutrition and dietary counseling do not receive adequate emphasis in their education program, its importance will not be realized, and it is not likely that time will be made for it in the dental practice. However, services provided by the dental hygienist are usually dictated by the employing dentist. Thus, the adequacy of nutrition training of the dentist will ultimately determine if

time is allowed for dietary counseling in the practice. The literature suggests that the dental hygienist receives more training in preventive dentistry and nutrition than does the dentist. Dental hygienists should be given the opportunity to provide the preventive services for which they are prepared in order to serve the best interest of their patients.

Lack of cost effectiveness is also cited by many as a barrier. This seems to stem from a lack of understanding of the objectives of this service. It has, however, been found to be cost effective in some dental practices. It is suggested by supporters of dietary counseling that effective counseling demands specialized skills and knowledge and should therefore be compensated based on the value of the time spent (18,133). Some may be more inclined to offer this service if insurance reimbursement was allowed.

Of course, dietary counseling must be provided by someone who has been adequately trained. If the dental professionals in the dental practice are not prepared to provide this service, they should seek the assistance of a nutrition professional, i.e. Registered Dietitian or nutritionist. Consultation or referral to a Registered Dietitian would provide dental patients with a component of their treatment that would otherwise be neglected or perhaps dealt with ineffectively. The results of this study as well as review of the literature suggest that nutrition professionals are not being utilized in this capacity. Training of dentists and dental hygienists must also include a greater emphasis on the role of dietitians and nutritionists in the dietary counseling of patients. The training of nutrition professionals should include an oral health emphasis as well.

The American Dental Hygienists Association foresees the dental hygienist of the future as the primary provider of preventive dental services (26,29,35). Furthermore, as dental practices increase their preventive services in response to the

public's interest in prevention and health, the role of the dental hygienist may be expanded to assume more patient education and counseling activities (35). Since dietary counseling is a component of preventive dentistry, it is essential that dental hygienists be properly trained to provide that service.

Recommendations for Future Research

Future research could include extending this study to other parts of the country as representation was limited to Oregon licensed dental hygienists. There is little information in the literature with which to compare the results of this study. It would be interesting to observe any regional differences that might occur, particularly through their training. Limitations of this study should be addressed. The measure of nutrition knowledge was obtained from a very short knowledge test, thereby limiting its accuracy. It was also "open book" as it was self-administered. Several comments by the respondents indicated that they felt quite inadequate in answering these questions, indicating that perhaps some may have felt a need to look to nutrition sources to answer the questions.

The measure of extent would be more useful if one could also obtain a profile of the dental patients associated with the practice in terms of their dental needs (e.g. the percent of patients with periodontal disease).

Another limitation of this study was the measure for personal dietary practices. The method used was neither sensitive nor precise enough to obtain an accurate assessment of actual practices. There may be a built in bias associated with these questions as well. The respondents may wish to appear to be healthy role models.

Research that addresses the nutrition training of dental hygienists is needed. An in-depth study of dental hygiene curricula would identify the extent of nutrition

education being provided. The study should examine all phases of the dental hygienist's education, including the basic science courses, dental hygiene didactic courses, laboratory and clinical areas. From this research, further recommendations regarding nutrition education of the dental hygienist would be made.

A study of dental practices that have successfully incorporated dietary counseling into their preventive dentistry service would be a valuable learning guide. One could examine how practice constraints have been controlled; patient acceptance of counseling; observe benefits to the patients and the practice; and cost effectiveness, including patients' willingness to pay a fee for the service. A variation to this could be an observational study in which one designs and implements a dietary counseling program for the dental practice.

SUMMARY

Preventive dentistry is at the forefront today in the dental practice and nutrition is one of the components of preventive dental care. The control of diet and nutrient intake along with good oral hygiene are important elements in the prevention and treatment of both dental caries and periodontal disease. Therefore, dietary counseling is recommended in the comprehensive care of the dental patient. While the importance of dietary counseling in dentistry has been established, many dental practices do not provide this service.

