NUTRITIONAL ATTITUDES OF SENIOR DENTAL STUDENTS

by

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Thesis submitted to the Graduate Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in

Human Nutrition and Foods

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February, 1978
Blacksburg, Virginia

ACKNOWLEDGMENTS

The writer wishes to thank Dr. Mary Ruth Bedford for her guidance in preparing the thesis. She wishes to acknowledge Dr. Jean A. Phillips and Dr. Van Bowen for their assistance and for serving as committee members.

Acknowledgment is made to the senior dental students at Virginia Commonwealth University for their cooperation with the study. Support received from my husband, and technical assistance from have been invaluable in the preparation of the thesis.

L.S.H.

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INTRODUCTION

The dentist not only needs to be aware of nutrition as it relates to oral health, but he needs to be skilled in interpreting and communicating this information to his patients. In recent years, various types of nutrition education programs, including those for dental students, have been designed and implemented, so as to expose individuals to the principles of sound nutrition. Nutrition education in the dental school curriculum is aimed at positive change in knowledge, attitudes, and practices as related to food and nutrition. The time for action in terms of curriculum changes and the acceptance of the role of nutrition in all aspects of patient care is long overdue.

Dental disease is a complex disease in which diet might play an important part (1). The dentist has a number of techniques available with which he can control oral disease. The techniques include the removal of dental plaque, the use of fluoride and sealants, and the instructing of patients on the utilization of diet therapy. These techniques can result in the prevention of dental disease and in the maintenance of oral health. The prognosis of most oral diseases is determined by the interaction of the tooth (host) with the demineralizing effects of acids produced by the fermentative action of

bacteria (the agent) on sugar (2). Both the host and the agent have been affected by the quality, quantity, and physical consistency of food, and the frequency of food intake (3). The successful approach to preventing oral disease lies in modifying all three of the factors involved: microbial plaque, host tissues, and diet (4). Of all the options available to the dentist in controlling oral disease, perhaps none is more poorly understood, and yet, has received more attention than nutrition.

Increasing public interest in the prevention aspect of health has produced an unending supply of nutrition information, both fact and fiction. Consumers are questioning which foods are beneficial and which foods are detrimental to health. Many groups of health professionals, including dentists, have a direct influence through nutrition education, on the well-being of children, adolescents and adults.

Dentists have unique opportunities for providing sound information about nutrition. Since periodic recall for maintenance care is a standard procedure, dental patients are ordinarily seen more frequently and routinely than physicians' patients. Visits to the physician are usually precipitated by problems which need immediate care, thereby leaving little or no time for nutritional counseling.

The dentist has many opportunities to recognize oral problems related to nutritional intake. The oral tissues are perhaps the most sensitive to nutritional deficiency states. Examples of non-specific lesions associated with the mouth include glossitis (inflammation of tongue), cheilosis (fissuring of lips), and stomatitis (inflammation of oral mucosa). While these conditions may also be caused by non-nutritional factors, they serve as early indications for predicting the presence of nutritional anemias and some vitamin deficiency states (5). Dental students are taught to recognize these states during nutritional biochemistry courses.

The relationships of the concepts of the diet and plaque formation can be easily incorporated into a prevention program. A good prevention program includes fluoride application, toothbrush and flossing instructions, and diet instruction. None of the components of the prevention program should be given priority over the others (2).

During the prevention program, the patient can learn the role of sucrose and other carbohydrates in plaque formation. This can then lead to a discussion of the role of sucrose in obesity and coronary heart disease. Focusing on a patient's diet provides a method for discussion of preventive measures for good health associated with nutritional intake. Among the rewards of good nutrition in dental health can be money saved through less need for

dental restorative work, avoidance of tooth loss, improved appearance, and maintenance of physical stamina.

Navia (6) believed that for dentists, nutritional and dietary knowledge would be useful in three areas of their professional practice: clinical diagnosis, therapeutic procedures, and health education. In clinical diagnosis, because the dentist can recognize nutritional deficiencies in the oral cavity, he should be able to diagnose the problem before it becomes a chronic deficiency. If the dentist had a knowledge of nutrition, he would be qualified to provide nutrition counseling and health education that would not only benefit the patient, but also his family.

Dentists, with the help of dietitians and dental hygienists, would be able to make therapeutic procedures more effective through dietary counseling that is directed to a specific clinical problem. That is, when a patient is without dentures or is unable to chew food properly, he should be instructed on how he can maintain adequate nutrition through modification of various foods.

Nutrition courses in dental schools must be designed to teach the student principles of nutrition in relation to total health. One of the goals of nutrition education for both professionals and the lay public is to put the facts of nutrition into proper perspective and to counteract the misinformation and half-truths about food which receive

extensive publicity. However, the curriculum of most dental schools does not include any identifiable course in nutrition. As a result of this, a large number of dentists may either give incorrect opinions on the importance of nutrients in oral health care, or they feel that nutrition has no place in the prevention, care, and management of dental problems.

The objective of this study was to determine the attitude of senior dental students toward nutrition. Attitude has been interpreted as a positive or negative reaction toward nutrition. Attitude was defined by Anastasi (7), is a "tendency to react favorably toward a designated class of stimuli." Kerlinger (8) further classifies attitude as "a predisposition to think, feel, perceive, and behave toward a referent or cognitive object."

This survey was designed to measure attitudes toward nutrition counseling in the student's future dental practice, and toward nutrition education in dental school. Nutrition education in the dental school curriculum is usually not treated as a separate entity, but rather as part of another program. It is hoped that this study will indicate the dental student's desire to learn those basic sciences that are positively related to clinical dentistry. An understanding of the attitudes of dental students toward nutrition and their nutrition education experience will

provide information for nutrition educators on the methods needed to teach nutrition to dental students.

Nutrition as used in this paper refers to foods and the categorization of foods into food groups as well as the biochemical aspects of food utilization.

REVIEW OF LITERATURE

Nutrition is accepted as an essential component of good health, including dental health. Preventive dentistry rather than restorative dentistry is the key to oral health. Dental schools will be failing if they do not prepare their students with the necessary skills and knowledge to utilize sound nutritional principles in the care and management of patients.

The reason that nutrition should be taught in dental schools is that food and nutrition play an integral part in the cause, and therefore, the prevention and control of dental disease (9). Nizel (10) pointed out that if a child were provided a balanced diet, devoid of between meal snacks of sweets, and if he drinks optimally fluoridated water, his dental experience in a lifetime would be minimal. Another example points to the supportive effects of protective nutrients such as protein, ascorbic acid, and vitamin A on periodontal tissues so that they can resist breakdown. Therefore, it is essential that the dentist learn and understand how to use diet for the prevention and control of oral diseases.

Assessing the nutritional status of a patient should be part of a general diagnosis and treatment planning course. Assessing the nutritional status of a patient involved the determination of why the patient selected or

omitted foods with essential nutrients from his diet (11). The dentist must be skilled in collecting the necessary data from the patient through a diet history. He must be able to analyze the diet, and then make appropriate recommendations to patients regarding the diet.

Nutrition education and nutrition counseling have slowly been incorporated into the curriculum of many United States dental schools (12, 13, 14, 15, 16).

Attitudes Toward Nutrition

Success in nutrition education has been defined as the incorporation of sound nutritional knowledge into daily practice. Among the variables affecting both the acquisition of knowledge and its application is the learner's attitude (17). The development and explanation of a person's attitudes has always been recognized as complex (7, 8).

Sherif and Sherif (18) defined attitudes as "that inferred from characteristic, consistent, and selective modes of behavior directed toward or against relevant objects and events." Attitudes have been reported to influence behavior independent of the individual's knowledge of nutritional concepts and practices (19).

Summers suggested (20) that attitudes have a motivational quality. Attitudes contribute to routinizing behavior, and they also have a directional quality in that they involve an affective dimension, such as a person's

evaluation of, liking for, or emotional response to, the attitude object.

Attitudes may be transmitted to others. Baker (21) reported the negative influence a teacher's attitude had on the subsequent selection of squash by her elementary school pupils. Her avoidance attitude toward squash resulted in avoidance behavior by the children. Likewise, positive attitudes toward nutrition would also influence another's attitudes.

Eppright et. al. (22) found that the nutrition knowledge of mothers of preschool children was highly and positively correlated with attitudes toward nutrition. However, the attitude toward nutrition had little relationship to nutrient content of the diet that mothers prepared for their families. This indicated that favorable attitudes did not motivate mothers to provide better diets.

The nutrition knowledge of elementary school teachers, studied by Petersen (19), was found to be low. The teachers realized that their behavior changes were based on their attitudes more than their knowledge of nutrition. Petersen found that there was little relationship between nutrition knowledge and attitudes of the teachers toward nutrition. This indicated that attitudes toward teaching nutrition were not affected by the level of nutrition knowledge.

A survey of female high school graduates (23) showed

that previous enrollment in high school home economics courses with a unit in food, nutrition, and health was not consistently associated with scores on tests of nutritional knowledge, attitudes, and practices. The graduates achieved higher mean scores in tests of nutritional attitudes and practices than did those who had not taken home economics courses, but the differences were not significant at the 0.05 level of significance. The findings supported the relationship of knowledge/attitudes and attitudes/practices, but did not support a direct relationship between nutritional knowledge and practices. Schwartz (23) stated that research was needed on techniques, strategies, and nutrition education materials available as well as those that have been used. Efforts to teach students not only the principles and concepts of nutrition, but how to apply this knowledge in nutritional practices should be a goal of nutrition educators.

Two studies have been conducted with members of the medical profession. Vickstrom (24) surveyed registered nurses, and Krause (25) studied the nutritional knowledge and attitudes of physicians. Vickstrom reported that nutritional knowledge of nurses declined with age and experience, while attitudes toward nutrition improved as they became older and were more experienced. Nutritional knowledge correlated positively with nurses' attitudes toward their role in the nutrition education of patients

and their perception of the team approach to health care. Vickstrom concluded that knowledge inspired confidence and therefore, enhanced the nurses' attitudes toward nutrition. Nurses expressed favorable attitudes toward nutrition. Their least favorable attitude was directed toward their own nutrition education experiences.

