

**Oral Health Literacy Educational Experiences of North Carolina Dental
Hygiene Students: Implications for Dental Hygiene Research**

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ABSTRACT

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Oral Health Literacy Education, Experiences and Opinions of North Carolina
Dental Hygiene Students: Implications for Dental Hygiene Research
(Under the direction of R. Gary Rozier)

This descriptive study focuses on the educational experiences of North Carolina senior dental hygiene (DH) students in patient communication, their use of communication techniques in patient care, and factors associated with that use. A cross-sectional survey design was used to assess Oral Health Literacy (OHL) knowledge and experiences of approximately 249 senior DH students enrolled at 13 North Carolina (NC) DH Programs. The program response rate was 100% with an individual response rate of 91.56%. DH students' reported level of instruction was high (98%) but not a statistically significant predictor of communication technique use. The majority of students believe that dental hygienists should be trained to use appropriate communication techniques based on the patients OHL status (96%). However, over half reported that there is not enough time during an appointment to assess patient understanding of oral health information (62%). OHL model curricula and the development of standards are needed to prepare DH students to communicate effectively with low health literacy patients.

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LIST OF ABBREVIATIONS

ADA:	American Dental Association
ADEA:	American Dental Education Association
DH:	Dental Hygiene
IOM:	Institute of Medicine
IRB:	Institutional Review Board
NAAL:	National Assessment of Adult Literacy
NALS:	National Adult Literacy Survey
NC:	North Carolina
OHL:	Oral Health Literacy
OHLI:	Oral Health Literacy Instrument for Adults
REALD-30:	Rapid Estimate of Adult Literacy in Dentistry
REALD 99:	Rapid Estimate in Adult Literacy in Dentistry
REALM-D:	Rapid Estimate of Adult Literacy in Medicine and Dentistry
TOFHLA:	Test of Functional Health Literacy in Adults
TOFHLiD:	Test Of Functional Health Literacy in Dentistry
UNC-CH	University of North Carolina-Chapel Hill
US:	United States

INTRODUCTION

Oral health is an integral part of overall health and quality of life. Research indicates that there are associations between chronic oral infections such as periodontal disease and heart and lung diseases, diabetes, stroke and pre-term low birth weight babies. The incidence of untreated oral diseases and problems is high among populations with lower incomes and less education, the uninsured and underinsured, the elderly and racial and ethnic minorities. These disparities in part led to the US Surgeon General referring to dental and oral diseases as a “silent epidemic” affecting our most vulnerable citizens.^{1,2}

One common risk factor for dental disease and use of dental care is the limited literacy levels of many people. Oral health literacy is defined as the “degree to which individuals have the capacity to obtain, process and understand basic oral health information and services needed to make appropriate health decisions”.³ The National Adult Literacy Survey (NALS) indicated that 71% of adults age sixty and older demonstrated difficulty with print materials and most demonstrated difficulty using documents such as forms, lists, charts and graphs. Health literacy skills of older adults vary based on education, health-related limitations and access to resources.⁴

The Surgeon General’s report on oral health in America noted that limited oral health literacy may serve as a deterrent to care, a barrier to information and preventive services and decrease the patient’s active engagement in treatment

option discussions.¹ Oral health maintenance and management of disease depends on the person's ability to understand, interpret and act on verbal or written health information.

Scientifically based oral health information is not reaching the people who need it the most. A major strategy to address the existing gap between patient communication used by oral healthcare providers and the literacy levels of their patients is to design professional education curricula so that they ensure communication competency of graduates.⁵ *Healthy People 2010* lists "improving the ability of providers to communicate with their patients" as a specific objective of the focus of health literacy.⁶ Dental hygienists play an important role in conveying preventive information to dental patients. It is important to know how dental hygiene students are taught to communicate and assess patients' communication skills.

Currently there is no published research about the oral health literacy education that dental hygienists' receive. How best to teach communication skills among dental and dental hygiene students is listed as an opportunity for advancing dental hygiene research under the umbrella of cultural considerations for practice.⁷ The aim of this study is to determine the educational experiences of senior dental hygiene students in North Carolina (NC) in patient/provider communication, and their resulting knowledge and opinions associated with using health literacy techniques. The study also aims to determine the association of their educational experiences and the number of communication techniques they report using in patient care.

REVIEW OF THE LITERATURE

Literacy

According to the 2003 National Assessment of Adult Literacy (NAAL), 80-90 million Americans have basic or below-basic literacy skills and 110 million have basic or poor quantitative (numeracy) skills. NAAL defines literacy as task-based, used in both the 1992 and 2003 assessments and skills-based, used only in the 2003 assessment. The task-based definition of literacy focuses on the everyday literacy tasks an adult can and cannot perform while the skills-based definition of literacy focuses on the knowledge and skills an adult must possess in order to perform these tasks. These skills range from basic, word-level skills (such as recognizing words) to higher-level skills (such as drawing appropriate inferences from continuous text).⁴ Those with more general literacy skills are also more likely to have stronger health literacy skills, the distribution of health literacy is not independent of general literacy skills.⁸ However, an overestimation of skill level results when educational attainment is used to predict adult literacy skills.⁹

Health literacy

Health literacy is the intersection of the fields of literacy and health. The National Library of Medicine defines health literacy as “the degree to which individuals can obtain, process and understand the basic health information and

services they need to make appropriate health decisions.”¹⁰ Health literacy was brought to the forefront of research with the simultaneous release of the Institute of Medicine’s (IOM) report, *Health Literacy: A Prescription to End Confusion* and the Agency for Healthcare Research and Quality’s *Literacy and Health Outcomes*.^{10,11} Health literacy is more than the ability to read, it includes writing, listening, the ability to use math and oral communication. Health literacy goes beyond individual skills to encompass the skills, preferences and expectations of health information and health care providers.¹⁰ Health literacy also encompasses navigating our health care system, culture, society and education. Individuals with low health literacy have increased use of emergency care, hospitalization and are less likely to use preventive regimens and screenings.^{10,12-15}

Nutbeam established a three-tiered concept of health literacy. Tier one is *functional health literacy*, which encompasses basic reading and writing skills to understand and follow simple health messages. Tier two; *interactive health literacy* refers to more advanced skills to manage health in partnership with professionals. Finally, tier three, *critical health literacy* is the ability to critically analyze information, increase awareness and participate in action to address barriers. Health literacy is critical to empowerment by improving patient’s access to health information and their capacity to use that information effectively.¹⁶ Health literacy (including numeracy) is a barrier to good health that is potentially modifiable by improving underlying literacy skills or by providing accommodations to help with lower skills.¹⁷

Limited health literacy

Our nation is at great risk for an epidemic of limited health literacy due to inadequate and declining adult literacy skills, shifting demographics (increased immigrant population) and a changing job market.⁵ Limited health literacy can reduce an adults' ability to comprehend and use basic health-related materials.¹⁸ Patients with low literacy levels are significantly less likely to ask questions, request additional services or seek new information during a medical encounter than patients with better literacy. Individuals 65+ years of age, those who have less than a high school education and those belonging to racial or ethnic minority groups are at the greatest risk for low levels of health literacy.¹⁰

The quality of early education should be improved and health care simplified to reduce the impact of low health literacy.¹⁹ Individuals need to be able to obtain healthcare and understand health information presented to them but according to the 2003 National Assessment of Adult Literacy (NAAL) survey only one in ten US adults are proficient in understanding health related written materials and one in three have difficulty understanding and applying health information.⁴ The demands of the health care system and health care providers are complex and can be challenging for most patients, even those with high literacy levels.¹² Recommended actions include applying "universal precautions" to ensure that all instructions avoid jargon and everyone is offered help with forms. There are continuing education and tool kits available to aid hospitals, health centers, clinical practices and practitioners in applying universal precautions.^{20,21}

Successful communication depends on both the sender and the receiver of information, this is especially important in relation to health literacy. Providers should be able to assess their patient's level of health literacy in order to ensure that they are able to successfully communicate health information to their patients.^{15,19,22} In a systematic review of complex interventions to improve the health of people with limited literacy, knowledge and self-efficacy were the category of outcome variables most likely to improve.²³ Healthcare providers often rely on written materials because of the lack of time to provide patient education, leaving patients with low health literacy at a substantial disadvantage.²⁴ However, well-designed materials that take health literacy into account can improve patients' ability to manage chronic diseases.²⁵ When used properly written materials can have a positive benefit for patients.

Core health literacy techniques

According to the American Medical Association (AMA), there are six core health literacy techniques. These techniques consist of speaking slowly, using plain, nonmedical language, showing or drawing pictures, limiting the amount of information provided (and repeat it), using the teach-back technique to confirm that patients understand and enlisting the aid of others (patient's family or friends to create a shame-free environment and promote understanding.²¹ New professional programs and workshops are teaching writers and practitioners to use these suggested techniques in healthcare materials and clinical encounters.²⁵

Oral health and oral health literacy

Oral health is an integral part of overall health and well-being. Research indicates that there are associations between chronic oral infections such as periodontal disease and heart and lung diseases, diabetes, stroke and pre-term low birth weight babies. The incidence of untreated oral diseases and problems is high among populations with lower incomes and less education, the uninsured and underinsured, the elderly and racial and ethnic minorities. These disparities led to the US Surgeon General referring to dental and oral diseases as a “silent epidemic” affecting our most vulnerable citizens.¹ The National Adult Literacy Survey (NALS) indicated that 71% of adults age sixty and older demonstrated difficulty with print materials and most demonstrated difficulty using documents such as forms, lists, charts and graphs. Health literacy skills of older adults vary based on education, health-related limitations and access to resources.⁴ *Healthy People 2010* oral health objectives demonstrate a clear oral health disparity between those with higher and lower levels of education. Lower levels of education resulted in higher unmet dental needs, more disease and higher oral cancer morbidity rates.⁶

The Surgeon General’s report on oral health in America noted that limited oral health literacy may serve as a deterrent to care, a barrier to information and preventive services and decreases the patient’s active engagement in treatment option discussions.¹ Oral health maintenance and management of disease depends on the person’s ability to understand, interpret and act on verbal or written health information. Health literacy has been found to be positively

associated with the use of dental checkups for adults in the age group 40-64.¹⁸ Patients have the opportunity to receive guidance and learn skills to improve oral health outcomes at each visit with a dentist or dental hygienist but improvement is dependent upon the ability of the dental team to recognize the patient's oral health literacy level.¹² Scientifically based oral health information is not reaching the people who need it the most.