Dental hygienists are primarily responsible for the delivery of preventive dental health care. Factors associated with the dental hygienist's role in dietary counseling, within the realm of preventive dentistry, were examined in this study. The purposes of the study were (1) to identify the extent and quality of dietary counseling provided by the dental hygienist in dental practices, (2) to analyze factors that may influence the extent of dietary counseling by the dental hygienist (i.e. dental practice constraints, attitudes, personal dietary practices), (3) to assess the knowledge and academic preparation of the dental hygienist to provide dietary counseling, and (4) to determine the need to improve nutrition education in the dental hygiene curriculum.

A questionnaire was developed and mailed to a random sample of 300 dental hygienists licensed in Oregon. A total of 212 questionnaires (72% adjusted response rate) were completed and returned. From the demographic information obtained, it was found that most of the respondents held an associate degree (51%) or a bachelor's degree (43%). Most of the respondents (81%) graduated from an

Oregon dental hygiene school. Year of graduation ranged from 1956 to 1989. Forty-four percent graduated between 1980 and 1989, 43% between 1970 and 1979, and 12% between 1956 and 1969. Many (67%) were employed in one dental practice, and 21% were employed in two. Most (87%) practiced in a general dentistry, private practice and 7% in a periodontal specialty practice.

Survey results showed that dietary counseling takes place to a very limited extent in the dental practice. Fifty-two percent of the respondents provided dietary counseling in their dental practice. More than half (54%) of the respondents reported providing dietary counseling to fewer than 10% of their patients. The majority of respondents (96%) reported that they did not obtain dietary intake records; 82% did not evaluate their patient's diet for nutritional adequacy. Most (92%) respondents did not refer patients to a nutrition professional.

Attitude toward the importance of nutrition to dental health and the role of dietary counseling in preventive dentistry was generally favorable among the respondents. Many of the respondents reported that they are not confident in their knowledge of nutrition (71%) or dietary counseling skills (57%). This lack of confidence was reinforced in the respondents' comments. A significant relationship ($p \leq .05$) was found between confidence and the year of graduation. More recent graduates indicated a higher degree of confidence.

Several practice constraints were identified as barriers to performance of dietary counseling. Most notably, 86% of the respondents gave lack of time as the principal reason. This was frequently mentioned in the open ended comments and appears to be a real concern for many. Cost effectiveness (62%) and lack of insurance reimbursement (55%) were also indicated as practice constraints.

Nutrition knowledge, as a variable, received a mean score of 3.5 ± 1.0 with a range of 0 to 5 (5 being the highest score). The respondents scored well on ques-

tions related to fundamental dental health principles, but poorly on basic nutrition knowledge questions. The mean score for the variable, quality, of dietary counseling was 3.4 ± 1.1 with a range of 0 to 5 (5 being the highest score), indicating limited application of nutrition knowledge. The respondents were also found to be lacking in current nutrition information.

The reported frequencies for personal dietary practices suggest that dental hygienists are aware and do follow the dietary guidelines. Many (64%) were also found to use vitamin/mineral supplements, an ineffective health practice.

There was a significant relationship ($p \leq .05$) between extent of dietary counseling and several variables, including: attitude of the dental hygienist toward the relationship between nutrition and dental health; the dental hygienist's confidence in dietary counseling skills; practice constraints experienced by the dental hygienist; and personal dietary practices of the dental hygienist. A significant relationship was also found ($p \leq .05$) between quality of nutrition information and nutrition knowledge.

Attendance in a nutrition-related continuing education course within the last three years was reported by 77% of the respondents. Of those who did not attend, lack of available nutrition education courses was cited as the reason for nonattendance by many (72%) of the respondents.