Two hundred ninety-two physicians participated in the Krause study of nutritional knowledge and attitudes. She found that physicians' attitudes were favorable toward nutrition. However, 12% received no nutrition education in medical school, either as a specific course or integrated with other subject. No significant relationship was found between nutritional knowledge and attitude.

Nutrition and Dental Health

The existence of either oral health or disease has been thought to depend upon interactions between the oral environment, the host/tissue resistance, and the microflora of which dental plaque is composed. It has been established that a variety of nutrients are involved in the interactions at both the local and systemic levels (5, 26, 27).

Nutrition has been shown to affect teeth during development and after eruption (5, 28). During development, evidence has indicated that nutrients may affect the cellular architecture of the organic matrix. The calcification and maturation process of enamel as well as the morphology and eruption pattern of the tooth would also be

affected. A deficiency of fluorides, calcium, phosphate, calories, proteins, or vitamins A, C, or D is frequently implicated in dental malformations. During this period of development, nutrients such as vitamins A and C and protein have influenced the bacterial flora by modifying the oral environment and thus selecting specific microorganisms to be implanted on the susceptible surfaces of the newly erupted teeth (4).

Foods have been found to affect developed teeth, both directly and indirectly (4). Directly, as foods are chewed and come in contact with the tooth surface; nutrients in the diet may contribute to plaque formation and to plaque metabolism by providing the required nutrients to the plaque flora for the production of acids, enzymes, and other metabolites active in producing carious lesions. Foods may modify the oral environment indirectly, after digestion and absorption. The environment of dental tissues is subject to the influence of secretions from the salivary glands. Studies (5, 26, 27) indicated that the physical consistency and nutritional quality of food affects the structure of the major salivary glands as well as the flow rate of saliva. Salivary secretions are good sources of several ions such as calcium, phosphorus, and fluoride. These elements participate in posteruptive maturation of tooth enamel and they also determine the pH at which the tooth mineral content will begin to dissolve. Saliva contains buffers

which tend to counteract the fall in pH associated with microbial metabolism of carbohydrates in the formation of dental plaque (5).

During the post-eruptive life of the tooth, carbohydrates, specifically disaccharides and monosaccharides, have been shown to assume the greatest importance among nutrients in relation to dental caries. Madsen (29) reported that the frequency of intake, rather than the actual amount of carbohydrate ingested, has been the more critical factor. Evidence has indicated that less frequent eating patterns and restriction of carbohydrate-containing foods which are retained on caries susceptible tooth surfaces has depressed the metabolism of the caries-producing microorganisms and resulted in major reductions in dental caries (1, 26, 29, 30).

The number of well-balanced meals eaten each day has decreased. The majority of the population now eats only one or two complete meals a day, and the rest of the food consumed in a day are at a third, fourth, or fifth time as snacks. The increase in the number of snacks consumed daily has caused concern on the part of some dentists (4). Sweet, high-sucrose foods have been increasingly consumed between meals. The consequence of this change has been that there has been a more frequent consumption of sugar-containing foods that are known to stimulate caries development. In the 1970 United States nutritional survey

(31), the long term consumption of snack foods containing high levels of sugars was positively correlated with dental caries status, particularly in the high-income areas.

Nutrition is of known importance in preventive dentistry for two oral diseases, dental caries and periodontal disease. Caries have been associated with Western civilization, and more specifically with increasing replacement of dietary starch with sugar. Periodontal disease has been commonly encountered in malnourished, underprivileged areas (5).

The same kinds of interrelationships between agent, host, and environment that pertain to dental caries are also recognized for periodontal disease. Although periodontal disease has not been identified as a primary nutritional disease, it has been shown that it may be influenced by local or systemic dietary factory (1). Plaque formation and its calcification has been described as the primary stimulus for the breakdown of periodontal tissues (1, 26, 32).

Shaw (1) believed that the best advice that could be given to the patient with periodontal disease would be to maintain an optimal diet with a regular mealtime schedule, a minimum number of between-meal snacks, and the substitution of foods such as fruits, vegetables, cheese, nuts, and comparable items for those known to encourage plaque formation. The recommendations needed to be

accompanied by instruction in good oral hygiene practices.

Nutrition Counseling for Dental Patients

The relationship of various nutrients and good eating practices to the increase or decrease of dental caries has been shown. This information provided to the patient with basic nutrition principles would produce a dental caries preventive diet (2). Various methods of evaluating nutritional status that would provide adequate information to insure a sound basis for diet therapy have been suggested for the dentist. A medical history, clinical examinations, diet analysis, and laboratory tests have been used successfully. Dietitians or appropriately trained dental auxiliaries could provide the personalized nutrition counseling. Since the relationship between dietary nutrients and oral health has been established, many authors (1, 2, 4, 5, 26) expressed the belief that diet evaluation and counseling should become an integral part of patient care in the dental office.

Howe et. al. (33), reported in 1942, that cavities decreased in children by 56% when nutrition counseling was offered with routine dental health care. The control group consisted of children who had also been dental patients at the Infirmary, and who had not received any nutritional supervision. Nutrition counseling for the individuals in the experimental group was provided for an average of three and three-tenths years. These findings indicated that the

progress of dental caries in children could be substantially reduced by an intensive nutrition education program.

To be effective, nutrition counseling has needed to be coordinated with the rest of dental therapy (34). Ideally, the dentist should provide the nutrition counseling because of his status with the patient. If a dietitian, dental hygienist, or dental assistant provided the counseling, the dentist should have assumed the responsibility of giving this counselor and this responsibility prestige value to the patient (34). The person responsible for the nutrition counseling procedure must have been skilled in both nutrition and communication. The interviewer must have avoided either favorable or critical suggestions since patients have been known to please the interviewer with inaccurate or exaggerated responses (1).

Nizel (10) suggested that all patients might benefit from nutritional guidance, but he considered it necessary for the patient with high caries susceptibility. He recommended that all adolescent patients regardless of their present dental status should be given nutrition counseling because they are the most vulnerable age group in relation to dental caries. Truuvert (35) believed that all patients should be counseled. In cases where the diet was good, only a few minutes were needed to evaluate the diet and another few minutes to inform the patient of the result of

the analysis.

Model Counseling Plans

An approach that could easily be accomplished in the dental office was proposed by Nizel (2). After the patient has been selected to be counseled, he should be instructed on how to record all food and beverage consumed over a five-day period, including a week-end. The patient must be directed to record not only the foods and the amounts eaten, but also the form of the food, such as fried chicken, raw carrots or baked apple. In addition, the patient should be instructed to include the sequence in which the foods were eaten and which foods contained sugar added by the patient, i. e., coffee with milk and two teaspoons of sugar. The details of record keeping should then be demonstrated by the counselor by questioning the patient on his food intake during the previous 24 hours.

Nizel (2) suggested a follow-up visit devoted only to diet counseling. The purpose of this visit would be to assess the factors influencing the patient's nutritional status, i. e., personal, environmental, social, and phychological factors that determined the food choices. Items to be included during the patient interview would be chief complaints or present illness, personal and social history, family history, and medical history. At this point, the session would then change from an interview to a counseling session. The process of dental decay and how foods and

food practices can contribute to causing caries should be explained to the patient. The diet history the patient was asked to keep would then be analyzed for: (1) the number, type and frequency of foods sweetened with sugar, (2) whether a nonplaque-forming detersive food such as raw fruits and vegetables was eaten at each meal, and (3) whether the diet was adequate in essential nutrients.

The patient would then be asked to circle in red all foods listed in the food diary that were sweetened with sugar. The total number of exposures of the teeth to sweets, the form (solid or liquid), and when they were eaten (with meals or between meals) would then be totaled. The total number of exposures of the teeth to sweets is multiplied by 20. This figure was determined to be the approximate number of minutes that acid is produced when sweets come into contact with plaque (2).

The food diary would then be evaluated for a non-plaque-promoting food eaten at each meal. The adequacy of the diet in terms of the desirable number of servings of each of the Four Food Groups would then be tallied by the dentist and the patient on a work sheet (2).

The dentist's knowledge gained from nutrition classes would then enable him to prescribe a diet for the patient based on the previously gathered information. By using the evaluation chart, the dentist would be able to point out to the patient positive nutrition practices. The

dentist would involve the patient in analyzing the diet by asking him which foods in his diet are not adequate to meet the recommendations for his age (2).

The list of plaque-forming, sugar-sweetened foods would be re-examined, and the patient asked to select sweets he would be willing to give up. Nonplaque promoting snack substitutes should be recommended to the patient. Acceptable substitutes would be raw fruits and vegetables, cheddar cheese or nuts. Using the food diary prepared by the patient, the dentist would ask the patient what changes could be made to improve each of the meals (2).

During dental school, the dentist learned that gradual improvement as related to diet and not drastic change would be a realistic goal. The purpose of the counseling would be to improve the quality of the diet, not the quantity of the diet. Cooperation and acceptance of the diet prescription on the part of the patient would then be possible (36).

A follow-up visit about six weeks after the initial counseling session should be required. At this time, the patient would record another five-day food diary. The new food diary would be evaluated and compared to the original diet prescription. Problems and misconceptions could then be discussed (2).

Several authors (1, 34, 35, 37) have reported the use of nutritional counseling using the Nizel technique as

a basis for their counseling procedure. DePaola and Alfano (38) agreed that the system of personalized nutrition counseling developed by Nizel (2) was excellent and useful. However, the system was based on the Four Food Groups model and might be inadequate to meet the needs of many nutrition-conscious patients. Food intake deficiencies might need to be converted to specific nutrient needs.

DePaola and Alfano (38) further suggested a triphasic approach to nutritional counseling. The first phase consisted of a medical and social history, a comprehensive clinical examination, and a qualitative dietary analysis. Particular care was taken to note factors suggestive of nutritional problems, such as diabetes, hypertension, pregnancy, trauma, hyperlipidemia, and coronary artery disease. Social problems that might have been noted were the food faddist, the elderly person living alone, or perhaps the low income family. The clinical examination should have included not only the oral tissues, but also those areas readily accessible to the dentist, e. g., skin, eyes, hair, nails, neck, etc. Food consumption was easily grouped into familiar categories. However, because of the large variability of nutrients within each group, considerable expertise was needed to determine specific nutrient imbalances. DePaola and Alfano suggested that the analysis should be conducted in conjunction with an appropriately trained auxiliary such as a dietitian, nutritionist, or

dental hygienist. If potential problems were not detected at this point, enough information was available so that the nutritional assessment could be terminated and appropriate dietary counseling begun.