Some strategies include continuing education that addresses effective patient/provider communication techniques and how to identify educational materials that are written at an appropriate reading level to reach patients with low oral health literacy.²² The US Department of Health and Human Services report, "Communicating Health," calls for change and improvements in the education systems as well as in the reading levels of health materials, the communication abilities of health professionals and the characteristics of health delivery systems.¹¹ Oral health literacy (OHL) research including the role of dental care providers is an important avenue to pursue in order to improve oral health outcomes and a research agenda has been proposed.³

Oral health literacy instruments

To date, five instruments have been published that test health literacy in dentistry. The five instruments are the Rapid Estimate of Adult Literacy in Dentistry (REALD-30), Rapid Estimate in Adult Literacy in Dentistry (REALD-99), Test Of Functional Health Literacy in Dentistry (TOFHLiD), Oral Health Literacy Instrument for Adults (OHLI) and the Rapid Estimate of Adult Literacy in Medicine and Dentistry (REALM-D). The REALD-30 and REALD-99 are both word

recognition instruments that are patterned after the proven word recognition instrument in medicine (Rapid Estimate of Adult Literacy in Medicine-REALM). The REALD-30 consists of 30 dental common dental words of varying degrees of difficulty arranged in an order of increasing difficulty. The list of words is designed to be read aloud by subjects to interviewers and 1-point is assigned for each word that is pronounced correctly with 0 (lowest literacy) and 30 (highest literacy).²⁶

The REALD-99 is similar to the REALD-30 with the only difference being the use of 99 words instead of 30. The REALD-99 did not improve the validity results enough to justify the longer administration time. Both REALD instruments showed promise as oral health literacy instruments but should be tested in a more diverse population. The weakness of both the REALD-30 and the REALD-99 are that while they test reading abilities they do not identify patients who have comprehension difficulty.²⁷

In response to this limitation, the Test Of Functional Health Literacy in Dentistry (TOFHLiD), an instrument that measures functional oral health literacy was developed.²⁸ Functional oral health literacy encompasses knowledge as well as the ability to use that knowledge in making appropriate decisions related to oral health.³ The Test of Functional Health Literacy in Adults (TOFHLA) served as a template for the development of the TOFHLiD because it is a proven instrument that tests general functional health literacy. The TOFHLiD consists of a 68-item reading comprehension test and a 12-item numerical ability test. The numeracy part of the TOFHLiD tests comprehension of directions for taking

common prescriptions associated with dental treatment, post-extraction instructions and the management of dental appointments. The reading comprehension section included an instruction, consent form and medicated rights section. The consent form section was assessed at a 17.0 reading level grade, whereas the instruction section and Medicaid rights section were assessed at 7.0 and 10.4, respectively. The TOFHLiD had sufficient discriminant power that justified further research but is not currently supported for widespread use in clinical or public health practice.²⁸

The Oral Health Literacy Instrument for adults (OHLI) was developed and also modeled after the TOFHLA. The OHLI consists of 38-item reading comprehension test and 19-item numeracy test.²⁹ Both the TOFHLiD and OHLI require further testing on population groups known to be at high risk of limited functional health literacy before they can be used as anything more than a research tool.^{28,29}

Finally, the Rapid Estimate of Adult Literacy in Medicine and Dentistry (REALM-D) was developed at University of California, Los Angeles (UCLA). The REALM-D consists of 84-items: 3 lists with a total of 28 words, 6 of which are specifically dental. Future use of this screening tool requires addressing redundancy and developing a shorter version.³⁰

Dental hygienists' knowledge and practices

Currently there is no published research about the OHL education in dental hygiene curricula. Research was conducted on how U.S. and Canadian

dental schools teach interpersonal communication skills. The findings of this study suggest that instruction in interpersonal communication skills appears to be inadequate.³¹ The introduction of health literacy into an allied dental curriculum was researched at Indiana School of Dentistry, Dental Hygiene Program, where they have taken the initial steps to increase awareness of the importance of health literacy and how to assess it in the clinical setting.³²

Research also has been conducted on communication techniques of physicians, nurses and pharmacists for patients with low health literacy. This research revealed that they do not routinely incorporate the core health literacy techniques into clinical practice.³³ Health literacy knowledge and experiences of senior baccalaureate nursing students was assessed and determined that although nursing students are exposed to health literacy techniques in their curricula, the exposure should occur earlier in the curriculum to give students more practice applying these concepts.³⁴

As in nursing, significant communication occurs between patients and dental hygienists. For this reason dental hygienists need to be able to assess a patient's oral health literacy and then communicate in writing, verbally and visually on a level that will reach that individual patient in order to reduce barriers to improving oral health. In 2003, the American Dental Education Association (ADEA) recommended that as a competency, the graduating dental hygienist be able to "evaluate factors that can be used to promote patient/client adherence to disease prevention and/or health maintenance strategies."³⁵ According to the OHL Workgroup sponsored by the National Institute of Dental and Craniofacial

Research, National Institutes of Health, “it is important to conduct research on the role and needs of dental health providers as they convey health information and gather important data from patients.”³

To begin this work, we need to first examine the communication skills taught to dental and DH students and add readings and discussions about health literacy to the curriculum.”³ Incorporating health literacy components into curricula can improve health service providers’ knowledge, awareness and responsiveness to the health literacy of patients.¹⁰ Clinical faculty are in a key position to provide feedback on students communication skills by observing them communicating with patients and modeling clear communication.³⁶ Rudd and Horowitz state that, “studies in the communication skills of dental providers and how these skills are taught in educational institutions are critically needed.”³⁷ *Healthy People 2010* lists “improving the ability of providers to communicate with their patients” as a specific objective of the focus of health literacy.⁶

INTRODUCTION AND LITERATURE REVIEW

Oral health is an integral part of overall health and well-being. Research indicates that there are associations between chronic oral infections such as periodontal disease and heart and lung diseases, diabetes, stroke and pre-term low birth weight babies. The incidence of untreated oral diseases and problems is high among populations with lower incomes and less education, the uninsured and underinsured, the elderly and racial and ethnic minorities. These disparities led the US Surgeon General to refer to oral diseases as a “silent epidemic” affecting our most vulnerable citizens.¹

One common risk factor for dental diseases and use of dental care is the limited literacy levels of many people. Poor health literacy skills are considered an important determinant of health because they can exaggerate other barriers to improved health such as gaining access to health care services, navigating complex health care systems and obtaining or using insurance coverage.^{7,38} The NAAL survey revealed that 44% of Americans can make only simple inferences from moderately dense text and apply this information in making health decisions. Only one in ten US adults is proficient in understanding health related materials while 36% fall into a basic or below basic level literacy, which means they have difficulty understanding and applying health information.^{4,8,10,12}

Health literacy skills of older adults vary based on education, health-related limitations and access to resources.¹⁰ *Healthy People 2010* oral health objectives demonstrate a clear oral health disparity between those with higher and lower levels of education. Lower levels of education are associated with more dental disease, higher levels of unmet dental needs, and higher oral cancer morbidity rates.⁶ While healthcare providers can do little to directly improve the literacy skills of their patients, they can examine their practice activities, the assumptions on which care for patients with different educational levels are based, and their practice environments. The goal of these assessments is to remove literacy-related barriers that impede access to information, hinder navigation of services and the ability of patients to make informed decisions.²⁵

The Surgeon General's report on oral health in America noted that limited oral health literacy may serve as a deterrent to care, a barrier to information and preventive services and decreases the patient's active engagement in treatment option discussions.¹ Oral health maintenance and management of disease depends on the person's ability to understand, interpret and act on verbal or written health information. The use of dental terms, such as periodontal disease, dental caries and orthodontia can act as barriers to understanding for most patients. Often individuals with the highest treatment needs and little or limited public or private insurance have low health literacy skills and would benefit from enhanced provider communication.¹²

Dental professionals may not have the knowledge or skills to address literacy needs of patients, so information may be presented far above the

patient's literacy level, which can lead to noncompliance with instructions. Some strategies for improving patient communication include continuing education that addresses effective patient communication techniques and how to identify educational materials that are written at an appropriate reading level to reach patients with low oral health literacy.²² The US Department of Health and Human Services report, "Communicating Health," calls for change and improvements in the education systems as well as in the reading levels of health materials, the communication abilities of health professionals and the characteristics of health delivery systems.¹¹ Research on OHL including the role of dental care providers is an important avenue to pursue in order to improve oral health outcomes.^{3,12}

A major strategy to address the existing gap between patient communication techniques used by oral healthcare providers and the literacy levels of their patients is to provide professional education curricula so that they ensure communication competency of graduates.⁵ *Healthy People 2010* lists "improving the ability of providers to communicate with their patients" as a specific objective in the health literacy focus area."⁶ Dental hygienists play an important role in conveying preventive oral health information to dental patients. It is important to know what and how these students are taught to communicate and assess patients' communication skills. Currently there is no published research about the OHL education that dental hygienists' receive. OHL research has far-reaching implications that can eventually provide changes in the way dental hygienists' communicate with patients by recognizing their OHL needs,

providing appropriate verbal and written communication and therefore impacting the ability of patients to improve their oral health.

The aim of this study was to examine the educational experiences of senior dental hygiene students in NC in patient communication, and their resulting knowledge and opinions associated with using health literacy techniques. The association of these educational experiences and students' use of communication techniques in the clinical care of patients was also examined.

METHODS AND MATERIALS

An anonymous self-administered questionnaire was distributed to all dental hygiene students in their final year of training in all programs in North Carolina. The Institutional Review Board (IRB) at the University of North Carolina at Chapel Hill (UNC-CH) approved the survey. After IRB approval, the survey was pilot tested with four Central Carolina Community College dental hygiene graduates from the class of 2010. Modifications were made based on feedback from the pilot test and the survey was resubmitted for IRB approval. After final IRB approval, the survey was mailed to directors at the 13 NC dental hygiene (DH) programs for distribution to senior dental hygiene students.