Comments were made at the end of the questionnaire by 38% of the respondents. The results of the survey were reinforced by many of these comments. Most of the respondents confirmed that they provided dietary counseling to a very limited extent if at all. Among those reasons most often mentioned were lack of confidence in knowledge and skills, lack of training, lack of time, resistance by the employing dentist, lack of cost effectiveness, and lack of insurance reimbursement.

The results of this survey indicate that dietary counseling is not often provided to dental patients. Extent of dietary counseling was found to be influenced by a number of factors. Most notable were the dental hygienists' lack of confidence in nutrition knowledge and dietary counseling skills and lack of time for the service in the dental practice. The provision of time for dietary counseling may be dependent upon a number of factors, including its perceived importance by the employing dentist and its cost effectiveness in the dental practice. It is also apparent from this study that the services of nutrition professionals are not being utilized in the dental practice. There is a need to increase the awareness of the benefits of this interaction in both professions.

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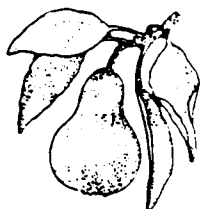
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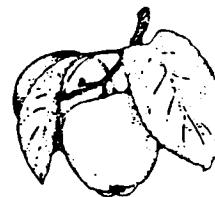
APPENDICES

Appendix A

Survey Questionnaire Cover Letter, Initial Mailing



DIETARY COUNSELING SURVEY



Your name has been randomly selected from the list of Oregon dental Hygienists to participate in a thesis research project concerning dietary counseling in the dental practice. Your thoughtful response to this questionnaire will be invaluable to our profession.

You may be assured of complete confidentiality. The questionnaire has an identification number for mailing purposes only. This is so that I may check your name off of the mailing list when your questionnaire is returned.

You may receive a summary of the results by writing "copy of result requested" on the back of the return envelope, and printing your name and address below it. Please do not put this information on the questionnaire itself.

I would be happy to answer any questions that you may have. I can be reached at the address on the enclosed return envelope or by telephone at 882-7921 (OIT).

Your assistance will be greatly appreciated.

Theresa Levy, R.D.H., B.S.
Assistant Professor, Dental Hygiene Program
Oregon Institute of Technology
Graduate Student
Foods and Nutrition Department, Oregon State University

Carolyn A. Raab, Ph.D., R.D.
Associate Professor, Foods and Nutrition
Oregon State University



Survey Questionnaire

1. Please indicate how often you perform the following procedures in your dental practice: often, sometimes, seldom, or never. (Circle one number for each.)

	OFTEN	SOME- TIMES	SEL- DOM	NEVER
a. Ask a patient to record his/her food intake for a given period of time	1	2	3	4
b. Evaluate a patient's diet for nutritional adequacy	1	2	3	4
c. Give a patient information related to the foods he/she eats	1	2	3	4

d. Recommend dietary modifications based on the patient's present diet	1	2	3	4
e. Follow up on suggestions after initial recommendations are made	1	2	3	4
f. Refer patients to nutrition professionals, i.e., Registered Dietitian	1	2	3	4

2. Do patients ask you questions about nutrition or diet: often, sometimes, seldom, or never? (Circle one number.)

- 1 OFTEN
2 SOMETIMES
3 SELDOM
4 NEVER

3. To about what percent of your patients do you give nutritional or dietary advice? (Circle one number.)

- 1 LESS THAN 10%
2 10%-25%
3 26%-50%
4 51%-75%
5 MORE THAN 76%

4. Is dietary counseling provided in your dental practice by the following personnel? (Circle one number for each.)

	YES, PROVIDED	NO, NOT PROVIDED
a. Dental Hygienist	1	2
b. Dentist	1	2
c. Dental Assistant	1	2
d. Registered Dietitian	1	2
e. Other (please specify _____)	1	2

5. Please indicate how often you discuss the following topics with your patients: often, sometimes, seldom, or never. (Circle one number for each.)