If a nutritional problem existed, a more detailed dietary analysis was conducted utilizing a more precise listing of the individual's intake. DePaola and Alfano suggested computer assisted dietary analysis to eliminate repetitive work. Routine blood chemistry that included a differential blood count and postprandial glucose level should be conducted as another source of essential information. Nutritional counseling should be started and any necessary supplementation should be instituted if it was indicated by the analysis of the detailed dietary intake and blood chemistry.

If a patient had more complex nutritional problems, he should be referred to a physician for comprehensive nutritional biochemical assays of blood, urine, and tissues as well as tests of metabolic and endocrine function (38).

The dentist is described in the Principles of Ethics issued by the American Dental Association as "providing the highest type of service of which he is capable, and a leader in his community, especially in all efforts leading to the improvement of dental health of the public" (30). A sound knowledge of good nutrition is essential to enable the dentist to take advantage of this opportunity.

Nutrition Education in Dental School

Dentists need practical nutrition information. As early as 1927, Lydia Roberts (40) wrote, "If the dentist can do nothing more than to reiterate, 'Drink milk; eat generously of fruits and vegetables, limit sweets,' making the relation between these practices and good teeth impressive, he will be doing an unquestionable nutrition service as well as one in preventive dentistry."

In 1940 the Professional Education Section of The American Dietetic Association studied the present status of nutrition courses in medical and dental schools (13). Thirty-nine schools of the 44 dental schools that were surveyed responded to the questionnaire. Thirty-five dental schools reported that nutrition instruction was given in some form; no nutrition was taught in four schools; separate courses in nutrition were offered in 15 schools. Results also indicated that a great variety of people were listed as providing the nutrition instruction; 21 different job titles were reported from 30 schools responding. This emphasized the fact that the material was often presented by specialists in other fields. The length of time devoted to the study of nutrition varied from eight to 34 hours. All courses included lectures, but some also included demonstrations, clinics, and seminars. Course content was not requested for this study.

In 1948 Hadjimarkos (14) conducted a survey to deter-

mine the extent to which the subject of nutrition was taught in dental schools. Of the 35 schools which replied, 22 gave a course in nutrition; 11 included lectures on nutrition as part of another course; and two did not include any nutrition information at all. This represented an increase over The American Dietetic Association's report that found only 15 schools were offering a separate course in nutrition in 1940.

In a study reported in 1966, Wessels (15) reported that of 44 dental schools in the United States, 17 (38%) offered separate courses in nutrition, with a range of eight to 52 clock hours; 16 hours represented the mode. All students received reasonably adequate instruction in digestion and metabolism of the nutrients. But, it appeared to Wessels that most students were not prepared adequately in the area of applied nutrition if they were to assume their responsibilities in total health care of their patients. Wessels was concerned about the structure of the curriculum and its influence on the student. Emphasis on a specific area indicated the importance attached to that area by those responsible for curriculum planning. He proposed that the establishment of a separate course might increase the student's appreciation of nutrition as an integral element of the curriculum and as a vital part of modern dental practice.

A survey was conducted by DePaola and Cheney (41) to

determine the extent to which nutritional information has been used by dentists in private practice in Virginia. The majority of the dentists responding to the survey obtained their nutritional information from continuing education courses, and not from courses in dental school. DePaola and Cheney recommended that qualitative nutritional screening be an integral part of patient care. They purported that nutrition become diagonally integrated into the dental school curriculum so that diet therapy could become an active component of the patient's preventive program.

During a "Symposium on Nutrition in Dental Education" held in 1977, Modrow (unpublished observations) reported the results of her study on the inclusion of nutrition in the dental school curriculum. Forty-eight of 50 questionnaires sent to deans of dental schools in the United States provided the data. Thirty-five schools were teaching nutrition as a separate course; one school was planning a course; and, 12 schools had no plans to include nutrition as a separate course in the dental curriculum. The mean number of didactic hours devoted to nutrition was 18-1/2. The mean number of clinical hours devoted to nutrition was 12.

Modrow also confirmed that there was no pattern in the way dental schools taught nutrition. Many schools used a combination of the various methods reported, i. e., 12

schools reported integration of nutrition throughout both the didactic and clinical experiences. Few schools offered only a one part nutrition program; four schools required a separate course in nutrition as the only nutrition experience; and, only one school offered nutrition as a separate part within another course.

The question of who should be responsible for teaching the nutrition courses was answered by Nizel (10) when he recommended that the ideal teacher was one who had both a basic science background in nutritional biochemistry and clinical experience in dentistry. If one person did not possess both these types of training, then a collaborative effort between a clinical dentist and a nutrition educator should be considered. Unless a nutritionist or home economist had had training and could relate oral problems to nutrition, that person should not teach the course. Modrow (unpublished observations) reported no pattern regarding the person charged with teaching the nutrition component within the dental school.

Menaker, a dentist, (unpublished observations) supported the recommendations made during the 1966 "Conference on Nutrition Teaching in Dental Schools" (16). These recommendations would still be considered by many practicing dentists as appropriate goals for dental schools in 1977. The recommendations included:

1. The ultimate objective of having knowledge

and skills in nutrition acquired in dental schools is to make it possible for the dentist to diagnose and treat diseases in the oral cavity and related structures and tissues thereby leading toward the prevention of disease due to nutritional disorders.

2. Each dental school should have at least one staff member of professorial rank with appropriate education, experience, and interest in nutrition who is identified primarily with teaching and research related to nutrition and general health.

3. The dentist should learn to use the valuable assistance that can come from paramedical specialists, e. g., biochemists, nutritionists, dietitians, and home economists.

4. Dental students after having completed courses in biochemistry, physiology, and pathology should be taught the basic principles of nutrition. Thereafter, teaching in the applications of food science and nutrition should be promoted as a unit primarily in clinics and conferences.

THE NUTRITION EDUCATION PROGRAM AT VIRGINIA COMMONWEALTH UNIVERSITY SCHOOL OF DENTISTRY

The nutrition education program at Virginia Commonwealth University, Medical College of Virginia School of Dentistry was begun in 1974. Dr. Dominick DePaola, Associate Professor in the Department of General and Preventive Dentistry has been in charge of the program. Formerly, Dr. DePaola was a Clinical Instructor of Nutrition and Preventive Dentistry at Tufts University School of Dental Medicine, Boston where he worked with Dr. Nizel.

The goal of the Virginia Commonwealth University program as stated by DePaola (unpublished observations) has been to diagonally integrate nutrition into the dental school curriculum. During the first year of training, emphasis has been on didactic learning of nutrition with no clinical experience. In the senior year, the clinical skills of nutrition counseling would become the major focus.

During the dental student's education, he has received the following nutrition education:

First year.	Nutritional Biochemistry. 15 clock hours. Deals with metabolic activity.
	Preventive Dentistry. 6-8 clock hours. Deals with the nutritional development of oral tissues.

Second year.	Human Nutrition. 20 clock hours. Areas covered include nutrition pathways, patient management, personal dental health, nutrition quackery, and applied nutrition counseling. (Goals and objectives of the course are listed in the Appendix p. 67).
Third year.	Preventive Dentistry Clinic. Clinical nutrition counseling sessions. Students work with patients on a 1:1 basis. Each student is required to complete two nutrition counseling sessions.
Fourth year.	Same as third year. Also, a 20 clock hour nutrition elective course is offered.

In 1975, the dietetic interns at the Medical College of Virginia Hospitals were asked to participate in the nutrition education program of the School of Dentistry. The dietetic interns led small group discussions on the mechanics associated with the nutritional counseling, such as which forms of counseling to use, how to transpose food into categories, and then how to determine adequacy of the diet using the Basic Food Groups evaluation sheet. The School of Dentistry has adopted the basic principles of the nutrition counseling process developed by Nizel (2). The evaluation of the diet has been expanded from the Basic Four Food Groups to include fats and oils so that attention would be given to cholesterol and saturated fatty acid content of foods in the diet.

During the Preventive Dentistry Clinic, the

dietetic interns served as resource persons for the dental student. The dietetic interns were available to help the students with problems that might occur during the counseling process. Each dental student was required to counsel patients about their nutritional needs under the direct supervision of the dietetic intern or a faculty member from the Department of Community Dentistry. Each counseling session was critiqued by the faculty member or dietetic intern with the dental student. The benefits of this program were two-fold. The dental students became more aware of the dietitian as a resource person, and has helped them to better understand the services provided by the dietitian. For the dietetic interns, these experiences in the dental school helped them learn to recognize and understand the oral problems associated with poor diets as well as have the opportunity to function as members of other health care teams.

A nutritionist has been hired to work with Dr. DePaola under a two-year special project grant the School of Dentistry received from the Department of Health, Education, and Welfare. The purpose of the grant has been to develop an integrated nutrition education program in the dental school. The course director for the second year Human Nutrition course has been this nutritionist.

Dr. DePaola (unpublished observations) pointed out the unique features of the nutrition education program at

Virginia Commonwealth University, Medical College of Virginia School of Dentistry. The format of diagonal integration of nutrition into the curriculum is not widely utilized, but has been found to be highly effective. The nutrition information presented has been timely, complete, and relevant to the dental student. The clinical program has been intensive and extensive, and Dr. DePaola felt that this approach would give the student a practical approach to nutrition which can be utilized both in the student's practice of dentistry as well as in his own lifestyle.

EXPERIMENTAL PROCEDURE

This study was designed to measure attitudes of a group of senior dental students toward nutrition. Attitude statements were developed for the following three attitude parameters: nutrition and counseling, nutrition counseling in the student's future dental practice, and nutrition education in dental school.

Formulation of Statements

A Likert-type format was chosen as most suitable for an assessment of attitudes because of the ease of responding and the familiarity of categories used, for example, a five category scale from "strongly agree" to "strongly disagree." The Likert-type scale is a set of attitude items, all of which are considered of approximately equal "attitude value," and to each of which subjects respond with degrees of agreement or disagreement (8).