Sample identification and selection

This was a descriptive, cross-sectional survey of all senior dental hygiene students in North Carolina. The census sample of dental hygiene students was identified through a two-staged process. All DH programs in North Carolina were identified through published lists. Program directors in each of these programs were identified through published lists from the NC Dental Hygiene Educators' Association and asked via email to identify all enrolled senior dental hygiene students in their program and to distribute a questionnaire to them. The maximum total sample size was estimated to be 249 DH students based on program directors' reports of the total number of dental hygiene students in North Carolina in their last year of training.

Questionnaire development and variable construction

The survey was based on questions used in previous published research conducted by Cormier and Kotlik ³⁴, Schwartzberg, et al.³³, and Rozier et al.³⁹ We also relied on questions under development for a survey to be conducted in Maryland and questions we developed to meet the specific needs of this particular survey.

The questionnaire contained 82 items in seven domains: educational experiences (6 items); frequency of use of communication techniques (17 overall items; 7 core items); opinions about patient communication (7 items); beliefs about effectiveness of communication techniques, called outcome expectance in this study (17 items); student confidence in use of basic techniques (5 items), advanced techniques (4 items), and culturally competent techniques (4 items); knowledge (6 items); and barriers to patient communication (8 items). We also collected sociodemographic information about both students (gender, age, educational degrees, educational attainment of mother and father) and patient population (% low socioeconomic status, limited English ability, insured by Medicaid, older than 65 years of age, Hispanic).

Students reported (yes, no, don't recall) if they had received instruction in six areas (assess patient understanding, determine if patient has low literacy skills, evaluate reading materials, evaluate cultural appropriateness of materials, use of written materials, and reinforcement of classroom instruction in the clinic). We created a summary scale for instruction as a count

(0-6) of 'yes' responses and then constructed a categorical variable (low=0-3, moderate=4 or 5, high=6) based on the distribution of responses.

The respondent indicated on a 4-point Likert scale for each of the 17 communication techniques their own frequency of use from "often" to "never" in response to the question, "How often do you use each of the following communication techniques in providing patient care?" These communication items were adapted from recommendations by the American Medical Association on effective communication techniques, most of which had been included in a survey by Schwartzberg *et al.*³³ Items were grouped into domains as follows: (1) interpersonal communication (5 items); (2) use of the Teach Back method (3 items); (3) use of patient-friendly materials and aids (3 items); (4) provide help or assistance in understanding information (4 items); and (5) patient friendly practice (3 items). The first two domains are considered to be basic skills that every provider should use routinely, with the others being additional techniques that are useful, particularly for patients with limited literacy. Responses for "often" and "sometimes" were collapsed into a category indicating use, responses for "seldom" and "never" as non-use. Variables for the count of the overall number of techniques used and the basic techniques used were created for analysis.

Summary variables for students' opinions about health literacy, general literacy knowledge and knowledge about effectiveness (outcome expectancy), confidence and barriers were constructed. These variables were constructed as counts of items for favorable opinions, correct responses to the knowledge questions, and counts of barriers. Based on the distribution of responses,

categorical variables (low, moderate, high) were created for each.

Student confidence in communicating with patients was measured with 17 items using the 0-100 response scale suggested by Bandura.⁴⁰ The original scale was analyzed with exploratory factor analysis using the maximum-likelihood method of extraction.⁴¹ This method is believed to produce the best parameter estimates.⁴² We determined the number of common factors to retain by considering the scree test ⁴³, the Root Mean Square Error of Approximation (RMSEA) ⁴⁴ and the interpretability of the rotated factors. We chose to perform oblique rotation because we expected the factors in our original scale to be correlated. All analyses were conducted using Comprehensive Exploratory Factor Analysis (CEFA, version 3.04, 2010).

The factor analyses suggested that either a 3 or 4 factor solution was appropriate. We chose to drop the fourth factor (which contained only two items, both with relatively low loadings of 0.41). We also dropped two other items with loadings below 0.40. The remaining 13 items loaded on 3 primary factors. Loadings on these three factors ranged from 0.44 to 0.89. The first factor contained 5 items collectively referred to as “basic communication skills” (Cronbach’s alpha=0.73). The second factor contained 4 items that are called “other communication skills” (Cronbach’s alpha=0.81) and the third factor contained 4 items that are referred to as “literacy and cultural competency skills” (Cronbach’s alpha=0.87). We scored each scale by taking the mean of the items in that scale (0-4 Likert scale with 0=strongly disagree and 4=strongly agree).

Data collection

Program directors were asked via email to provide mailing addresses for survey delivery, assistance with distribution, collection and return of the paper surveys. A cover letter with a description of the study and a Confidentiality Statement asked each participant to participate. Participants were also provided envelopes with instructions to place the completed questionnaire in the envelope and seal it before giving it to their instructor so that any potential for breach of confidentiality would be minimized. The dental hygiene program directors or appointed faculty member distributed and collected the surveys and mailed them back to the primary investigator. Up to three follow-up contacts were made with DH program directors to ensure return of the surveys.

Tele-Form® was used for development of the paper survey instrument and for data entry. *Tele-Form®* is a type of data capture through use of optically scannable forms. This approach greatly reduces data entry costs by entering data more efficiently. Data editing is reduced because range checks can be built into the process for all fields and data verification is done on-screen.

Data analysis

In a descriptive analysis means or frequency distributions are displayed for individual survey items or summary scores for the different domains. Because the primary focus of the analysis is on the instruction that students report receiving, tests also were performed for differences in use of communication techniques and other variables such as knowledge and opinions according to level of instruction (low, moderate, high). We also tested bivariately for

differences in use of patient communication techniques according to each of the other survey domains (educational experiences, opinions about oral health literacy, confidence in using techniques with limited literacy patients, sociodemographic characteristics of the student and patient populations, and program) using statistical tests appropriate for the type of data being analyzed (e.g., chi-square or logistic regression for nominal data; t-tests, Analysis of Variance [ANOVA] or Ordinary Least Squares [OLS] regression for continuous data).

The primary test of the relationship between students' level of instruction and a count of the numbers of techniques used sometimes or often was computed for all 17 items and the 7 basic items using OLS regression to control for imbalances in the instructional groups (low, moderate, high). Level of significance was set at 0.05% for the final model. These analyses tested for clustering of responses within each of the 13 dental hygiene programs and control for these correlations as necessary.

RESULTS

A total of 228 out of the 249 questionnaires distributed were completed for a response rate of 91.5%. At least one questionnaire was completed in each of the 13 dental hygiene programs in the state, for a program-level response rate of 100%.

Sociodemographics characteristics of respondents

Characteristics of the sample are presented in Table 1. Respondents were almost entirely female (99.1%) and predominately less than 25 years of age (49.7%). Forty-three percent of respondents had no college education prior to enrolling into their DH program. The majority (87.9%) of respondents plan to practice in a private dental office setting after graduation.

Students' educational experiences in patient communication

Ninety-eight percent of respondents reported having received traditional methods of instruction in patient communication during their DH training. More than 50% reported that their instructors provided information about how to use written materials, assess patient's understanding, evaluate the cultural appropriateness and reading levels of materials, and identify low-literacy patients (Table 2). In addition, 67% of students reported that clinical instructors reinforced communication techniques taught in the classroom.

During their DH program, respondents were exposed to oral health communication in Dental Health Education/Theory (88.6%), Clinical Dental

Hygiene (72.4%), Nutrition (66.7%), Community/Public Health (46.9%) and Ethics/Professionalism (7.9%). Lecture (96.5%), role-playing (61%) and clinical activities (59.7%) were the most common forms of instruction used to teach oral health communication. Dental hygiene textbooks (98.3%), journal articles (44.3%) and Internet sites (39%) were the main resources used to teach oral health communication.

Students' use of communication techniques

DH students reported using a mean of 9.8 of the 17 communication techniques “sometimes” or “often”. The frequency of use of the 17 techniques varied within and across the five domains (Table 3 and Figure 1). The majority (78.8%) of DH students never use a video or DVD, an item listed in the patient-friendly materials and aids domain, or ask patients whether they would like a family member or friend to participate in the discussion (57.8%), a core technique item listed in the interpersonal communication domain. Only five of the techniques (speaking slowly, using simple language, presenting only 2-3 concepts at a time, asking patients to demonstrate oral hygiene procedures, explaining with models or x-rays) were used “often” by more than 50% of students.

The majority of DH students evaluate the reading level (80.5%), cultural appropriateness (70.9%) and use of illustrations (81.5%) of healthcare materials with some degree of frequency (Table 4). However, 64.7% never use an oral health literacy screening tool, and only 9.4% and 6.7% “sometimes” or “often”, respectively, use a screening tool.

Factors associated with use of communication techniques

Descriptive information about respondents' level of knowledge and opinions about health literacy, their confidence in communicating with patients and its effectiveness, and barriers to communicating with low-literacy patients are presented in the Appendix (Tables A1- A5). Table 5 displays the bivariate association between each of these variables, summarized as categorical variables, and the number of overall or basic techniques used "sometimes" or "often". Respondent and patient population sociodemographics are included in the table along with one of the primary variables of interest, the level of instruction (low, moderate, or high) students reported having received.

Level of instruction was associated with use of techniques at a marginally significant level (p-value for all techniques = 0.06; basic techniques = 0.09). Knowledge was not found to be associated with use, but opinions, confidence, outcome expectancy and barriers were found to be associated with use at statistically significant levels. Variations in use also were associated with school attended. Respondent characteristics were weakly associated with use, while the percentages of patients with limited English and who were Hispanic were both associated with use.

The effect of each of the variables found to be significant in bivariate associates were tested in an ordinary least squares regression for their association with use of all techniques (Table 6). This analysis provides the independent effect of each variable on use, but also is necessary to test for the effect of instruction because of differences in the three instruction groups in some of these predictor

variables (see Appendix Table A6). In this analysis, the level of instruction was no longer associated with use of communication techniques once the differences in group characteristics were controlled. However, more positive opinions and beliefs that the communication techniques are effective were strongly associated with increased use. Students also reported more use with a larger percentage of Hispanic patients compared to a lower percentage.

DISCUSSION

Level of instruction

Several findings in this study suggest that students received a high-level of instruction in patient communication during their DH training. Students received oral health communication training throughout several courses with a variety of traditional communication instruction techniques that used dental hygiene textbooks as the primary source of instruction (98.3%). Ninety-eight percent of students reported receiving instruction while 67% of respondents reported that their instructors provided reinforcement of classroom taught communication techniques in the clinical setting.