	OFTEN	SOME- TIMES	SEL- DOM	NEVER
a. Diet and dental caries	1	2	3	4
b. Nutrition and periodontal disease	1	2	3	4
c. Nutrition and tissue healing	1	2	3	4
d. Nutrition and development of oral structures	1	2	3	4
e. The Basic Four Food Groups and required daily servings.	1	2	3	4
f. Dietary Guidelines for Americans	1	2	3	4
g. Nutrient functions in the body	1	2	3	4
h. Use of vitamin/mineral supplements	1	2	3	4
i. Recommended Dietary Allowances (RDAs)	1	2	3	4
j. Nutrition labeling	1	2	3	4

6. Please indicate whether or not you provide dietary counseling to the following patients in your dental practice: often, sometimes, seldom, or never. (Circle one number for each.)

	OFTEN	SOME- TIMES	SEL- DOM	NEVER
a. Children	1	2	3	4
b. Parents about their child's nutritional concerns	1	2	3	4
c. Pregnant women	1	2	3	4
d. Adults	1	2	3	4
e. Seniors	1	2	3	4

7. In choosing and preparing the foods you eat and serve to others, do you do the following: often, sometimes, seldom, or never? (Circle one number for each.)

Do you . . .	OFTEN	SOME- TIMES	SEL- DOM	NEVER
a. Eat a variety of foods	1	2	3	4
b. Avoid too much fat, saturated fat and cholesterol	1	2	3	4
c. Eat foods with adequate starch and fiber	1	2	3	4
d. Avoid too much sugar	1	2	3	4
e. Maintain desirable weight	1	2	3	4
f. Take a daily vitamin and/or mineral supplement	1	2	3	4
g. Read labels	1	2	3	4

Please answer Questions 8-17 based on what you know or have heard regarding diet and nutrition without the aid of resource materials.

8. Iron from dietary sources is better absorbed when food containing which of the following nutrients is consumed at the same time. (Circle one number.)

1 VITAMIN A
2 VITAMIN K
3 VITAMIN C
4 CALCIUM

9. A diet deficient in calcium will have the greatest effect on calcium concentration in the: (Circle one number.)

1 TEETH
2 BONES
3 BLOOD
4 KIDNEYS
5 1, 2, 3 and 4

10. Protein and vitamin C are dietary components that are essential in maintaining the integrity of the periodontium because of their role in: (Circle one number.)

1 WOUND HEALING
2 COLLAGEN SYNTHESIS
3 HEMOGLOBIN SYNTHESIS
4 1 AND 2 ONLY
5 1, 2, AND 3

11. The nutrient(s) with the greatest effect on increasing tooth resistance to caries is/are: (Circle one number.)

1 ZINC
2 CALCIUM AND PHOSPHORUS
3 FLUORIDE
4 MAGNESIUM

12. Which one of these recommendations would have the greatest effect on reducing the incidence of caries? (Circle one number.)

- 1 REPLACE SUGAR IN THE DIET WITH HONEY
- 2 REDUCE THE FREQUENCY OF REFINED CARBOHYDRATE CONSUMPTION
- 3 REDUCE THE AMOUNT OF REFINED CARBOHYDRATE CONSUMED
- 4 INCREASE MILK CONSUMPTION

The following is a one-day diet of a female, age 27, 130 pounds and lightly active. Please use this as a reference in answering Questions 13-17.

<u>BREAKFAST</u>	<u>LUNCH</u>	<u>DINNER</u>
toast, 2 slices white enriched bread	cheeseburger	steak, 6 oz
butter, 2 pats	french fries, 1 small serving	corn, 1/2 cup
jam, 2 tsp	apple	butter, 1 Tbsp
coffee		iceburg lettuce, 1 wedge
sugar, 1 packet		Thousand Island dressing, 2 Tbsp
coffee cream, 1 Tbsp		fudge brownie
Calories from: Protein 20%		
Carbohydrates 41%		
Fats 39%		