Attitude statements specific to nutrition and dentistry were obtained from various sources. These sources included literature in the areas of nutrition and dentistry; reports of studies on nutrition attitudes; personal interviews with students enrolled in nutrition courses and faculty members of the Department of Human Nutrition and Foods, Virginia Polytechnic Institute and State University; and personal interviews with faculty members of Virginia Commonwealth University, Medical College

of Virginia School of Dentistry. This instrument containing 35 statements was reviewed by two faculty members in the field of nutrition and two in the area of dentistry and changes were made based on their recommendations.

Pretest of Questionnaire

The questionnaire was pretested and analyzed by 25 dietitians and three randomly selected dental students. Comments regarding each statement as well as responses were requested. Questions that appeared to be ambiguous were reworded; some were removed. Five statements were eliminated because they were repetitious or were not found to contribute information being sought.

The questionnaire (Appendix page 71) utilized in this study consisted of 30 statements related to nutrition and counseling, nutrition counseling in the student's future dental practice, and nutrition education in dental school. The division of the statements into the attitude parameters is included in the Appendix.

Administration of Questionnaire

The population studied was the class of senior dental students at Virginia Commonwealth University, Medical College of Virginia School of Dentistry. Seniors were selected for the study because they had completed the formal classroom studies and were in the clinical phase of their training. A questionnaire with a cover letter was sent to each of the 112 members of the senior class on October 25,

1977. Responses were requested by November 4 (Appendix page 78). Sixty-one responses were received by November 11. Another letter was sent on November 14 by the investigator to the students urging them to complete and return the questionnaire they had received if they had not done so. Twelve additional responses were received by December 1.

Subjects were asked to respond Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), or Strongly Disagree (SD). In scoring the attitude test, responses received varying points for degree of agreement or disagreement with the statement. Responses which favored the statement were scored 5 if strongly agree was circled, and 4 for agree, 3 for undecided, 2 for disagree, and 1 for strongly disagree. For negatively worded statements, the opposite scoring system was used; 5 for a choice of strongly disagree, and likewise, 1 for strongly agree. A high score indicated a favorable attitude toward a statement.

Analysis of Responses

Seventy-three responses were statistically analyzed using the Statistical Package for the Social Sciences (42). The results of the study were coded and tabulated. The demographic data was used to describe the group studied. Condescriptive and Pearson Corr tests were run on the data. Frequency distributions were tabulated for the responses to the attitude statements. Mean scores were calculated for all statements as well as for each statement. The total

score and the mean score for each attitude parameter were calculated. Correlation coefficients were computed between the statements and selected demographic data, and between the various attitude parameters.

RESULTS AND DISCUSSION

Sixty-five percent (N=73) of the senior dental students completed and returned the questionnaire. The results were analyzed using the Statistical Package for the Social Sciences.

Characteristics of Group Studied

The characteristics of the students responding are reported in Table 1. The subjects ranged in age from 24 to 35 years with the mean age being 25.7 years. Ninety percent of the group were males; 58% were married. There was no significant difference in the mean score of married (2.53) or single (2.52) respondents. Students thirty years old and older had a slightly higher mean score (2.73) than students who were less than thirty years of age (2.48).

The majority of the students (86%) received their undergraduate degrees from Southern schools. Eighty-eight percent of the students spent the first 18 years of their lives in the South.

The educational level of the parents ranged from grade school to 51% of the mothers and 59% of the fathers who had some college, a college degree, or an advanced degree.

Nutrition Attitudes

The mean scores for each of the three attitude parameters measured are presented in Table 2. The mean

TABLE 1

CHARACTERISTICS OF PARTICIPATING DENTAL STUDENTS

Characteristic	Percent
Age:	
24	14
25	41
26	11
27	10
28	4
29	4
30	7
31	4
32	3
35	2
Sex:	
Male	90
Female	10
Marital Status:	
Single	42
Married	58
Undergraduate College or University:	
No degree	4
Southern; university	58
Southern; comprehensive or 4 year	28
Mid-Atlantic; university	4
New England; university	3
New England; comprehensive or 4 year	1
Hawaii; university	1

TABLE 1 (continued)

CHARACTERISTICS OF PARTICIPATING DENTAL STUDENTS (continued)

Characteristic	Percent
Educational Level of Mother:	
Grade school	1
Some high school	1
High school graduate	38
Business or vocational/technical school	8
Some college	14
College degree	29
Advanced degree	8
Educational Level of Father:	
Grade school	1
Some high school	4
High school graduate	27
Business or vocational/technical school	8
Some college	8
College degree	33
Advanced degree	18
Area in which the respondent spent the first 18 years of his life:	
New England	5
Mid-Atlantic	13
Southern	75
Mid-Western	1
Rocky Mountain	3
Pacific Coast	3

N = 73

TABLE 2

MEAN SCORES OF DENTAL STUDENTS ON ATTITUDE PARAMETERS

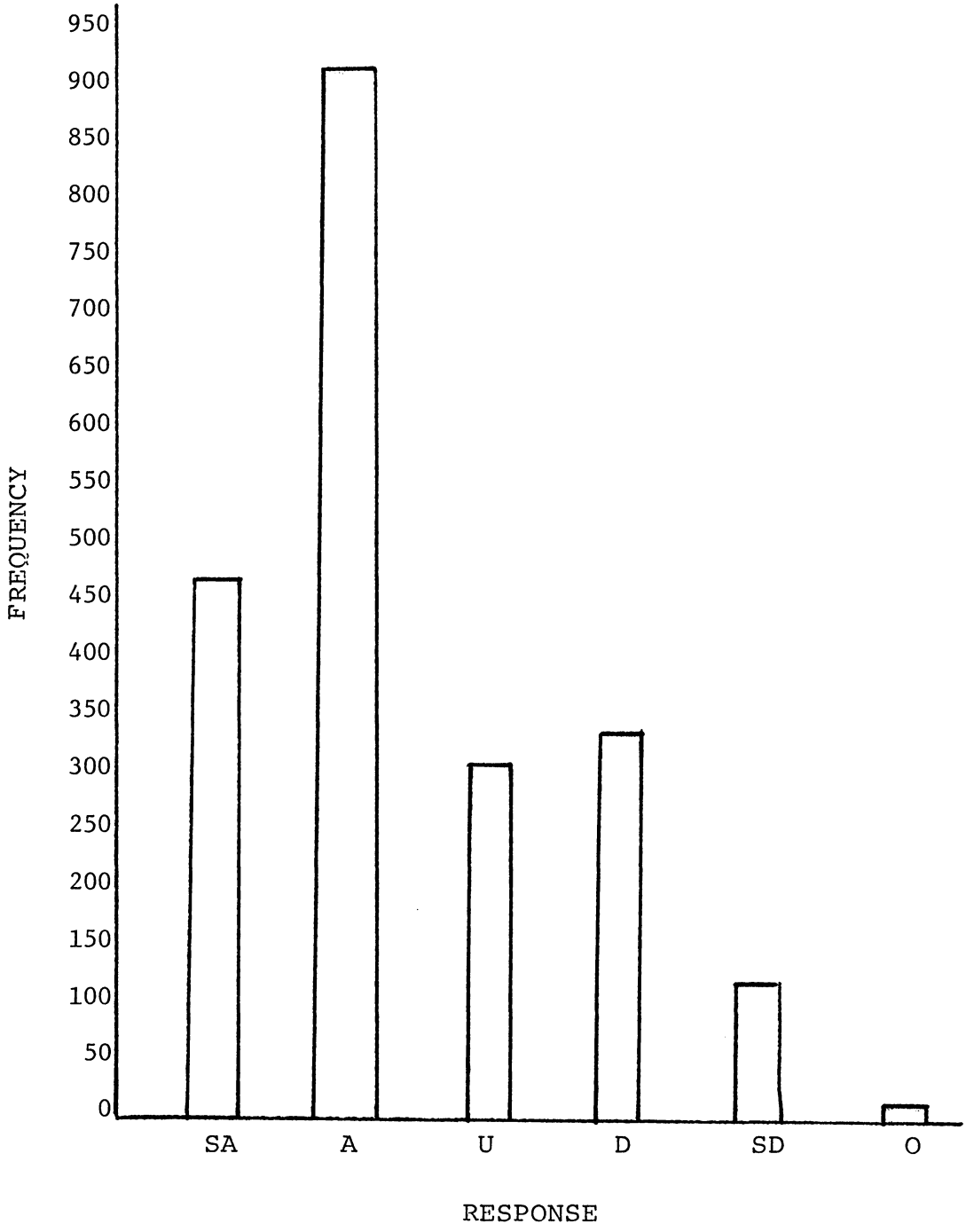
Attitude Parameter	Mean	SA	A	U	D	SD
		(%)	(%)	(%)	(%)	(%)
Nutrition and Counseling	3.613	25	40	13	18	4
Nutrition Counseling in My Dental Practice	3.529	18	42	19	16	5
Nutrition Education in Dental School	3.607	21	46	13	14	6

N = 73

scores, all above 3, indicate that the responses to all the attitude parameters were favorable. The least favorable attitude was toward nutrition counseling in their future dental practice. However, there was only a small difference between the lowest mean score and the means for nutrition and counseling (3.613) and nutrition education in dental school (3.607). The small variation of mean scores on responses to the attitude statements may have been caused by the questionnaire.

The frequency distribution of each response to the attitude statements is given in Figure 1. Most students chose "agree" as their response to the statements. The "agree" category received almost twice as many responses as any other category. Twelve statements were left blank on 73 questionnaires.