As a second point, 96% of students reported that instructors provided information about how to use written materials to provide dental health information, while only 53.9% reported receiving instruction on how to evaluate the reading level of written materials (Table 2). This discrepancy is similar to the results of a study of senior baccalaureate nursing students who reported frequently using written materials while they reported evaluating the reading level of these written materials only sometimes.³⁴ Oral health maintenance and management of disease depends on the person's ability to understand, interpret and act on verbal or written health information.¹⁸ Patients have the opportunity to receive guidance and learn skills to improve oral health outcomes at each visit with a dentist or dental hygienist but improvement depends to some extent upon

the ability of the dental team to recognize the patient's oral health literacy level.¹² While dental hygiene students reported a high level of instruction for using written materials, little more than 50% evaluate the reading level of these materials which may impact the patients ability to understand, interpret and act on the provided written information.

Factors influencing use of communication techniques

Level of instruction was associated with use of techniques at a marginally significant level (p-value for all techniques = 0.06; basic techniques = 0.09 in Table 5) in the bivariate analysis that did not control for potential factors that differed among the groups defined by categories for amount of instruction. However, in regression analysis, the level of instruction was no longer associated with use of communication techniques once the differences in group characteristics were controlled (Table 6). The reasons for this finding are not readily apparent in this cross-sectional survey, but suggest that outcome expectancy, barriers and opinions have a greater influence on students' use of communication techniques than the level of instruction or knowledge. We also could hypothesize that instruction is related to use through its effect on these intermediate factors. The mediating effects of outcome expectancy, barriers and opinions were not tested in this study because of the complexity of these types of analyses.

More positive beliefs about the effectiveness of the communication techniques presented in the survey, referred to as outcome expectancy, were strongly associated with increased use of those techniques in the regression analysis. This variable is part of a larger theoretical construct that includes among

other factors both ones confidence in performing a task, known as self-efficacy, and ones belief that the action will have the intended outcome. Although not significant in the final regression models, from one-quarter to one-third of respondents fell into the “low” confidence category for the three confidence scales based on having confidence scores of less than 85, 65 and 75 on the 100 point scale for basic, other and cultural competency subscales, respectively (Figure 3).

Opinions about communication and health literacy were found to be associated with use at statistically significant levels. The majority of students agreed that communication is an integral part of the appointment and that dental hygienists should receive training to assess oral health literacy status. Most students (99%) felt that good communication between the hygienist and the patient can improve prevention and treatment outcomes (Table A2).

Results of the regression analysis show that as barriers increased, use of techniques decreased. Students (61.6%) reported that there was not enough time during an appointment to assess patient understanding of information. In addition, a large percentage of students (84%) reported that limited English proficiency makes it difficult to communicate oral health information to some patients. A large percentage of respondents (85.9%) believe that information about periodontal disease is not too complex for patients to understand its prevention and treatment. Therefore, most graduating dental hygiene students do not perceive that communicating information about the etiology of periodontal disease, its prevention or treatment is a barrier in patient care. This finding suggests that studies are

needed to ensure that accurate information is being presented using techniques that are effective in ensuring patient understanding.

Respondent characteristics were weakly associated with use, while the percentage of patients that each student typically treated who had limited English and who were Hispanic were both associated with increased use of communication techniques in the bivariate analysis. The percentage of patients who were Hispanic continued to be significant in the regression analysis. These findings suggest that faculty should ensure that interpreters are available and/or increase the recruitment of bi-lingual and minority students. Variation in use of communication techniques was associated with school attended (Figure 2).

Limitations of study

This study has several limitations that should be considered in interpreting its results and their significance. First, the validity of the respondents' assessments of communication is unknown. We used a list of 17 items drawn primarily from the medical literature to measure communication techniques, but also used in a national survey of dentists and dental hygienists. Although the list reflects current guidance about important communication items, the summary scale counting the number of techniques used has not been tested for validity or reliability. Further, this list of communication techniques, which was developed for a survey of private practice dentists and hygienists, might not be valid for dental hygiene students. Future research likely will result in modifications to some of these items and identification of new ones.

Information in this study might suffer from reporting biases. The type and quality of communication could be determined more accurately through direct

observation of didactic instruction and student-patient interactions than with the self-reported survey instrument used in this study. Non-response bias could also have influenced our findings but it is not likely to be a large problem because of the high response rate obtained of 91.6%.

It is recognized that this sample of graduating NC dental hygiene students might not be representative of all graduating dental hygiene students in the country, thus limiting the external validity of study results. However, the respondents represent all dental hygiene schools across North Carolina. Thus the sheer number of programs suggests some degree of external validity, particularly when combined with the knowledge about the lack of oral health literacy curriculum standards for dental hygiene school.

A final limitation is the lack of information on the quality of communication used by dental hygiene students. Future studies are needed to assess this aspect of dental hygienist-patient communication. The number of techniques needed might differ depending on how well they are performed.

Implications of findings

This study provides the first assessment of communication techniques instruction and use by dental hygiene students. The results have two broad implications for dental hygiene education. First, the profession needs to develop and disseminate communication curricula standards that include oral health literacy techniques for dental hygiene programs and incorporate these standards into the accreditation process. The development of standards will require a standardized platform for communication techniques in oral health literacy didactic

and clinical instruction. However, a multidisciplinary research agenda is needed to determine the effectiveness of various communication techniques in the dental setting. Most dental outcomes based on the communication techniques that dental professionals use are unknown. Initially, basic questions should be addressed, such as the most effective techniques to use in a variety of circumstances, how to translate these findings into clinical practice, and the patient, dental hygiene student and environmental characteristics that affect both adoption of these techniques and their effectiveness.³⁹

Second, model curricula are needed to ensure that graduating dental hygiene professionals are able to assess the literacy skills of all patients. Years of communication research, education techniques and practice experience from other disciplines provide a strong foundation for faculty to develop curricula that focuses dental hygienists' attention to the literacy needs of their patients. Medical guidelines, training courses and a comprehensive toolkit are available for use by the dental community due to limited availability of dental specific research.^{20,21} Dental-specific recommendations are emerging since the research agenda incorporating oral health literacy was developed and made a priority by the ADA.¹² It is likely that faculty training could also be necessary to ensure that graduating dental hygiene professionals are able to effectively assess the oral health literacy status of their patients. The results of this survey provides an important foundation to begin assessment of oral health literacy education practices in dental hygiene programs and to aid in model curricula development. Future research should include, a national survey of communication techniques instruction and use in dental

hygiene programs as well as a national survey of dental hygiene educators to determine their knowledge and report of instruction and use of oral health literacy techniques.

CONCLUSION

Graduating NC dental hygiene students report a high level of traditional instruction in communication techniques, but a low to moderate level of knowledge about oral health literacy techniques. However there was no statistically significant difference in the level of instruction and knowledge with increased use of communication techniques. Students believe that dental hygienists should be taught about oral health literacy and communication techniques. They also agree that there needs to be more time within an appointment to assess the health literacy status of the patient and that limited English proficiency requires the use of more communication techniques. Now is the time to implement strategies to educate and promote communication and oral health literacy curricula standards in order to prepare dental hygiene professionals for the communication needs of a growingly diverse population of patients.

Table 1: Respondent Sociodemographic Characteristics

Characteristic	Sample Size	(%)
<i>Age in years</i>		
<25	112	49.7
25-30	64	28.4
31-35	20	8.8
>35	29	12.8
<i>Gender</i>		
Male	2	0.8
Female	222	99.1
<i>Program</i>		
Asheville-Buncombe Community College	14	6.1
Cape Fear Community College	11	4.8
Catawba Valley Community College	15	6.5
Central Carolina Community College	10	4.3
Central Piedmont Community College	16	7.0
Coastal Carolina Community College	21	9.2
Fayetteville Technical Community College	20	8.7
Forsyth Technical Community College	11	4.8
Guilford Technical Community College	30	13.1
Halifax Community College	11	4.8
UNC-Chapel Hill	29	12.7
Wake Technical Community College	14	6.1
Wayne Community College	26	11.4
<i>Degrees before entering DH school†</i>		
Undergraduate (AS or BS)	82	36.0
Graduate	6	2.6
Other degree	42	18.4
No degree beyond high school	99	43.4
<i>Practice plans after graduation†</i>		
Private Practice	196	87.9
Public Health	36	16.1
Education	8	3.6
Military	8	3.6
Other	6	2.7
<i>Mother's education</i>		
<High school	9	4.0
High school grad or GED	93	41.7
2-year college degree	55	24.6
4-year college degree	41	18.3
Other	21	9.4
Not sure	4	1.7
<i>Father's education</i>		
<High school	22	9.7
High school grad or GED	75	33.3
2-year college degree	51	22.6
4-year college degree	45	20.0
Other	22	9.7
Not sure	10	4.4

†Multiple responses allowed.

Table 2: Percent reporting having received instruction in selected communication techniques (n=225)

<i>Instructor provided information about how to...</i>	Percent
use written materials to provide dental health information	96.0
...assess your patient's understanding of information you provided them during a clinical appointment	92.5
evaluate the cultural appropriateness of written materials	82.3
...have oral health literacy techniques that were taught in the classroom reinforced by clinical instructors	65.0
determine if a patient has low literacy skills	60.3
evaluate the reading level of written materials	53.9

Table 3: Percent distribution of dental hygiene students by frequency of use of communication techniques

Domain and Item	N	Percent Distribution			
		Never	Seldom	Sometimes	Often
Interpersonal communication ∞					
Present only 2 to 3 concepts at a time	224	0.4	3.5	12.5	83.4
Ask patients whether they would like a family member or friend in the discussion	216	57.8	27.7	12.5	1.8
Draw pictures or use printed illustrations	219	39.2	26.0	24.6	10.0
Speak slowly	223	0.8	4.0	38.1	56.9
Use simple language	224	0.4	0.8	10.2	88.3
Teach Back ∞					
Ask patients to repeat back information or instructions	218	23.3	28.4	31.6	16.5
Ask patients to tell you what they will do at home to follow instructions	219	7.3	13.6	30.5	48.4
Ask patients to demonstrate oral hygiene procedures	223	0	4.4	13.9	81.6
Patient-friendly materials and aids					
Use a video or DVD	217	78.8	15.2	5.0	0.9
Hand out printed materials	222	6.7	31.5	40.9	20.7
Use models or x-rays to explain	224	1.7	9.3	37.0	51.7
Assistance					
Underline key points on print materials	218	36.6	30.2	24.7	8.2
Follow-up with patients by telephone to check understanding and adherence	213	44.6	33.8	16.9	4.6
Read instructions out loud	223	8.65	15.2	33.1	43.0
Write or print out instruction	218	23.3	33.0	30.7	12.8
Patient-friendly practice					
Refer patients to the Internet or other sources of information	222	15.7	36.9	35.1	12.1
Use a translator or interpreter	220	23.6	21.8	24.5	30.0