13. Which one of the following statements is true concerning vitamin A and C sources in the diet? (Circle one number.)

- 1 THE DAY'S DIET PROVIDES A GOOD SOURCE OF VITAMIN C
- 2 THE DAY'S DIET PROVIDES A GOOD SOURCE OF VITAMIN A
- 3 THE DAY'S DIET PROVIDES A GOOD SOURCE OF BOTH VITAMINS A AND C
- 4 THE DAY'S DIET IS LACKING A GOOD SOURCE OF BOTH VITAMINS A AND C

14. Which food in the diet provides the best source of iron? (Circle one number.)

- 1 ENRICHED WHITE BREAD
- 2 STEAK
- 3 CHEESE
- 4 CORN

15. The diet provides 339 mg of calcium. Which one of the following recommendations would you make? (Circle one number.)

- 1 INCREASE LOW FAT DAIRY PRODUCTS
- 2 INCREASE MEAT INTAKE
- 3 INCREASE WHOLE GRAINS
- 4 1, 2, and 3
- 5 CALCIUM INTAKE IS ADEQUATE, NO NEED TO INCREASE CALCIUM SOURCES IN THE DIET

16. Please select the statement which best describes the day's diet in terms of servings from the Basic Food Group meal plan. (Circle one number.)

- 1 THE DIET LACKS ONE OR MORE SERVINGS FROM THE BREAD AND CEREAL GROUP
- 2 THE DIET LACKS ONE OR MORE SERVINGS FROM THE MILK GROUP
- 3 THE DIET LACKS ONE OR MORE SERVINGS FROM THE FRUIT AND VEGETABLE GROUP
- 4 BOTH 2 AND 3
- 5 THE DIET CONTAINS THE MINIMUM NUMBER OF SERVINGS FROM ALL OF THE FOUR FOOD GROUPS

17. In reference to the Dietary Goals for Americans concerning the percent of calories provided by protein, carbohydrate and fat in the diet, which one of the following statements is true? (Circle one number.)

- 1 PROTEIN INTAKE IS HIGHER THAN RECOMMENDED
- 2 FAT INTAKE IS HIGHER THAN RECOMMENDED
- 3 COMPLEX CARBOHYDRATE INTAKE IS LOWER THAN RECOMMENDED
- 4 2 AND 3 ONLY
- 5 1, 2, and 3

18. For each of the statements below please indicate if you strongly agree, agree, disagree, or strongly disagree. (Circle one number for each.)

	STRONGLY		STRONGLY	
	AGREE	AGREE	DISAGREE	DISAGREE
a. Proper nutrition is as important as proper oral hygiene in the prevention of dental disease . .	1	2	3	4
b. Our dental practice supports the concept of dietary counseling	1	2	3	4
c. Patients often ask me questions about nutrition that I feel unprepared to answer	1	2	3	4

d. Dietary counseling should be a component of a comprehensive preventive dentistry service . .	1	2	3	4
e. Dietary counseling is not cost effective in our dental practice	1	2	3	4
f. I feel very confident in recommending dietary modifications to my patients	1	2	3	4

g. The lack of insurance reimbursement is a major obstacle to dietary counseling	1	2	3	4
h. It is a responsibility of the dental hygienist to provide dietary counseling to his/her patients	1	2	3	4
i. I developed adequate dietary counseling skills through my dental hygiene curriculum	1	2	3	4

j. Dietary counseling is not likely to be well received by our dental patients	1	2	3	4
k. I feel very confident in my knowledge of nutrition	1	2	3	4
l. Dietary counseling fits well into the patient scheduling routine of our dental practice . . .	1	2	3	4

Finally, a few questions about you.

19. Please give the name of the dental hygiene program from which you graduated, also include the city, state, and year.

NAME OF SCHOOL	CITY	STATE	YEAR

20. What is the highest academic degree you have earned? (Circle one number.)

- 1 CERTIFICATE
- 2 ASSOCIATE DEGREE
- 3 BACHELOR DEGREE
- 4 MASTER DEGREE OR HIGHER

21. How many dental practices are you currently employed in?

_____ Number of practices

22. Please indicate the type(s) of dental practices in which you are employed (i.e., private practice, periodontist, education, etc.).