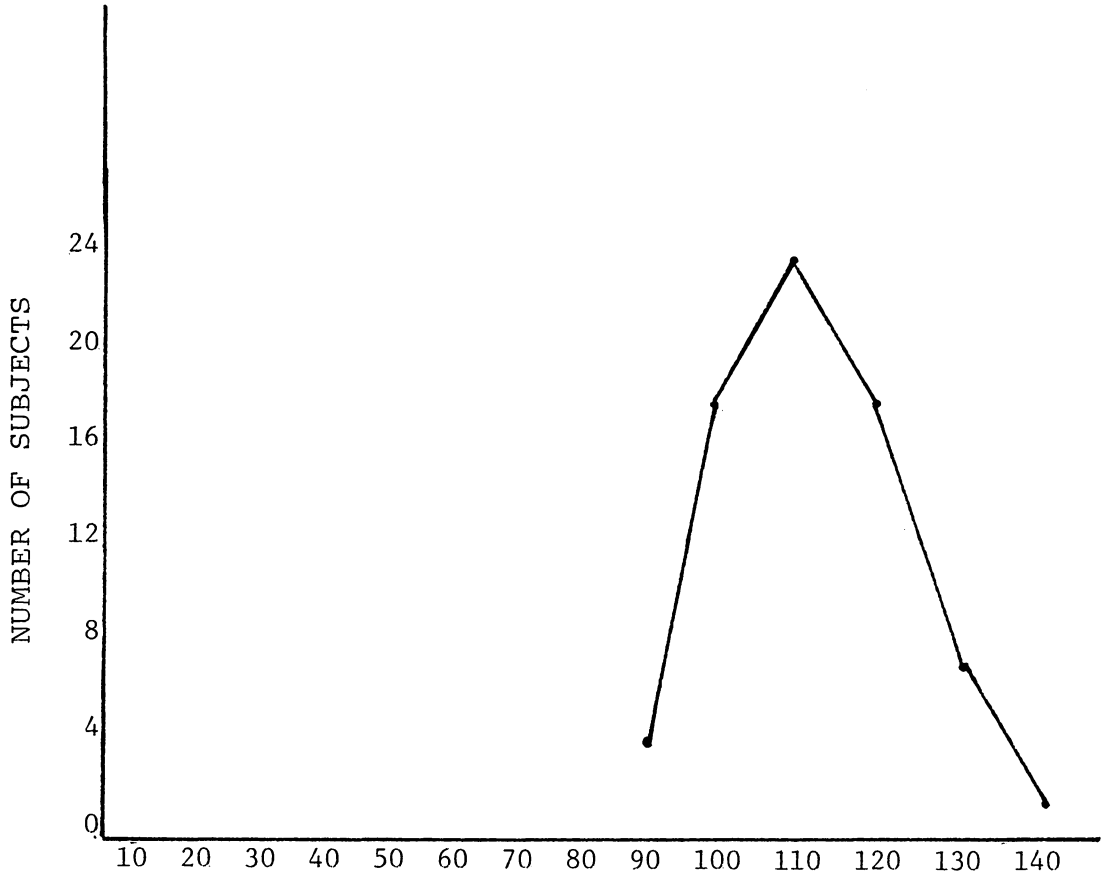
The scores of the questionnaire were normally distributed (Figure 2). The highest possible score a student could receive was 150. Students in the study attained a mean score of 107 and a median score of 105. The mode was 103. The lowest attitude score was 89; the highest score was 137. Negative statements were reversely coded, i. e., 5 points were assigned to the response of strongly disagree, and likewise, 1 point was assigned to strongly agree. High scores, therefore, indicate a favorable attitude toward nutrition counseling as a part of the practice of dentistry.



SA = Strongly Agree
A = Agree
U = Undecided
D = Disagree
SD = Strongly Disagree
O = No Response

FIGURE 1

FREQUENCY DISTRIBUTION OF RESPONSES TO ATTITUDE STATEMENTS



N = 73
Mean = 107
Median = 105
Mode = 103

FIGURE 2

FREQUENCY DISTRIBUTION OF SCORES FOR ATTITUDE STATEMENTS

Nutrition and Counseling

The responses to the statements regarding nutrition and counseling are presented in Table 3. The most positive response elicited regarding nutrition and counseling was the statement, "Nutrition is an essential component of total health care" (mean = 4.795). This concept is generally accepted by health professionals and seldom provokes any disagreement among others.

The range of mean responses to the other statements in the area of nutrition and counseling was from 4.795 to 2.329. The two statements with the lowest mean scores were, "A sound nutritional practice is to eat a wide variety of different foods from day to day," (2.792); and, "The Basic Four Food Groups is the best guide for teaching patients good nutrition principles," (2.329). Both of the statements were reversely coded, therefore, a higher score was received when the student disagreed with the statements. While both statements appear frequently in the lay literature, neither is accepted by all professionals in the field of nutrition. Neither statement reflects the current belief of increasing the amount of polyunsaturated fat and decreasing the amount of saturated fat in the diet. Also, a wide variety of nutrients are available within each group of the Basic Four Food Groups, and selections from each group may not insure a balanced diet (38). Many nutrition educators prefer to teach clients the relationship of

TABLE 3

RESPONSES OF DENTAL STUDENTS TO ITEMS ASSESSING NUTRITION AND COUNSELING

Statement	Mean	Response SA (%)	A (%)	U (%)	D (%)	SD (%)
Nutrition is an essential component of total health care.	4.795	79	21	0	0	0
Good nutrition plays an integral part in the prevention and control of dental caries.	4.233	47	38	7	8	0
Ethnic and/or cultural background of a patient must be considered in the nutrition counseling process.	4.110	22	74	0	1	3
More accurate food diaries usually result when the patient is given reasons for keeping them and the specific type of information needed.	4.041	21	67	8	4	0
The oral cavity is one of the most sensitive indicators of nutritional status.	3.803	28	41	14	17	0

TABLE 3 (continued)

RESPONSES OF DENTAL STUDENTS TO ITEMS ASSESSING NUTRITION AND COUNSELING (continued)

Statement	Mean	Response SA	A	U	D	SD
		(%)	(%)	(%)	(%)	(%)
Good nutrition concepts should be taught in federally funded programs such as Title VII, Head Start, etc.	3.781	25	41	26	4	4
Sucrose is the greatest nutritional threat to oral health.	3.740	29	37	19	10	5
Man-made vitamins are just as good nutritionally as natural vitamins.	3.444	15	32	35	18	0
Calories from sugar are no different than calories from beef, bourbon, or butter.	3.408	21	39	6	27	7
Poor food choices are often the cause of dental caries.	3.164	4	51	11	26	8
A sound nutritional practice is to eat a wide variety of different foods from day to day. *	2.792	4	26	22	39	8

TABLE 3 (continued)

RESPONSES OF DENTAL STUDENTS TO ITEMS ASSESSING NUTRITION AND COUNSELING (continued)

Statement	Mean	Response SA	A	U	D	SD
		(%)	(%)	(%)	(%)	(%)
The Basic Four Food Groups is the best guide for teaching patients good nutrition principles. *	2.329	5	8	15	56	15

N = 73

* Negative statements regarding nutrition were reversely coded.

nutrients to physiological fundtions, e. g., "Calcium is necessary to build strong bones and teeth."

The remaining statements produced favorable attitudes toward nutrition. The students agreed with the statement that good nutrition plays an integral part in the prevention and control of dental caries (4.233). They also agreed with the statement that the oral cavity is one of the most sensitive indicators of nutritional status (mean 3.803).

Agreement was also recorded for the fact that ethnic and/or cultural background of patients must be considered in the nutrition counseling process. The students concurred with Nizel's approach (2), that more accurate food diaries usually result when patients have been given reasons for keeping them, and when the dentist tells the patient the specific type of information needed.

Two statements that were confusing for the students were, "Man-made vitamins are just as good nutritionally as natural vitamins," and, "Calories from sugar are no different than calories from beef, bourbon, or butter." Comments received from the students indicated their desire for more information regarding the statement. They felt that the statements were true to a certain point, but that specific foods need to be considered. An example of man-made vitamins might be illustrated by the person who takes a vitamin C capsule daily. He may get his daily allowance of vitamin C, but if he eats an orange, potassium and roughage

are additional benefits for the patient. Calories from beef would also be accompanied by protein, and therefore beef could not be compared to bourbon or butter.

The students were undecided about the statement regarding poor food choices often being the cause of dental caries (mean 3.164). The information in the literature (1, 2, 3, 4) indicated that caries are a multi-factorial problem, and not caused by poor food choices only. The mean score for the statement implicating sucrose as the greatest threat to nutritional oral health (3.740) was high, but students felt that a sound diet, and frequency of eating, and physical consistency of foods should also be considered.

Nutrition Counseling in Dental Practice

The nine statements measuring the attitudes of the students toward including nutrition counseling in their dental practice (Table 4) produced a mean score of 3.529. Many students (69%) agreed that nutrition counseling should be a part of their dental practice. Dental hygienists (mean 3.085) outranked dietitians (mean 2.836) in the students' choice of the person who would be responsible for providing the patient nutrition education.

Responses ranging from strongly agree to strongly disagree, with a mean of 3.542, were recorded for the statement, "Nutrition counseling as part of preventive dentistry is an easy way to charge the patient more money for an office visit." This statement, reversely coded,

TABLE 4

RESPONSES OF DENTAL STUDENTS TO ITEMS ASSESSING NUTRITION COUNSELING IN THEIR FUTURE DENTAL PRACTICE

Statement	Mean	Response SA	A	U	D	SD
		(%)	(%)	(%)	(%)	(%)
The relationship of good eating habits to good dental health should be stressed to patients.	4.438	44	56	0	0	0
A dentist should be concerned only with the caries producing potential of the patient's diet. *	4.125	35	53	4	7	1
It is fine with me no matter how much sugar containing foods my patient eats as long as he brushes immediately after eating. *	3.875	24	54	11	8	3
Nutrition counseling will be a part of my dental practice.	3.849	16	53	29	1	0
Nutrition counseling as part of preventive dentistry is an easy way to charge the patient more money for an office visit. *	3.542	28	32	15	17	8

TABLE 4 (continued)

RESPONSES OF DENTAL STUDENTS TO ITEMS ASSESSING NUTRITION COUNSELING IN THEIR FUTURE DENTAL PRACTICE (con't.)

Statement	Mean	Response SA	A	U	D	SD
		(%)	(%)	(%)	(%)	(%)
Food diaries are an essential part of nutrition counseling in dental practice.	3.178	3	48	22	19	8
If I use nutrition counseling in my practice, it will be handled by the dental hygienist.	3.085	1	35	39	18	6
In my practice, every adolescent patient will receive nutrition counseling.	2.836	5	27	21	38	8
It is the responsibility of a dietitian to teach basic nutrition and diet therapy to dental patients.	2.836	5	23	30	32	10

N = 73

* Negative statements were reversely coded.

indicated that most students disagreed with it.