∞ Core Techniques

Table 4: Percent reporting having experience with assessment of materials (n=226)

	<i>Never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>
Evaluate the reading level of written healthcare materials	19.5	19.9	34.5	26.1
Evaluate the cultural appropriateness of healthcare materials	29.2	24.8	23.5	22.6
Evaluate the use of illustrations in healthcare materials	18.6	13.3	36.3	31.9

Table 5: Bivariate analysis of predictor variables and number of practices used sometimes or often

Variables		17 items			7 Basic items		
		Sample Size	Mean	Anova P-value	Sample Size	Mean	Anova P-value
Instruction		211			217		
Low (0-3)		47	9.1		49	3.6	
Moderate (4, 5)		86	9.7		88	3.4	
High (6)		78	10.2	0.066	80	3.8	0.090
General Knowledge		210					
Low (<=3)		57	9.8		58	3.6	
Medium (4)		63	9.5		63	3.4	
High (5,6)		90	10.0	0.432	96	3.8	0.081
Effectiveness knowledge		191			191		
Low (<4)		51	12.0		51	4.3	
Moderate (4-7)		88	9.9		88	3.6	
High (8-17)		52	7.9	<0.001	52	3.1	<0.001
Opinions		213			220		
Low (<3.29)		74	9.2		79	3.4	
Moderate (3.29 < 4.00)		71	9.7		72	3.6	
High (4.00)		68	10.5	0.016	69	3.9	0.017
Confidence in basic skills							
Low (<85)		54	9.1		57	3.4	
Moderate (85-94)		75	9.6		77	3.5	
High (>94)		88	10.4	0.007	90	3.8	0.065
Confidence in advance skills							
Low (<65)		78	9.1		80	3.5	
Moderate (65-84)		55	9.8		57	3.6	
High (>84)		84	10.4	0.006	87	3.7	0.297
Confidence in cultural skills							
Low (<75)		69	9.3		71	3.6	
Moderate (75-89)		53	9.5		56	3.5	
High (>89)		95	10.3	0.019	97	3.7	0.334
Barriers							
Low (0, 1)		55	10.1		56	3.6	
Moderate (2, 3)		125	9.8		130	3.6	
High (4-8)		34	9.0	0.104	34	3.4	0.543

Outcome expectancy		191			191		
Low (<10)		59	8.1		59	3.2	
Moderate (10-12)		80	9.7		80	3.6	
High (13-17)		52	12.3	<0.001	52	4.3	<0.001
<i>Age in years</i>							
<25		214			221		
≥25		108	9.5		110	3.5	
		106	10.0	0.127	111	3.7	0.146
<i>Program</i>							
Asheville-Buncombe Com College		13	9.1		24	3.6	
Cape Fear Community College		10	10.3		14	3.6	
Catawba Valley Community College		15	11.4		10	4.1	
Central Carolina Community College		9	11.0		15	4.0	
Central Piedmont Community College		15	10.2		9	3.8	
Coastal Carolina Community College		20	10.5		15	4.0	
Fayetteville Tech Community College		19	9.7		20	3.6	
Forsyth Technical Community College		11	8.0		20	2.9	
Guilford Technical Community College		29	10.6		11	3.5	
Halifax Community College		11	9.5		30	3.8	
UNC-Chapel Hill		27	8.5		11	3.4	
Wake Technical Community College		12	10.1		29	3.5	
Wayne Community College		26	9.1	0.006	14	3.5	0.252
					26		
<i>Degrees before entering DH school</i>							
Undergraduate (AS or BS)		80	9.8		82	3.5	
Other		137	9.8	0.818	142	3.6	0.552
Graduate		4	12.0		5	3.8	
Other		213	9.7	0.093	219	3.6	0.746
Other degree		38	10.2		40	3.8	
Other		179	9.7	0.264	184	3.6	0.182
No degree		95	9.4		98	3.6	
Other		122	10.0	0.090	126	3.6	0.807
<i>Patient characteristics</i>							
Socioeconomic status		97	9.7		101	3.6	
Low (0-65%)		95	10.0		96	3.6	
High (66-100%)		24	9.2	0.404	26	3.5	0.853
Don't know							
English ability							
Low (0-32%)		64	9.6		66	3.6	
High (33-100%)		7	10.5		8	3.7	

Don't know			8.0	0.009		3.2	0.358
Insured by Medicaid							
Low (0-32%)		46			47		
High (33-100%)		43	9.8		44	3.5	
Don't know		127	10.2		132	3.8	
			9.6	0.417		3.6	0.266
Over 65 years of age							
Low (0-65%)		156	10.0		163	3.6	
High (66-100%)		47	9.4		47	3.9	
Don't know		13	8.8	0.185	13	3.0	0.025
Hispanic							
Low (0-32%)		125	9.4		12	3.5	
High (33-100%)		80	10.4		82	3.7	
Don't know		11	9.7	0.014	82	3.7	0.479
<i>Practice plans after graduation</i>							
Private Practice		187	9.8		192	3.6	
Other		25	9.2	0.299	27	3.4	0.310
Public Health		35	9.1		36	3.5	
Other		177	9.9	0.124	183	3.6	0.746
Education		8	9.3		8	3.6	
Other		204	9.7	0.649	211	3.6	0.978
Military		8	10/0		8	3.7	
Other		204	9.7	0.808	211	3.6	0.749
Other		5	10.0		6	2.8	
Other		207	9.7	0.849	113	3.6	0.054
<i>Mother's education</i>							
≤HS / GED Grad		25	9.6		25	3.6	
College		96	9.8		98	3.6	
Other / Not Sure		93	9.7		96	3.5	
Missing		3	12.0	0.502	5	4.6	0.211
<i>Father's education</i>							
≤HS / GED Grad		31	8.8		31	2.3	
College		94	9.8		97	3.6	
Other / Not Sure		89	10.0		93	3.7	
Missing		3	12.0	0.071	3	4.6	0.137

Table 6: Results of ordinary least squares regression for all communication techniques(n=226)			
Variable	Parameter Estimate	SE	P-value
Moderate Inst (4. 5) vs. other	0.058	0.431	0.893
High Instr (6) vs. other	-0.015	0.452	0.971
Opinions (mean Likert scale)	0.870	0.402	0.032
Barriers (count 0-8)	-0.267	0.129	0.040
Outcome expectancy (count 0-17)	0.475	0.051	<001
Hispanic high (33-100%) vs. other	0.726	0.337	0.032
Hispanic don't know vs. other	0.710	0.755	0.348

FIGURE 1: Percent Distribution of Dental Hygiene Students by Number of Techniques Used Sometimes or Often