23. Have you attended any nutrition related continuing education courses/seminars within the last three years? (Circle one number.)

1 NO, HAVE NOT (SKIP TO QUESTION 24).

☒ 2 YES, HAVE ATTENDED.

23a. Please specify the topic(s) of the nutrition course(s)/seminar(s).

SKIP NOW TO QUESTION 25.

24. If you have not attended nutrition related continuing education courses/seminars within the last three years, please indicate whether or not each of the following is a reason for not attending. (Circle one number for each.)

	YES, A	NO, NOT A
	REASON	REASON
a. I am not interested in nutrition	1	2
b. I do not feel that nutrition is important to patient care . .	1	2
c. I keep current in nutrition through my reading	1	2
.....		
d. Continuing education courses in nutrition are not often available	1	2
e. There are other more important topics I would rather spend my time and money on	1	2
f. Other, please specify _____		

25. What nutrition resources do you utilize to stay current in nutrition? (i.e., journals, magazines, agencies, etc.)

26. For statistical purposes, please give the county and zip code in which your dental practice is located.

COUNTY

ZIP CODE

27. Is there anything else you would like to say about dietary counseling in your dental practice?

Thank you for taking the time to complete and return this questionnaire.

Post Card, Second Mailing



Last week, a questionnaire was sent to you seeking your participation in a thesis project concerning dietary counseling in the dental practice. Your name was selected from a random sample of Oregon dental hygienists.

If you have already completed and returned it to us, **please accept our sincere thanks.** If not, please do so today. The questionnaire was sent to only a small, but representative sample of Oregon RDH's.

It is extremely important that yours also be included in the study if the results are to accurately reflect dietary counseling in Oregon dental practices.

If by some chance you did not receive the questionnaire, or it has been misplaced, please call me at (503)882-7921. I will send another one to you immediately.

Sincerely,
Theresa Levy, R.D. H., B.S.
Assistant Professor
Oregon Institute of Technology

Cover Letter, Third Mailing

Dear :

About three weeks ago we sent you a questionnaire seeking your assistance in a research project concerning dietary counseling in the dental practice. As of today we have not yet received your response.

As health professionals, we will benefit the public as well as our own profession by researching areas relative to the practice of preventive dentistry.

We are writing to you again because of the significance each questionnaire has to the usefulness of this study. Your name was selected through a scientific sampling process from the list of Oregon Dental Hygienists. In order for the results of this study to be truly representative of dietary counseling in the dental practice, it is essential that each person in the sample return their questionnaire.

In the event that your questionnaire has been misplaced, a replacement is enclosed.

Your contribution to the success of this study will be greatly appreciated.

Sincerely,

Theresa Levy, R.D.H., B.S.
Assistant Professor, Dental Hygiene Program
Oregon Institute of Technology
Graduate Student
Foods and Nutrition Department, Oregon State University

Carolyn A. Raab, Ph.D., R.D.
Associate Professor, Foods and Nutrition Department
Oregon State University

br
Enclosure

Appendix B

Nutrition Continuing Education Courses Attended by
Dental Hygienists Within the Last Three Years

course topic	number of respondents who attended
Eating disorders	2
Cholesterol and fat in the diet	6
High complex carbohydrate living	1
Nutrition and dental health.....	5
Nutrition for women's health.....	1
Perinatal nutrition (WIC program)	1
Weight Watchers	1
Biochemistry and Nutrition.....	1
Nutrition and exercise.....	4
Nutrition and aging	1
General review course	2
Food allergies.....	1
Nutrient supplementation.....	1
Aids and nutrition.....	1
Carcinogenic foods.....	1
Covert Bailey's Fit or Fat	4
Course by Jeffery Bland	1
Course by Lendon Smith.....	3
Sang Lee, MD (21 day course);	1
Vitamin Therapy (5 day course);	
Body Chemistry; Mercury	
detoxicity diet (2 day course)	
Other comments:	
Graduated less than 3 years ago,.....	2
course in school still appropriate.	
Nutrition course in 1986 in D.H.	1
curriculum--haven't kept up on it.	
Don't remember	2