Responses related to the scope of the nutrition information which should be provided to patients were favorable. The students indicated that the relationship of good eating habits to good dental health should be stressed to patients (mean 4.438). The students disagreed with the negative statements regarding the fact that they should be concerned only with diet as it is related to caries control and sucrose restriction. They wanted to provide nutrition information essential to the well-being of the patient.

The dental students were undecided about using food diaries in their practice (mean 3.178). The students also were undecided about counseling every adolescent patient (mean 2.836) seen in their practice.

Nutrition Education in Dental School

The statements which outlined a favorable role for the dentist received high scores (Table 5). The dentists need to have good attitudes because of their influence on their patients, and the role of the dental profession in the fight against food faddism received mean scores of 4.438 and 4.068 respectively.

Agreement with the statements concerned with the ability to recognize nutritional problems and to diagnose dietary deficiencies were viewed by the students as an essential part of the nutrition education of a dental student.

TABLE 5

RESPONSES OF DENTAL STUDENTS TO ITEMS ASSESSING NUTRITION EDUCATION IN DENTAL SCHOOL

Statement	Mean	Response SA (%)	A (%)	U (%)	D (%)	SD (%)
Acceptance, understanding and sincerity are necessary factors for counseling and treatment.	4.438	44	56	0	0	0
Dentists should be able to recognize nutritional problems and make the necessary referrals.	4.315	36	60	4	0	0
Dentists need to have good attitudes toward nutrition because of their influence upon their patients.	4.096	27	56	15	1	0
The dental profession can be of help in the battle to combat food faddism and nutrition nonsense.	4.068	26	63	5	3	3
The dentist's nutritional knowledge will be useful in the diagnosis of dietary deficiencies before a chronic health problem results.	3.863	23	53	14	5	4

TABLE 5 (continued)

RESPONSES OF DENTAL STUDENTS TO ITEMS ASSESSING NUTRITION EDUCATION IN DENTAL SCHOOL (continued)

Statement	Mean	Response SA	A	U	D	SD
		(%)	(%)	(%)	(%)	(%)
Nutrition counseling should be a part of each patient's preventive care.	3.556	18	46	14	18	4
The nutrition education I received in dental school prepared me to handle the nutritional problems of my patients.	2.904	1	32	29	33	5
The nutritional knowledge I gained during dental school improved my eating habits or reinforced already good habits.	2.781	10	29	12	29	21
Nutrition counseling should be given to all adolescent patients regardless of the present dental status.	2.493	1	21	23	36	19

N = 73

Lower scores were recorded for the statements about the nutrition education the student had received. Scores indicated that the student was unsure if he could handle the nutritional problems of his patients (mean 2.904). When the student was asked if the nutrition education he received improved his eating habits or reinforced already good habits, 50% disagreed and 12% were undecided.

Relationships Between Attitudes and Demographic Data

Results of the analysis of the correlation coefficients appear in Table 6. The calculated variables were age, sex, marital status, education of parents, and the attitude toward including nutrition counseling in the student's future dental practice. The variables were correlated with each of the attitude parameters as well as the overall attitude score of nutrition and dentistry. A reason for the slight correlation (range = .2 through .5) between the variables might have been the complexity of the variables. Also, other variables not considered, such as their attitude toward their nutrition instructor may have caused a change in the variables that were calculated.

A slight positive correlation existed between age and the inclusion of nutrition counseling in the future dental practice (0.219). Marital status also produced a slight positive correlation with nutrition and counseling (0.211), indicating that married students have a more positive attitude toward nutrition than single students. There were

TABLE 6

CORRELATIONS BETWEEN ATTITUDES AND DEMOGRAPHIC DATA

Attitude Parameter	Age	Sex	Marital Status
Nutrition and Counseling	- 0.094	- 0.098	0.211
Nutrition Counseling in Future Dental Practice	0.219	- 0.095	- 0.094
Nutrition Education in Dental School	- 0.075	- 0.007	- 0.052
Overall Test Score	0.174	- 0.078	0.018

TABLE 6 (continued)

CORRELATIONS BETWEEN ATTITUDES AND DEMOGRAPHIC DATA (con't.)

Attitude Parameter	Education of Mother	Education of Father	Attitude Toward Nutrition Counseling In Future Dental Practice
Nutrition and Counseling	- 0.155	0.062	0.340
Nutrition Counseling in Future Dental Practice	- 0.108	- 0.013	1.000
Nutrition Education in Dental School	- 0.071	0.037	0.711
Overall Test Score	- 0.134	0.035	0.852

no correlations between sex of the student or the educational level of the parents and any of the attitudes measured.

There was a strong positive correlation (range = .6 to 1) between nutrition education in dental school and nutrition counseling in the future dental practice (0.711). The more positive the student's attitude toward his nutrition education experience, the greater his desire to include nutrition counseling in his patient's preventive dentistry program.

Another slight positive correlation was demonstrated between the parameter of nutrition and counseling, and the inclusion of nutrition counseling in the student's future dental practice (0.340).

CONCLUSIONS

Based on the findings of this study, the nutrition education experience of the student produced positive attitudes toward diagnosing nutritional problems and making the necessary referrals. However, the students did not feel that their nutrition education prepared them to treat the nutritional problem of their patients.

Favorable attitudes toward nutrition and counseling in general and its relation to oral health were recorded.

Students appear to be unsure of what the role of the dentist should be in providing nutrition consultation. Liability is one of the problems many health professionals face today. Thus, they may feel that nutritional counseling by the dentist would be contraindicated because a patient might have a medical problem of which they were unaware. While many dental students indicated that nutrition counseling would be a part of their practice, they were unsure of who should be responsible for the counseling. Dental hygienists were rated higher than dietitians. This indicates the need for dietitians to become more involved in the education of the dental student, and for dietitians to increase their role as consultants to health professionals other than physicians. Cost to the patient might be a factor to be considered at this point. Dental procedures are expensive, and the patient might not

be willing to pay the increased cost for services from a professional in the field of nutrition.

The students were also undecided as to who should receive nutrition counseling, i. e. every adolescent patient because of high caries susceptibility; and, exactly how the counseling should be handled. Students were undecided as to whether food diaries should be an essential part of nutrition counseling in their dental practice. A contributing factor to these results could be the dental student's uncertainty as to exactly how to set up his practice. Location, equipment, finances, and lack of patients are among the more immediate problems that need to be solved before the student could make decisions concerning the dental health education program of his patients.

If nutrition counseling were treated casually in the dental office, the dentist might feel more confident in guiding the patient toward wise food choices as related to good dental health. Informal or chairside counseling is not ideal because the patient might be intimidated, but it would be better than providing no nutrition information. Also, the informal counseling should not cost the patient additional money for an educational session.

If nutrition was included in the curriculum for dental hygienists, dietitians might be interested in joining faculties and teaching applied nutrition. While dentists would know the biochemical aspects of nutrition, the

hygienist would be prepared to counsel the patient about good nutrition principles as well as instruct about good oral health practices.

While students might include nutrition counseling in their practices, it might be that they assumed that nutrition counseling should be a segment of a good oral health program rather than a separate entity. If nutrition is treated this way, a dental hygienist would be of more help to a dentist than a nutritionist. The nutritionist would be limited in her knowledge of dental health, but the hygienist who had learned principles of good nutrition would be able to conduct an extensive oral health program.

The findings in this study indicate the need to improve the quality of nutrition teaching in dental schools. All nutrition education programs are aimed at positive change in knowledge, attitudes, and practices. The dental students had positive attitudes, but since their practices were unchanged or not reinforced further study is indicated to determine what should be done to have these attitudes reflected in their behavior. Research is needed on techniques and strategies that are available to teach dentists how to guide their patients, especially in instructing them about nutrition, an essential component of oral health and total health care.

The dentist, in his position of trust and confidence, must have positive attitudes toward nutrition in order to

transmit this information to his patients.

SUMMARY

The nutritional attitudes of senior dental students at Virginia Commonwealth University, Medical College of Virginia School of Dentistry were studied. A total of 47 clock hours was devoted to nutrition education in the dental school curriculum at Virginia Commonwealth University. Seventy-three students completed the questionnaire mailed to 112 members of the class. Data about attitudes toward nutrition and counseling, the inclusion of nutrition counseling in their future dental practice, as well as nutrition education in dental school were gathered.

The results showed that those dental students had favorable attitudes toward nutrition. They realized the importance of nutrition to good oral health and nutrition's role in the prevention and control of dental caries. Their least favorable attitude was toward the inclusion of nutrition counseling in their future dental practice.

Instruction in nutrition that they received as dental students did not improve their individual eating habits or reinforce already good habits. The students felt that the dental profession could be of help in the fight against food faddism. Also, the students were confident that they would be able to recognize nutrition problems and make the necessary referrals. However, the students did not agree that the nutrition education they received prepared them to

treat the nutritional problems they might encounter.

The statements receiving less positive agreement were those dealing with food and how to teach nutrition to patients, rather than statements dealing with the science of nutrition. Students who had favorable attitudes toward nutrition education also had favorable attitudes about including nutrition counseling in their dental practice.

LITERATURE CITED

1. Shaw, J. H. Nutritional guidance in the prevention of oral disease. Dent. Clin. North Am. 16: 733, 1972.

2. Nizel, A. E. Nutrition in Preventive Dentistry: Science and Practice. Philadelphia: W. B. Saunders Co., 1972, p. 356-395.

3. Enwonwu, C. O. Role of biochemistry and nutrition in preventive dentistry. J. Am. Soc. Prev. Dent. 4: 6, 1974.

4. Navia, J. M. Prospects for prevention of dental caries: dietary factors. J. Am. Dent. Assoc. 87: 1010, 1973.

5. Enwonwu, C. O. Nutrition and dental health. Nutr. News. 39: 1, 1976.

6. Navia, J. M. Dental health: nutrition's special role. The professional Nutritionist. 9: 6, 1977.

7. Anastasi, A. Psychological Testing, fourth edition. New York: Macmillan Publishing Co., Inc., 1976, p. 550.

8. Kerlinger, F. N. Foundations of Behavioral Research, second edition. New York: Holt, Rinehart and Winston, Inc., 1973, p. 495-496.