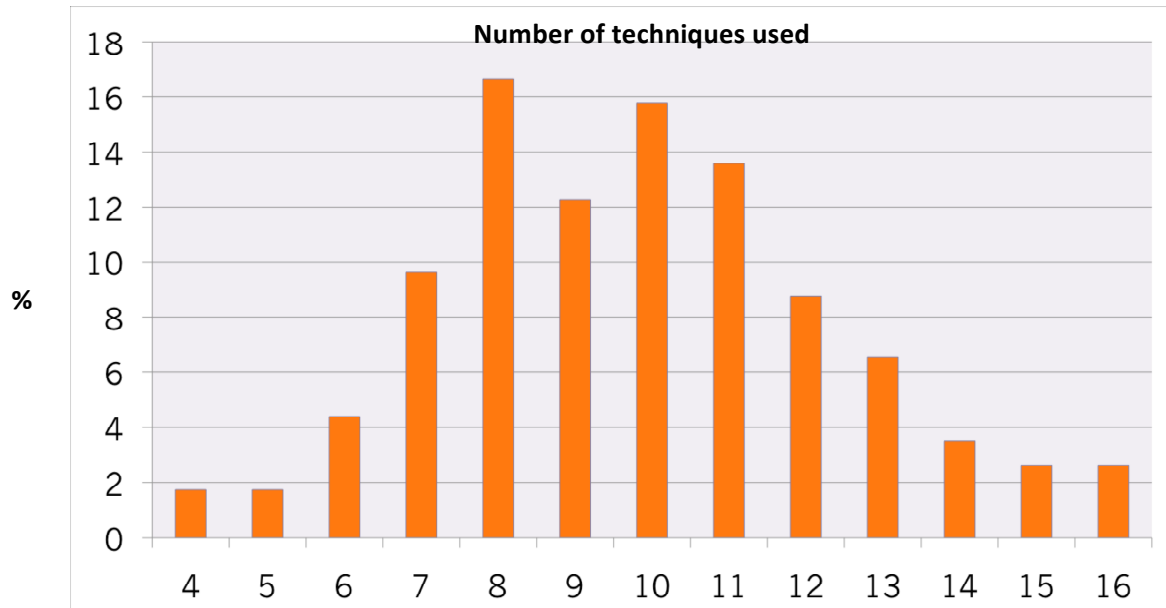


FIGURE 2: Percent Distribution of Variation in Level of Instruction by School

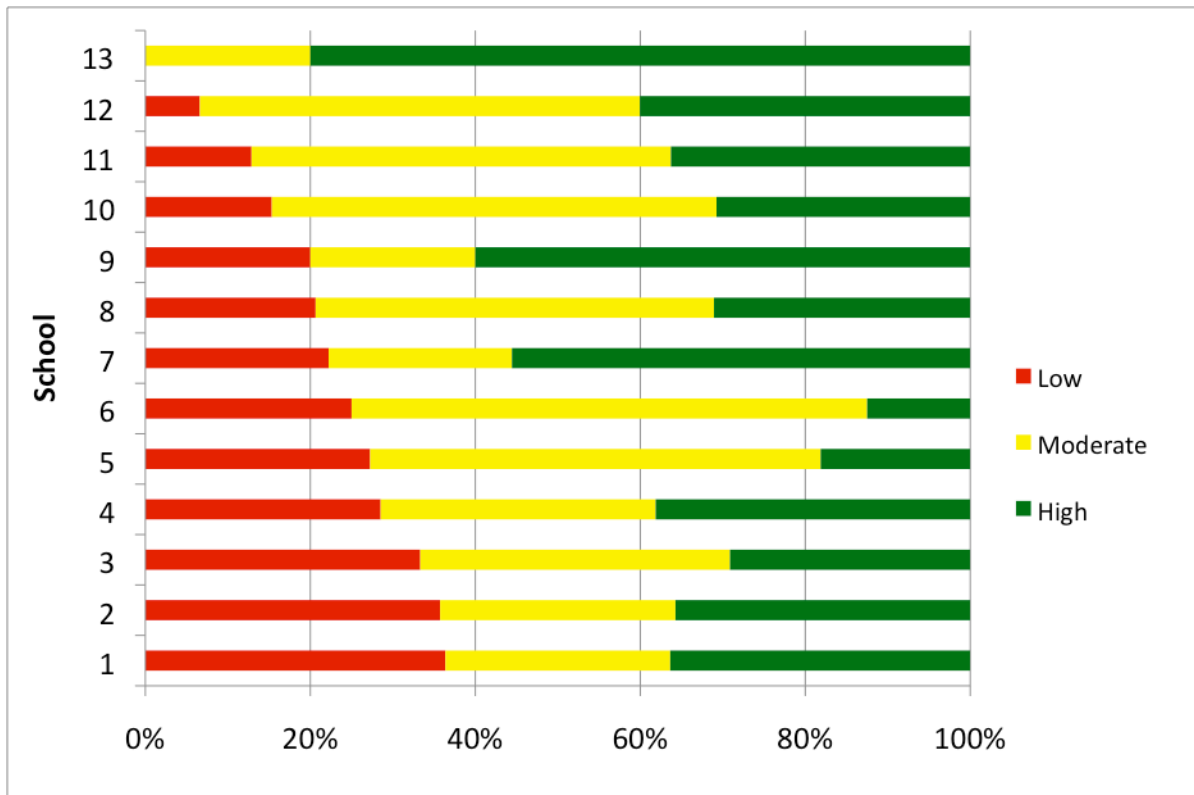
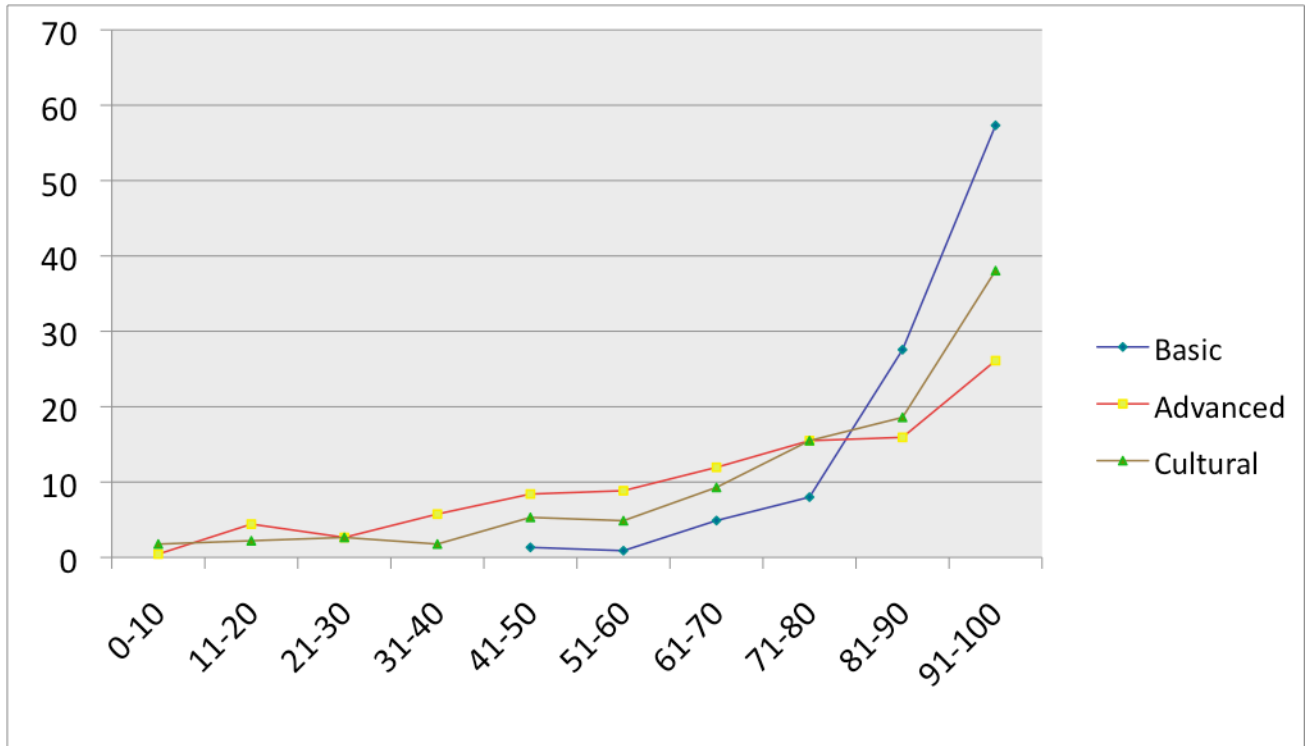


FIGURE 3: Percent Distribution of Respondents' by Mean Confidence Score and Domain



APPENDIX A:
ADDITIONAL TABLES

Table A1: Percent distribution of respondents by level of health literacy knowledge (n= 224)

<i>Knowledge questions...</i>	% Correct	% Incorrect
Patients cope with low health literacy skills by pretending to read information given to them	70.9	29.0
Illustrations do not aid in a patients understanding of written information	93.6	6.3
Patients will tell you if they cannot read	74.5	25.4
Years of schooling are a good indicator of a patients' ability to understand oral health information	66.6	33.2
Patients with low literacy are more likely to suffer from dental diseases than other patients	63.8	36.1
Patients with low literacy are less likely to follow dental care instructions	53.1	46.8

Table A2: Percent distribution of respondents by level of agreement about patient communication (n= 227)

<i>Opinions</i>	Level of Agreement				
	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
Ensuring patient understanding through good communication can improve patient satisfaction	61.6	37.0	0.4	0.8	0
Good communication between the hygienist and the patient can improve prevention and treatment outcomes	70.6	28.4	0	0.8	0
Ensuring that patients understand health information given to them can improve the quality of dental health care provided to patients	66.8	32.7	0	0.4	0
Communication is an integral part of the dental hygiene appointment	75.1	24.0	0.4	0.4	0
There are strategies that I can use to help ensure that patients understand health information I give them	51.3	45.5	2.2	0.8	0
Dental hygienists should be trained to assess a patients oral health literacy status	39.3	50.0	6.6	3.5	0.4
Dental hygienists should be trained to use appropriate communication techniques based on oral health literacy status	48.2	47.7	2.6	0.8	0.4

Table A3: Percent distribution of respondents by degree of confidence in communicating with patients (n= 226)

<i>Confidence...</i>	Level of Confidence				
	25%	Median	75%	Mean	SD
Get patients to repeat back information or instructions	70.0	90.0	100.0	83.4	20.2
Speak slowly	90.0	100.0	100.0	92.6	13.4
Limit number of concepts	90.0	100.0	100.0	93.8	12.4
Have patients tell you what they will do at home	80.0	90.0	100.0	86.9	17.9
Use simple language	90.0	100.0	100.0	93.2	12.2
Draw pictures/use printed illustrations	60.0	80.0	100.0	76.1	25.6
Use models/x-rays to explain treatment	90.0	100.0	100.0	92.6	12.3
Refer patient to internet or other sources for info	70.0	90.0	100.0	81.2	23.8
Use video or DVD	20.0	70.0	95.0	59.8	36.2
Follow-up by telephone	50.0	80.0	100.0	71.8	30.0
Involve family/friend in discussion	50.0	80.0	100.0	72.7	29.2
Use translator when needed	90.0	100.0	100.0	88.2	23.0
Evaluate reading level of healthcare materials	70.0	90.0	100.0	78.0	26.8
Use screening tool to assess literacy	50.0	80.0	100.0	69.1	32.3
Evaluate cultural appropriateness of materials	70.0	90.0	100.0	79.3	26.4
Evaluate usefulness of illustrations	80.0	100.0	100.0	87.2	20.7
Use written materials	90.0	100.0	100.0	90.9	17.7

Table A4: Percent distribution of respondents according to beliefs about effectiveness (Outcome Expectancy)

Domain and Item		N	Percent Distribution		
			Yes	No	Don't Know
<i>Interpersonal communication</i> ∞					
Present only 2 to 3 concepts at a time		224	92.8	1.3	5.8
Ask patients whether they would like a family member or friend in the discussion		216	31.4	3.7	64.8
Draw pictures or use printed illustrations		219	49.7	2.7	47.4
Speak slowly		223	94.1	0.4	5.3
Use simple language		224	97.3	0.4	2.2
<i>Teach Back</i> ∞					
Ask patients to repeat back information or instructions		218	57.7	2.2	39.9
Ask patients to tell you what they will do at home to follow instructions		219	72.6	3.6	23.7
Ask patients to demonstrate oral hygiene procedures		223	94.6	1.3	4.0
<i>Patient-friendly materials and aids</i>					
Use a video or DVD		217	17.9	4.6	77.4
Hand out printed materials		222	62.6	1.3	36.0
Use models or x-rays to explain		224	91.0	0.8	8.0
<i>Assistance</i>					
Underline key points on print materials		218	39.9	3.6	56.4
Follow-up with patients by telephone to check understanding and adherence		213	43.1	1.8	54.9
Read instructions out loud		223	71.7	3.1	25.1
Write or print out instruction		218	56.4	3.2	40.3
<i>Patient-friendly practice</i>					
Refer patients to the Internet or other sources of information		222	47.7	4.0	48.1
Use a translator or interpreter		220	72.2	0.4	27.2

[∞] Core Techniques

Table A5: Percent distribution of respondents by level of agreement that item is a barrier to use of communication techniques (n= 227)