Appendix C

Types of Resources Used by Dental Hygienists to Keep Current in Nutrition

nutrition resource	number	percent
Nutrition newsletter: University of California, Berkeley Wellness Letter Tufts University, Diet & Nutrition Letter Mayo Clinic, Harvard Newsletter	17	10
Journal: J. of Dental Hygiene; RDH; Dentistry Today; Periodontal Concepts; J. Am. Dent. Assoc.	108	61
Magazine: Prevention; Hippocrates; Today's Health; American Health; Better Homes and Gardens; Good Housekeeping; Redbook; Vegetarian Times; Cooking Light; Parents; Health; New Women; Organic Gardening; Time; Newsweek.	114	65
Other: newspapers; doctor's office; health food store; Weight Watchers; Oregon Dairy Council; newsletters through work; textbooks, popular books; study club; Cancer Society; Heart Assoc; co-op food store; television; WIC; home extension units; friends; peers; diet books.	86	41

Appendix D

Respondents' Comments

The following are selected comments that reflect many of the general comments made by the respondents in response to the final question: Is there anything else you would like to say about dietary counseling in your dental practice?

I feel it is an important foundation to dental care yet find it is not given much attention in the dental community, possibly due to time concerns, insurance non-payments, and my own lack of knowledge. Our school required us to complete a nutrition course but diet counseling was not emphasized as a regular component of a patient's appointment.

We don't do enough.

Many dentists just want profits from us and don't treat the patient as a whole. If their awareness level increased, it would be easier to incorporate counseling.

The dentist I work for feels dietary counseling has a limited application in the dental setting. Very broad statements would be appropriate concerning diet and dental disease. Discussing a patient's total food consumption would best be handled by a dietary counselor who is an expert in the field. I agree.

I really feel dietary counseling is a great idea, however, I do not feel qualified to do it.

Even if I had adequate knowledge about nutrition, I don't know when I could fit it into an appointment. There are so many demands already made on our time--so many hygienists are very frustrated being pulled in so many directions.

Patients rarely ask for nutrition information unless it pertains to cavity formation.

It's difficult to feel secure about diet counseling when even the experts disagree on so many issues. I finally let my instincts rule and reserve my comments to patients to simple well-accepted theories on good basic nutrition habits.

I am very interested in nutrition but will not feel confident in dietary advice until I make major changes in my own diet.

Mainly I speak to children about frequency and amount of sugar intake and how it is utilized by plaque.

Nutrition is mentioned frequently but not extensively. I would not consider this actual dietary counseling. After reading this questionnaire I realize how much more nutrition advice I could and should be giving.

I thought this survey difficult because I've forgotten a lot about nutrition, and am embarrassed at my lack of current knowledge on this subject.

The following two comments indicate questionable or inappropriate practices in dietary counseling:

I feel it is important and due to the large number of perio patients we see, I frequently recommend increase in vitamin C intake far beyond the RDA and USDA standards. I also refer to an internist who was initially a neuropath for any blood chemistry or nutritional questions which I am not comfortable answering.

We do not have a "formal" or "routine" time set up for dietary counseling in the daily schedule. However, when the situation arises, I give patients info or suggestions while I'm cleaning their teeth. For example, if I notice a patient has cracks at the corners of his/her mouth (cheilosis) I ask then if they drink very much milk---usually the answer is no, so I explain their vitamin deficiency to them, and recommend that they either drink more milk or take a vitamin B complex supplement.