9. The impact of food and nutrition on oral health. Dairy Council Digest. 44: 1, 1973.

10. Nizel, A. E. Nutrition teaching in preventive dentistry. J. Am. Coll. of Dent. 39: 211, 1972.

11. Nizel, A. E. The contribution of the science and practice of nutrition to prevention and control of dental caries. Food Nutr. News. 41: 1, 1970.

12. A Course of Study in Dentistry. Report of the Curriculum Survey Committee of the American Association of Dental Schools. Chicago, 1935, p. 170-173.

13. Nutrition Education in Dental Schools. Report of the Professional Education Section of the American Dietetic Association. J. Dent. Ed. 5: 15, 1940.

14. Hadjimarkos, D. Present status of nutrition education in dental schools. J. Dent. Child. 15: 10, 1948.

15. Wessels, K. E. Present status of nutrition instruction in dental schools. J. Dent. Ed. 30: 82, 1966.

16. Report and recommendations on nutrition teaching in dental schools. J. Dent. Ed. 30: 122, 1966.

17. Carruth, B. R. and H. L. Anderson. Scaling criteria in developing and evaluating an attitude instrument. J. Am. Dietet. Assoc. 70: 42, 1977.

18. Sherif, M. and C. W. Sherif. Social Psychology. New York: Academic Press, 1969, p. 334.

19. Petersen, M. E. and C. Kies. Nutrition knowledge and attitudes of early elementary teachers. J. Nutr. Ed. 4: 11, 1972.

20. Summers, G. F. Attitude Measurement. Chicago: Rand McNally & Co., 1970, p. 65.

21. Baker, M. J. Influence of nutrition education on fourth and fifth graders. J. Nutr. Ed. 4: 55, 1972.

22. Eppright, E. S. et. al. Nutrition knowledge and attitudes of mothers. J. Home Econ. 62: 327, 1970.

23. Schwartz, N. E. Nutritional knowledge, attitudes, and practices of high school graduates. J. Am. Dietet. Assoc. 66: 28, 1975.

24. Vickstrom, J. A. and H. M. Fox. Nutritional knowledge and attitudes of registered nurses. J. Am. Dietet. Assoc. 68: 453, 1976.

25. Krause, T. O. and H. M. Fox. Nutritional knowledge and attitudes of physicians. J. Am. Dietet. Assoc. 70: 607, 1977.

26. DePaola, D. P. Preventive dentistry: nutrition and oral health. Va. Dent. J. 52: 39, 1975.

27. Drummond, J. F. Clinical and laboratory diagnosis of nutritional problems. Dent. Clin. North Am. 20: 585, 1976.

28. Shaw, J. H. Diet regulations for caries prevention. Nutr. News. 36: 1, 1973.

29. Madsen, K. O. Frequency of eating and dental health. Food Nutr. News. 46: 1, 1975.

30. Kreitzman, S. N. Nutrition in the process of dental caries. Dent. Clin. North Am. 20: 491, 1976.

31. Ten-State Nutrition Survey 1968-1970. DHEW Publ. No. (HSM) 72-8134, U. S. Dept. of Health, Education and Welfare, Health Services and Mental Health Administration, Atlanta, Georgia 30333.

32. Alfano, M. C. Controversies, perspectives, and clinical implications of nutrition in periodontal disease. Dent. Clin. North Am. 20: 519, 1976.

33. Howe, P. R. et. al. The influence of nutritional supervision on dental caries. J. Am. Dent. Assoc. 29: 38, 1942.

34. Young, C. M. Nutrition counseling for the dental patient. J. Am. Dent. Assoc. 63: 469, 1961.

35. Truuvert, M. Diet counseling to prevent caries. The Dent. Assistant. 43: 20, 1974.

36. Wittemann, J. K. Behavioral implications in successful dietary counseling. Dent. Clin. North Am. 20: 601, 1976.

37. Di Orio, L. P. and K. O. Madsen. A personalized approach: discussing food in prevention of dental disease. Nutr. News. 33: 1, 1970.

38. DePaola, D. P. and M. C. Alfano. Triphasic nutritional analysis and dietary counseling. Dent. Clin. North Am. 20: 613, 1976.

39. Pearson, Paul B. Nutrition and dental health. J. Dent. Educ. 30: 64, 1966.

40. Roberts, L. J. Nutrition Work with Children. Chicago: University of Chicago Press, 1927, p. 279.

41. DePaola, D. P. and H. G. Cheney. A survey of the nutritional component of dental practice in the State of Virginia. Va. Dent. J. 52: 30, 1975.

42. Nie, N. H. et. al. Statistical Package for the Social Sciences, second edition. New York: McGraw-Hill Book Company, 1975.

APPENDIX

GOALS AND OBJECTIVES

HUMAN NUTRITION (CMD-525)

VCU-MCV School of Dentistry
Department of Community Dentistry

Introduction

The course is designed to give the student a practical approach to nutrition today which he can utilize both in his practice of dentistry as well as in his own lifestyle.

The course is not designed to make the student an expert in nutrition, nor is it expected that the student become one. Rather, the course should demonstrate the basic principles of good nutrition and how chronic and, in some cases, acute violation of these principles will lead to, or contribute to, the etiology and progression of oral disease.

Overall Objectives

The primary objectives for the program in Human Nutrition are:

1. To relate the basic nutritional processes (intermediary metabolism, nutrient absorption, protein biosynthesis, etc.) to clinical problems related to nutrition specifically those directly related to oral health such as altered growth patterns, caries, and periodontal disease.

2. To teach the student to discriminate between sound nutritional principles and fallacious or misleading information present in current medical and consumer literature.

3. To teach the student how to evaluate the nutritional status of a patient by means of an appropriate medical history, physical evaluation, dietary analysis, and laboratory tests.

GOALS AND OBJECTIVES
HUMAN NUTRITION (CMD-525)

Overall Objectives (continued)

4. To provide student experience in the dietary counseling, supplementation or therapy of patients with nutritional problems which may affect their oral health (this will primarily take place in the D2 second semester clinical program).

5. To discuss practical aspects of nutrition including food composition, food additives, food faddism, and other topics related to the delivery of appropriate nutrition information to patients and community.

Specific Objectives

Upon completion of the course in Human Nutrition and the associated clinical experience, the students should be able to:

1. Describe the recommended dietary requirements of essential and non-essential nutrients.

2. Describe the difference in nutrient requirements which occur as a result of the physiological stresses of pregnancy, lactation, growth and exercise.

3. Describe the reasons for the greater nutrient requirements of the toddler and infant; delineate the reasons why water and renal solute load are more critical in the infant; and list several situations that may compromise water and nutrient balance in the infant.

4. List the advantages and disadvantages of breast feeding vs. bottle feeding.

5. Describe the dietary needs of the adolescent patient.

GOALS AND OBJECTIVES
HUMAN NUTRITION (CMD-525)

Specific Objectives (continued)

6. Describe the dietary needs of the aged patient.

7. Differentiate between those nutrients which are stored, maintained in reserve, or required at all times.

8. List those nutrients which are of primary importance in the wound healing process, and describe the mechanisms of healing (e.g., clot formation, cellular proliferation, phagocytosis) which are affected by the nutrient in question.

9. Describe the dietary needs of the surgical patient.

10. Describe how oral surgical procedures may result in negative nitrogen balance, and thereby constitute a significant nutritional stress.

11. Describe the specific effect of deficiencies of ascorbic acid, B complex vitamins, vitamins A & D, calcium, fluoride, and phosphorous on the functioning organism - specifically on the development of oral tissues; and understand the effects of these deficiencies during the development on the resistance of the oral tissues to disease later in life.

12. Describe the concept of "hypernutritionosis."

13. List and discuss the specific mechanisms by which malnutrition may alter the resistance of the host to infectious disease, and also to list the effects of existing infections on nutritional status.

14. Describe how physiological and psychological stresses as well as concurrent disease, and genetic factors may modify the interactions of nutrition and infection and further compromise the resistance of the host.

GOALS AND OBJECTIVES
HUMAN NUTRITION (CMD-525)

Specific Objectives (continued)

15. Diagram the continuous interactions of malnutrition, altered growth and development, infection, poor hygiene, multiple pregnancies, and inadequate medical care which occurs in developing countries; and discuss the medical and political significance of the maldistribution of food both on the national and international level.

16. Discuss pre- and post-eruptive effects of nutrition on the resistance of the teeth to dental caries.

17. Describe the role of nutrition in the etiology of inflammatory periodontal disease in terms of: the interactions of nutrition and infection, alterations in microbial physiology, calcium/phosphorous imbalance and osteolytic bone resorption, and poor wound healing.

18. Diagnose nutritional deficiencies via a targeted medical and social history, clinical exam, dietary analysis, and laboratory tests.

19. List the potential advantages and disadvantages of food additives, and differentiate between commercial, natural, organic and health foods in terms of the agricultural and processing technology involved, and the ultimate quality of the food.

20. Counsel clinic patients, using non-directive techniques, to improve the balance of their diets and increase their resistance to oral disease.

21. Demonstrate the integration of practical nutrition education and dietary counseling into the comprehensive care of the patient.

NUTRITIONAL ATTITUDES OF SENIOR DENTAL STUDENTS

The following statements reflect attitudes toward nutrition. Please circle the response which corresponds best with how you feel about the statement. There is no right or wrong answer.

Please circle:

SA if you STRONGLY AGREE with the statement.

A if you AGREE but do not feel strongly about the statement.

U if you are UNDECIDED or neither agree or disagree with the statement.

D if you DISAGREE but do not feel strongly about the statement.

SD if you STRONGLY DISAGREE with the statement.

Please respond to every statement.