<i>Obstacles</i>	Level of Agreement				
	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
Not enough time during an appt to assess pt understanding of oral health info	18.5	43.1	28.1	7.4	2.6
Info about perio disease is too complex for pts to understand its prevention & treatment	0.8	11.0	2.2	60.8	25.1
Limited English proficiency makes it difficult to communicate oral health info to some patients	29.9	54.1	3.5	9.2	3.0
I have access to patient educational materials written in easy-to-read language	24.0	60.8	4.0	10.2	0.8
I have access to patient educational materials written in languages other than English	12.3	54.6	14.1	12.3	6.6
Not been taught enough about how to communicate effectively with low-literacy pts	2.2	17.2	5.7	53.1	21.6
Pts will not follow my instructions regardless of how well I explain them	1.7	5.7	8.3	57.2	26.8
I feel I might embarrass pts if I ask if they understand my instructions	1.7	15.8	4.4	61.6	16.3

Table A6: Mean and percent distribution of predictor variables by level of instruction in communication

Variables		Instruction Level (Q5Q8fYesesCat)			P-value
		Low (n=50)	Moderate (n=90)	High (n=81)	
Use techniques sometimes or often (mean)					
SometimesOftenUseCount	211	9.1	9.7	10.2	0.066
SometimesOftenUseQ7Q8bCount	210	9.1	9.8	10.4	0.028
SometimesOftenUseBasicCount	217	3.6	3.4	3.8	0.090
SometimesOftenEvalMatCount	220	1.1	1.7	2.1	<0.001
General Knowledge (mean)					
Q11correctCount	214	3.9	4.2	4.1	0.438
General Knowledge (% distribution)					
Q11correctCat	214				
Low (<=3)	58	25.8	39.6	34.4	
Medium (4)	61	29.5	36.0	34.4	
High (5,6)	95	16.8	44.2	38.9	0.430
Effectiveness knowledge (mean)					
EffDKCount	187	6.3	5.9	4.9	0.053
Effectiveness knowledge (% distribution)					
EffDkCat:					
Low <4	50	16.0	32.0	52.0	
Moderate 4-7	86	20.9	43.0	36.0	
High 8-17	51	27.4	41.1	31.3	0.223
Opinions (mean)					
Q10opinionsCount	217	6.6	6.7	6.9	0.031
Q10opinionsMean	216	3.3	3.5	3.6	0.003
Opinions (% distribution)					
Q10opinionsMeanCat	217	22.1	41.4	36.4	
Low (<3.29)	77	31.1	40.2	28.5	
Moderate (3.29 < 4.00)	73	26.0	41.1	32.8	
High (4.00)	67	7.4	43.2	49.2	0.001
Confidence (mean)					
ConfOverallMean	219	80.2	80.7	84.3	0.162
confBasicMean2	218	90.8	89.5	89.7	0.796
confOtherMean2	219	72.2	66.8	74.8	0.091
ConfLitMean2	219	68.3	77.9	84.4	<0.001

Confidence (% distribution)					
ConfBasicCat2	221	22.6	40.7	36.6	0.814
Low (<85)	56	19.6	46.4	33.9	
Moderate (85-94)	77	23.3	41.5	35.0	
High (>94)	88	23.8	36.3	39.7	
ConfOtherCat2	221	22.6	40.7	36.6	0.159
Low (<65)	81	22.2	45.6	32.1	
Moderate (65-84)	54	25.9	46.3	27.7	
High (>84)	86	20.9	32.5	46.5	
ConfLitCat2	221	22.6	40.7	36.6	0.005
Low (<75)	71	35.2	36.6	28.1	
Moderate (75-89)	57	21.0	49.1	29.8	
High (>89)	93	13.9	38.7	47.3	
Barriers (mean)					
Q9barriersCount	218	2.8	2.3	1.9	0.001
Barriers (% distribution)					
Q9barriersCat	218	22.9	40.8	36.2	0.005
Low (0, 1)	54	12.9	42.5	44.4	
Moderate (2, 3)	129	21.7	39.5	38.7	
High (4-8)	35	42.8	42.8	14.2	
Outcome expectancy (mean number yes)					
EffYesCount	187	10.0	10.8	11.6	0.028
Outcome expectancy (% distribution)					
EFFYesCat	187	21.3	39.5	39.0	0.198
Low <10	56	28.5	42.8	28.5	
Moderate 10-12	79	18.9	41.7	39.2	
High 13-17	52	17.3	32.6	50.0	
Age in years (% distribution)					
AgeYoung	219	22.80	41.1	36.0	
<25					
≥25					
Program (% distribution) schoolid					
Asheville-Buncombe Community College	13	15.3	53.8	30.7	
Cape Fear Community College	11	27.2	54.5	18.1	
Catawba Valley Community College	15	6.6	53.3	40.0	
Central Carolina Community College	10	0.0	20.0	80.0	
Central Piedmont Community College	16	25.0	62.5	12.5	
Coastal Carolina Community College	21	28.5	33.3	38.1	
Fayetteville Technical Community College	18	22.2	22.2	55.5	

Forsyth Technical Community College	11	36.3	27.2	36.3	0.170
Guilford Technical Community College	29	20.6	48.2	31.0	
Halifax Community College	10	20.0	20.0	60.0	
UNC-Chapel Hill	29	12.2	48.2	34.4	
Wake Technical Community College	14	35.7	28.5	35.7	
Wayne Community College	24	33.3	37.5	29.1	
Overall	221	22.6	40.7	36.6	
<i>Degrees before entering DH school</i>					
Undergraduate (AS or BS)	81	19.7	43.2	37.0	0.717
Other	140	24.2	39.2	36.4	
Graduate	6	33.3	33.3	33.3	0.813
Other	215	22.3	40.9	36.7	
Other degree	40	27.5	37.5	35.0	0.713
Other	181	21.5	41.4	37.0	
No degree	96	26.0	37.5	36.4	0.519
Other	125	20.0	43.2	36.8	
<i>Patient characteristics</i>					
SES (% distribution) q6LowSocEconomic					
Low (0-65%)	99	20.2	40.4	39.3	0.511
High (66-100%)	95	22.1	44.2	33.6	
Don't know	26	34.6	30.7	34.6	
English ability q6LtdSpeakEnglish					
Low (0-32%)	146	21.2	43.8	34.9	0.427
High (33-100%)	67	25.3	32.8	41.7	
Don't know	7	28.5	57.1	14.2	
Insured by Medicaid q6Medicaid					
Low (0-32%)	46	17.3	43.4	39.1	0.260
High (33-100%)	43	18.6	32.5	48.8	
Don't know	131	25.9	42.7	31.3	
Over 65 years of age q6Over65					
Low (0-65%)	160	23.7	40.0	36.2	0.715
High (66-100%)	47	17.0	42.5	40.4	
Don't know	13	30.7	46.1	23.0	
Hispanic q6Hispanic					
Low (0-32%)	126	23.8	42.8	33.3	0.854
High (33-100%)	82	20.7	39.0	40.2	
Don't know	12	25.0	33.3	41.6	

<i>Type of practice to work in after graduation</i>						
Private Practice	192	21.8	41.1	36.9	0.485	
Other	26	30.7	42.3	26.9		
Public Health	35	20.0	54.2	25.7	0.218	
Other	183	23.5	38.8	37.7		
Education	7	0	57.1	42.8	0.332	
Other	211	23.7	40.7	35.5		
Military	8	37.5	25.0	37.5	0.519	
Other	210	22.3	41.9	35.7		
Other	5	40.0	20.0	40.0	0.538	
Other	213	22.5	41.7	35.6		
<i>Mother's education</i>						
MomEdu						
≤HS / GED Grad	24	25.0	41.6	33.3	0.603	
College	98	20.4	39.8	39.8		
Other / Not Sure	95	24.2	43.1	32.6		
Missing	4	25.0	0	75.0		
<i>Father's education</i>						
DadEdu						
≤HS / GED Grad	32	21.8	40.6	37.5	0.740	
College	95	23.1	41.0	35.7		
Other / Not Sure	92	22.8	41.3	35.8		
Missing	2	0	0	100.0		

APPENDIX B:

SURVEY COVER LETTER

UNC SCHOOL OF DENTISTRY

ID #:

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Survey of North Carolina Dental Hygiene Programs: Experiences in Patient Communication

Thank you for helping us with this survey! The purpose of this survey is to assess your experiences with patient communication during your dental hygiene training. All senior dental hygiene students in the state are being asked to participate. The results will provide valuable information for dental hygiene faculty to help them ensure that students graduate with the skills needed to provide quality patient care. This survey should take approximately 15 minutes to complete.

Your responses will be anonymous and in no way affect your grade in any dental hygiene course. I encourage you to participate in this research study; however participation is optional for all students. You have the right to withdraw from the study at any time. If you choose to participate I encourage you to answer all questions, but you have the right to refuse to answer any question on the survey. Informed consent is implied with completion of the survey. If you have any questions or comments about the survey, please direct them to Lisa Barron (email: lbarron@dentistry.unc.edu) at the University of North Carolina at Chapel Hill School of Dentistry. You also can call Lisa Barron at (919 352-6104).

Instructions for Completing the Questionnaire

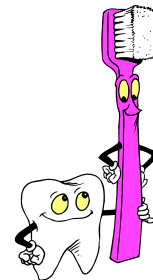
If you **ARE NOT** a senior dental hygiene student, please fill in the circle below and return the questionnaire to your survey administrator.

☐ I'm not a senior dental hygiene student

If you **ARE** a senior level dental hygiene student:

1. Please complete the entire questionnaire by using a ballpoint pen to completely fill in the appropriate circle for each question. Answer all questions as honestly and candidly as possible. Again, all survey responses are anonymous and there are no personal identifiers on any questionnaire.
2. When you are finished, place the questionnaire in the envelope provided, seal and return it to your survey administrator.
3. Please ensure that your survey administrator knows that you have returned your survey envelope. Your survey administrator is responsible for collecting questionnaires from all senior dental hygiene students in your program and returning them unopened to Lisa Barron, the investigator for this project. It is essential that your survey administrator have a record of all returned surveys.

Thank you again for your participation in this survey on patient communication! The information you provide will be of great value to us as we work to improve education of dental hygienists in North Carolina.



APPENDIX C:

SURVEY

Page 2

ID #:

FIRST, SOME QUESTIONS ON YOUR EDUCATION IN PATIENT COMMUNICATION

1. Do you recall having instruction in patient communication during your dental hygiene training?

- ☐ Yes ☐ No (If no, skip to question 6)

2. In what courses did you learn about communicating dental health information to your patients? (Choose all that apply.)

- ☐ Community Dental/Public Health ☐ Nutrition
☐ Dental Health Education/Theory ☐ Ethics/Professionalism
☐ Clinical Dental Hygiene ☐ Other (please specify) _____

3. What forms of instruction did your course instructor(s) use to teach you about oral health communication techniques? (Choose all that apply.)

- ☐ Lecture ☐ Case Studies ☐ Role Play/Modeling
☐ I-pod training module ☐ Clinical Activities ☐ Web based teaching module
☐ Other (please specify) _____

4. What resources did your course instructor(s) use to teach you about oral health communication techniques (Choose all that apply.)

- ☐ Dental Hygiene textbooks ☐ Journal articles ☐ Internet sites ☐ Dental textbooks
☐ Medical/Nursing textbooks ☐ Other (please specify) _____

5. Did your instructor(s) provide information about:

Yes No Don't Recall

a. How to assess your patients' understanding of information you provided them during a clinical appointment

☐ ☐ ☐

b. How to determine if a patient has low literacy skills

☐ ☐ ☐

c. How to evaluate the reading level of written materials before using them to teach patients

☐ ☐ ☐

d. How to evaluate the cultural appropriateness of materials before using them to teach patients

☐ ☐ ☐

e. How to use written materials to provide dental health information to your patients

☐ ☐ ☐

6. What percentage of patients that you typically treat in your dental hygiene program are:

0% 1%-32% 33%-65% 66%-100% Don't Know

a. Low socioeconomic status

☐ ☐ ☐ ☐ ☐

b. Limited in ability to speak English

☐ ☐ ☐ ☐ ☐

c. Insured by Medicaid

☐ ☐ ☐ ☐ ☐

d. Older than 65 years of age

☐ ☐ ☐ ☐ ☐

e. Hispanic

☐ ☐ ☐ ☐ ☐

QUESTIONS ABOUT YOUR COMMUNICATION EXPERIENCES WITH PATIENTS

7. How often do you use each of the following communication techniques in providing patient care and do you believe it is effective when you use it? [Choose one response for both the “use it” and “effective” columns in each row. If you have “never” used the technique in clinical practice, check “don’t know” for the “effective” column.]

	How often do you use it with patients?				Is it effective?		
	Often	Some-times	Seldom	Never	Yes	No	Don't Know
a. Ask patients to repeat back information or instructions after fluoride application	☐	☐	☐	☐	☐	☐	☐
b. Speak slowly	☐	☐	☐	☐	☐	☐	☐
c. Ask patients to tell you what they will do at home to follow instructions	☐	☐	☐	☐	☐	☐	☐
d. Use simple language	☐	☐	☐	☐	☐	☐	☐
e. Read instructions out loud	☐	☐	☐	☐	☐	☐	☐
f. Hand out printed materials	☐	☐	☐	☐	☐	☐	☐
g. Underline key points on print materials	☐	☐	☐	☐	☐	☐	☐
h. Write or print out instructions	☐	☐	☐	☐	☐	☐	☐
i. Draw pictures or use printed illustrations to explain treatment plans	☐	☐	☐	☐	☐	☐	☐
j. Use instructional models or radiographs to explain treatment needs	☐	☐	☐	☐	☐	☐	☐
k. Refer patients to the Internet or other sources of information	☐	☐	☐	☐	☐	☐	☐
l. Use video or DVD	☐	☐	☐	☐	☐	☐	☐
m. Follow-up with patients by telephone to check understanding and adherence	☐	☐	☐	☐	☐	☐	☐
n. Ask patients whether they would like a family member or friend to accompany them in the discussion	☐	☐	☐	☐	☐	☐	☐
o. Use a translator or interpreter when needed	☐	☐	☐	☐	☐	☐	☐
p. Ask patients to demonstrate what you have taught them about oral hygiene procedures	☐	☐	☐	☐	☐	☐	☐
q. Limit number of concepts presented at a time to 2-3 during oral hygiene instructions	☐	☐	☐	☐	☐	☐	☐

8. How often do you:

	<u>Often</u>	<u>Sometimes</u>	<u>Seldom</u>	<u>Never</u>
a. Evaluate the reading level of written healthcare materials before using them for patient education	☐	☐	☐	☐
b. Use an oral health literacy screening tool to assess the health literacy skills of an individual	☐	☐	☐	☐
c. Evaluate the cultural appropriateness of healthcare materials, including written handouts, videos, audiotapes, before using them for patient teaching	☐	☐	☐	☐
d. Evaluate the use of illustrations in written healthcare materials before using them for patient teaching	☐	☐	☐	☐
e. Use written materials to provide healthcare information to an individual or community group	☐	☐	☐	☐
f. Have oral health literacy evaluation techniques that you were taught in the classroom reinforced by your clinical instructors	☐	☐	☐	☐

YOUR OPINIONS ABOUT OBSTACLES TO PATIENT COMMUNICATION

9. Please indicate the extent to which you agree or disagree with each of the following statements.

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>	<u>Uncertain</u>
a. There is often not enough time during an appointment to assess a patient's understanding of oral health information	☐	☐	☐	☐	☐
b. Information about periodontal disease is too complex to present in a way that patients can understand its prevention and treatment	☐	☐	☐	☐	☐
c. Limited English proficiency makes it difficult to communicate oral health information to some patients	☐	☐	☐	☐	☐
d. I have access to patient educational materials written in easy-to-read language	☐	☐	☐	☐	☐
e. I have access to patient educational materials written in languages other than English	☐	☐	☐	☐	☐
f. I have not been taught enough about how to communicate effectively with low-literacy patients.	☐	☐	☐	☐	☐
g. Patients will not follow my instructions regardless of how well I explain them	☐	☐	☐	☐	☐
h. I feel awkward trying to find out if patients understand my instructions because I feel I might embarrass them	☐	☐	☐	☐	☐

YOUR OPINIONS ABOUT PATIENT COMMUNICATION

10. Please indicate the extent to which you agree or disagree with each of the following statements.

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>	<u>Uncertain</u>
a. Ensuring patient understanding through good communication can improve patient satisfaction	☐	☐	☐	☐	☐
b. Good communication between the hygienist and the patient can improve prevention and treatment outcomes	☐	☐	☐	☐	☐
c. Ensuring that patients understand health information given to them can improve the quality of dental health care provided to patients	☐	☐	☐	☐	☐
d. Communication is an integral part of the dental hygiene appointment	☐	☐	☐	☐	☐
e. There are strategies I can use to help ensure that patients understand health information I give them	☐	☐	☐	☐	☐
f. Dental hygienists should be trained to assess a patients oral health literacy status	☐	☐	☐	☐	☐
g. Dental hygienists should be trained to use appropriate communication techniques based on oral health literacy status	☐	☐	☐	☐	☐
h. I plan to use the techniques that I have learned to assess health literacy status of patients in my clinical practice after graduation	☐	☐	☐	☐	☐

11. Please indicate the extent to which you agree or disagree with each of the following statements.

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>	<u>Uncertain</u>
a. Patients cope with low health literacy skills by pretending to read information given to them by healthcare providers.	☐	☐	☐	☐	☐
b. Illustrations do not aid in a patient's understanding of written information	☐	☐	☐	☐	☐
c. Patients will tell you if they can't read	☐	☐	☐	☐	☐
d. Years of schooling are a good indicator of a patients' ability to understand oral health information	☐	☐	☐	☐	☐
e. Patients with low literacy are more likely to suffer from dental diseases than other patients	☐	☐	☐	☐	☐
f. Patients with low literacy are less likely to follow dental care instructions	☐	☐	☐	☐	☐

The following questions are designed to help us get a better understanding of the kinds of communication techniques that are difficult for students. Please rate how certain you are that you can do each of the things listed below by writing the appropriate number in the space provided.

Cannot do it at all	Moderately certain I can do do it at all					Highly certain I can do do it at all				
0	10	20	30	40	50	60	70	80	90	100

a. Get patients to repeat back information or instructions			
b. Speak slowly			
c. Present only 2 or 3 concepts during an oral hygiene appointment			
d. Get patients to tell me what they will do at home to follow instructions			
e. Use simple language instead of dental terminology			
f. Draw pictures or use printed illustrations to explain the treatment plan			
g. Use models or x-rays to explain treatment needs			
h. Refer patients to the Internet or other sources of information			
i. Use a video or DVD to inform patients			
j. Follow-up with patients by telephone to check understanding and adherence			
k. Involve a family member or friend in discussions with the patient			
l. Use a translator or interpreter when needed			
m. Evaluate the reading level of written healthcare materials before using them for patient teaching			
n. Use a screening tool to assess the oral health literacy skills of a patient			
o. Evaluate the cultural appropriateness of healthcare materials before using them for patient teaching			
p. Evaluate the usefulness of illustrations in written healthcare materials before using them for patient teaching			
q. Use written materials to provide healthcare information to an individual or community group			

NOW, A FEW QUESTIONS ABOUT YOU

13. What is your gender? ☐ Male ☐ Female

14. What is your age? ☐ < 25 yrs old ☐ 25-30 yrs old ☐ 31-35 yrs old ☐ 36+ yrs old

15. What degrees or credentials did you have before entering dental hygiene school? (Choose all that apply.)

☐ None ☐ Undergraduate, e.g. AS or BS ☐ Graduate, e.g. MS or MPH

☐ Other (Specify) _____

16. What type of practice do you plan to work in after graduation?

☐ Private Practice ☐ Public Health ☐ Education ☐ Other (specify) _____

17. How many years of education did your mother complete?

☐ Less than High School ☐ High School/GED ☐ 2-year college degree (AS, AA)

☐ 4-year college degree (BS, BA) ☐ Not Sure ☐ Other (Specify) _____

18. How many years of education did your father complete?

☐ Less than High School ☐ High School/GED ☐ 2-year college degree (AS, AA)

☐ 4-year college degree (BS, BA) ☐ Not Sure ☐ Other (Specify) _____

If you would like to make any additional comments, please write below. Please put the questionnaire in the envelope provided, seal and return it to your survey administrator.

Thank you for your time in completing this questionnaire!

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