		Strength of agreement				
1.	Nutrition is an essential component of total health care.	SA	A	U	D	SD
2.	Nutrition counseling will be a part of my dental practice.	SA	A	U	D	SD
3.	Ethnic and/or cultural background of a patient must be considered in the nutrition counseling process.	SA	A	U	D	SD
4.	It is the responsibility of a dietitian to teach basic nutrition and diet therapy to dental patients.	SA	A	U	D	SD

Attitudes con't.
Page 2

Please circle your response.	Strength of agreement				
5. Dentists should be able to recognize nutritional problems and make the necessary referrals.	SA	A	U	D	SD
6. The nutrition education I received in dental school prepared me to handle the nutritional problems of my patients.	SA	A	U	D	SD
7. Nutrition counseling should be a part of each patient's preventive care.	SA	A	U	D	SD
8. The relationship of good eating habits to good dental health should be stressed to patients.	SA	A	U	D	SD
9. Dentists need to have good attitudes toward nutrition because of their influence upon their patients.	SA	A	U	D	SD
10. Nutrition counseling as part of preventive dentistry is an easy way to charge the patient more money for an office visit.	SA	A	U	D	SD
11. If I use nutrition counseling in my practice, it will be handled by the dental hygienist.	SA	A	U	D	SD
12. Good nutrition plays an integral part in the prevention and control of dental caries.	SA	A	U	D	SD
13. In my practice, every adolescent patient will receive nutrition counseling.	SA	A	U	D	SD

Attitudes con't.
Page 3

Please circle your response.	Strength of agreement				
14. Good nutrition concepts should be taught in federally funded programs such as Title VII, Head Start, etc.	SA	A	U	D	SD
15. The dentist's nutritional knowledge will be useful in the diagnosis of dietary deficiencies before a chronic health problem results.	SA	A	U	D	SD
16. Sucrose is the greatest nutritional threat to oral health.	SA	A	U	D	SD
17. A dentist should be concerned only with the caries producing potential of the patient's diet.	SA	A	U	D	SD
18. The nutritional knowledge I gained during dental school improved my eating habits or reinforced already good habits.	SA	A	U	D	SD
19. It is fine with me no matter how much sugar containing foods my patient eats as long as he brushes immediately after eating.	SA	A	U	D	SD
20. Food diaries are an essential part of nutrition counseling in dental practice.	SA	A	U	D	SD
21. Poor food choices are often the cause of dental caries.	SA	A	U	D	SD
22. Nutrition counseling should be given to all adolescent patients regardless of the present dental status.	SA	A	U	D	SD

Attitudes con't.
Page 4

Please circle your response.	Strength of agreement				
23. More accurate food diaries usually result when the patient is given reasons for keeping them and the specific type of information needed.	SA	A	U	D	SD
24. A sound nutritional practice is to eat a wide variety of different foods from day to day.	SA	A	U	D	SD
25. The oral cavity is one of the most sensitive indicators of nutritional status.	SA	A	U	D	SD
26. Man-made vitamins are just as good nutritionally as natural vitamins.	SA	A	U	D	SD
27. Calories from sugar are no different than calories from beef, bourbon, or butter.	SA	A	U	D	SD
28. The dental profession can be of help in the battle to combat food faddism and nutrition nonsense.	SA	A	U	D	SD
29. Acceptance, understanding and sincerity are necessary factors for counseling and treatment.	SA	A	U	D	SD
30. The Basic Four Food Groups is the best guide for teaching patients good nutrition principles.	SA	A	U	D	SD

BIOGRAPHICAL DATA

YOUR AGE _____ SEX _____ MARITAL STATUS _____

FROM WHAT COLLEGE OR UNIVERSITY DID YOU RECEIVE YOUR UNDERGRADUATE DEGREE? _____

WHAT WAS THE HIGHEST EDUCATIONAL LEVEL COMPLETED BY YOUR PARENTS?

MOTHER _____

FATHER _____

IN WHAT SIZE CITY DID YOU SPEND MOST OF YOUR TIME DURING THE FIRST 18 YEARS OF YOUR LIFE?

_____ Less than 10,000 people

_____ 10,000 to 50,000

_____ 50,000 to 100,000

_____ 100,000 to 250,000

_____ Greater than 250,000

IN WHAT AREA DID YOU SPEND MOST OF YOUR TIME DURING THE FIRST 18 YEARS OF YOUR LIFE?**

_____ New England Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont.

_____ Mid-Atlantic New Jersey, New York, Pennsylvania.

Continued on next page

Biographical Data con't.
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_____	Southern	Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia.
_____	Southwestern	Arizona, New Mexico, Oklahoma, Texas.
_____	Mid-Western	Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin.
_____	Rocky Mountain	Colorado, Idaho, Montana, Nevada, Utah, Wyoming.
_____	Pacific Coast	California, Oregon, Washington.
_____	Hawaii or Alaska	
_____	Other	Europe, Canada, etc. Please specify.

**NOTE: United States regional breakdown according to World Book Encyclopedia, 1976.

ATTITUDE PARAMETERS

Attitude statements were grouped into three categories:

I. NUTRITION AND COUNSELING

Statements 1, 3, 12, 14, 16, 21, 23, 24, 26, 27, 30

II. NUTRITION COUNSELING IN THE STUDENT'S FUTURE DENTAL PRACTICE

Statements 2, 4, 8, 10, 11, 13, 17, 19, 20

III. NUTRITION EDUCATION IN DENTAL SCHOOL

Statements 5, 6, 7, 9, 15, 18, 22, 28, 29

October 25, 1977

To All Senior Dental Students:

As a graduate student at Virginia Polytechnic Institute and State University, I am completing research for a Master of Science degree in Human Nutrition and Foods. The purpose of my study is to determine the attitudes of senior dental students toward nutrition.

Would you please assist me by completing the attached questionnaire? It should not take more than 10 minutes to complete. Your response will be anonymous, and greatly appreciated.

Questionnaires may be returned to me via Campus Mail in the attached envelope. It is important for my research that all replies be returned by November 4, 1977.

Thanks so much for your help.

Sincerely,

Linda S. Honaker

SUMMARY OF MEAN SCORES FOR ATTITUDE STATEMENTS

RANK	MEAN	STATEMENT NUMBER	STATEMENT
1	4.795	1	Nutrition is an essential component of total health care.
2	4.438	8	The relationship of good eating habits to good dental health should be stressed to patients.
3	4.438	29	Acceptance, understanding and sincerity are necessary factors for counseling and treatment.
4	4.315	5	Dentists should be able to recognize nutritional problems and make tne necessary referrals.
5	4.233	12	Good nutrition plays an integral part in the prevention and control of dental caries.
6	4.125	17	A dentist should be concerned only with the caries producing potential of the patient's diet. NOTE: REVERSE CODING
7	4.110	3	Ethnic and/or cultural background of a patient must be considered in the nutrition counseling process.
8	4.096	9	Dentists need to have good attitudes toward nutrition because of their influence upon their patients.

SUMMARY OF MEAN SCORES FOR ATTITUDE STATEMENTS (continued)

RANK	MEAN	STATEMENT NUMBER	STATEMENT
9	4.068	28	The dental profession can be of help in the battle to combat food faddism and nutrition nonsense.
10	4.041	23	More accurate food diaries usually result when the patient is given reasons for keeping them and the specific type of information needed.
11	3.875	19	It is fine with me no matter how much sugar containing foods my patient eats as long as he brushes immediately after eating. NOTE: REVERSE CODING
12	3.863	15	The dentist's nutritional knowledge will be useful in the diagnosis of dietary deficiencies before a chronic health problem results.
13	3.849	2	Nutrition counseling will be a part of my dental practice.
14	3.803	25	The oral cavity is one of the most sensitive indicators of nutritional status.
15	3.781	14	Good nutrition concepts should be taught in federally funded programs such as Title VII, Head Start, etc.
16	3.740	16	Sucrose is the greatest nutritional threat to oral health.

SUMMARY OF MEAN SCORES FOR ATTITUDE STATEMENTS (continued)

RANK	MEAN	STATEMENT NUMBER	STATEMENT
17	3.556	7	Nutrition counseling should be a part of each patient's preventive care.
18	3.542	10	Nutrition counseling as part of preventive dentistry is an easy way to charge the patient more money for an office visit. NOTE: REVERSE CODING
19	3.444	26	Man-made vitamins are just as good nutritionally as natural vitamins.
20	3.408	27	Calories from sugar are no different than calories from beef, bourbon, or butter.
21	3.178	20	Food diaries are an essential part of nutrition counseling in dental practice.
22	3.164	21	Poor food choices are often the cause of dental caries.
23	3.085	11	If I use nutrition counseling in my practice, it will be handled by the dental hygienist.
24	2.904	6	The nutrition education I received in dental school prepared me to handle the nutritional problems of my patients.

SUMMARY OF MEAN SCORES FOR ATTITUDE STATEMENTS (continued)

RANK	MEAN	STATEMENT NUMBER	STATEMENT
25	2.836	4	It is the responsibility of a dietitian to teach basic nutrition and diet therapy to dental patients.
26	2.836	13	In my practice, every adolescent patient will receive nutrition counseling.
27	2.792	24	A sound nutritional practice is to eat a wide variety of different foods from day to day. NOTE: REVERSE CODING
28	2.781	18	The nutritional knowledge I gained during dental school improved my eating habits or reinforced already good habits.
29	2.493	22	Nutrition counseling should be given to all adolescent patients regardless of the present dental status.
30	2.329	30	The Basic Four Food Groups is the best guide for teaching patients good nutrition principles. NOTE: REVERSE CODING

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NUTRITIONAL ATTITUDES OF SENIOR DENTAL STUDENTS

by

Linda S. Honaker

(ABSTRACT)

The attitudes toward nutrition and dentistry were studied in a group of senior dental students at Virginia Commonwealth University, Medical College of Virginia. The attitude statements were divided into three categories, nutrition and counseling, the nutrition counseling in their future dental practice, and nutrition education in dental school.

Students responded positively or negatively to 30 statements related to nutrition and dentistry. Varying point values were assigned to each answer. High scores indicated a positive attitude toward nutrition.

The results indicated that students have favorable attitudes toward nutrition. Their least favorable attitude was toward the inclusion of nutrition counseling in their future dental practice. However, they realized the importance of nutrition to good oral health and nutrition's role in the prevention and control of dental caries.

The teaching of nutrition to dental students did not improve individual eating habits or reinforce already good habits. The students were confident that they would be able

to recognize nutritional problems and make the necessary referrals. However, the students did not agree that the nutrition education they received prepared them to treat the nutritional problems they might encounter.

Students who had favorable attitudes toward nutrition education also had favorable attitudes about including nutrition counseling in their dental practice.