

Introduction of Health Literacy into the Allied Dental Curriculum: First Steps and Plans for the Future

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Abstract: In 2003, the U.S. Department of Education's National Center for Education Statistics conducted the National Assessment of Adult Literacy (NAAL). The NAAL reported that over 90 million adults were functionally or marginally illiterate. When these individuals encounter the health care system, they often have difficulties with reading and understanding basic text and, as a result, have difficulty managing their disease or using medications. The purpose of this article is to describe our initial efforts to educate our students concerning health literacy, its consequences, and our assessment. As part of a new segment of the allied health curriculum, second-year dental hygiene students received a lecture concerning the prevalence of poor literacy in America and the possible consequences of poor literacy on their patients' ability to maintain oral health. To provide clinical experience with assessing health literacy, the students were instructed in the administration of a validated medical health literacy tool. This clinical exercise had two functions: 1) to familiarize students with assessing health literacy as part of their clinical experience and 2) to continue to gather preliminary data concerning the level of health literacy of adult patients at Indiana University School of Dentistry using a standardized methodology, the Short Test of Functional Health Literacy in Adults (S-TOFHLA). The results indicated that 13 percent of those assessed had "inadequate" or "marginal" literacy as measured by the S-TOFHLA. As a result, we plan to continue to expand our educational efforts and develop a larger investigation of the prevalence in our dental school population. With these data, we hope to develop effective educational programs and experiences for our students, faculty, and staff to improve their awareness and communication skills and ultimately improve the oral health of our patients.

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In 2003, the American Dental Education Association (ADEA) House of Delegates approved the Competencies for Entry into the Profession of Dental Hygiene¹ presented by the Section on Dental Hygiene Education's Competency Development Committee. One of the five domains of competency is health promotion/disease prevention, which requires that the graduating hygienist has a general knowledge of wellness, health determinants, and characteristics of various patient/client communities. Health promotion (HP) goals 4 and 5 include the need to "Identify individual and population risk factors, and develop strategies that promote health-related quality of life" and "Evaluate factors that can be used to promote patient/client adherence to disease prevention and/or

health maintenance strategies." In addition, the 2003 ADEA House of Delegates also approved a position paper entitled "Statement of Roles and Responsibilities of Academic Dental Institutions in Improving the Oral Health Status of All Americans," recognizing the need of academic dental institutions to provide graduates who have the skills and knowledge to meet the needs of all Americans and to assist in efforts to reduce health disparities in vulnerable populations.²

Poor general literacy and in particular poor health literacy skills are recognized as a possible cause of health disparities.³⁻⁵ Fundamental literacy is an important component of health literacy, and health literacy has been defined as "the degree to which individuals have the capacity to obtain, process, and

understand basic health information and services needed to make appropriate health decisions.^{7,6}

Fundamental literacy, as measured by reading comprehension, is lacking in many Americans. In 2003, the U.S. Department of Education's National Center for Education Statistics conducted the National Assessment of Adult Literacy (NAAL). The NAAL found that over 90 million adults were functionally or marginally illiterate.^{7,8} The NAAL also found that 36 percent of American adults tested had basic or below basic medical health literacy.^{9,10} Lower literacy is commonly associated with advanced age, living below the poverty line, lower educational attainment, and English as a second language.¹¹⁻¹⁴ Health literacy is a strong correlate of health status, chronic disease management, development of health-promoting behaviors, and the use of preventive services.^{6,12-17}

Many tools to measure or assess medical literacy are available in English and Spanish.^{18,19} One is the Test of Functional Health Literacy in Adults (TOFHLA) and its derivative, the Short Test of Functional Health Literacy in Adults (S-TOFHLA). The TOFHLA and the S-TOFHLA were designed to measure a patient's ability to read and comprehend items commonly encountered as part of health care such as prescription labels, written instructions, and appointment cards.¹⁹ Both have been shown to be valid and reliable indicators of a patient's ability to read health-related materials.^{19,20} Subjects read passages from which every fifth to seventh word is removed. For each passage or sentence, four possible words are provided, and the patient must determine which of the words provided best fit.¹⁸ The TOFHLA also includes assessments of the patient's ability to interpret numerical data. The S-TOFHLA is similar, but questions and some sections were eliminated to reduce the time of administration from twenty minutes to ten minutes and remove the need for an interviewer.^{11,19} The S-TOFHLA has two sections of thirty-six sentences with readability levels at grade levels 4.3 and 10.4, respectively.^{20,21} The shorter duration of testing and lack of need for an interviewer make it more amenable to being used in a clinical setting such as a busy health care office or clinic. The TOFHLA and S-TOFHLA are available in English and Spanish, and both have been found to be valid and internally consistent.²⁰⁻²⁵

Indiana University School of Dentistry (IUSD) is located in Indianapolis, Indiana, and serves as the primary educational institution of dentistry in the state. The dental hygiene program resides within the dental school and is one of six dental hygiene

programs in Indiana. While patients at IUSD come from many communities within Indiana, the school's primary drawing area is the six surrounding counties comprising the Indianapolis metropolitan area. A review of the school's database indicated that in 2008 there were 22,000 active adult patients.

As a response to the ADEA competency statements concerning dental hygiene, the IUSD Dental Hygiene Program incorporated curricular changes within the associate degree program to accommodate inclusion of information concerning health literacy, specifically its impact on obtaining informed consent and the incorporation of health literacy screening into clinical practice as an accepted standard of care since it is often the hygienist who provides health information to the patients seen in private practice. Understanding the concept of health literacy and actively participating in the selection of educational materials and the construction of informed consent documents are within the scope of practice for the dental hygienist.

To this end, the dental hygiene curriculum at the IUSD was modified to include lectures and student exercises concerning oral health literacy. Prior to the in-class session, students were assigned an article about oral health literacy in the private practice setting²⁶ and were required to visit the website of the National Network of Libraries of Medicine (<http://nmlm.gov/outreach/consumer/hlthlit.html>) to view materials pertaining to health literacy and clinical practice, as well as to visit the Healthy People 2010 online document related to national community initiatives (www.health.gov/communication/literacy/default.htm). A quiz was given to the students to assess their understanding of the reading assignments. The students were also asked to complete the S-TOFHLA after having been read the introductory comments as designated by the guidelines. They then "graded" themselves to determine their own health literacy level as well as providing them with a hands-on experience with the assessment tool. It was hoped this experience would increase the comfort level of students and provide calibration when administering the tool to patients seen in the dental hygiene clinic.

After a lecture summarizing content pertaining to health literacy, the students were also provided information concerning the level of reading skills needed to read many dental educational materials and how to assess these materials using SMOG (Simple Measure of Gobbledygook)²⁷ to assess the educational level needed to fully understand a text. SMOG was developed by Professor G. Harry

McLaughlin, and the calculator is available online (www.harrymclaughlin.com/SMOG.htm). SMOG analyzes the number of polysyllabic words from thirty randomly selected sentences in the document to derive a score and the grade level necessary to read the material. SMOG has 0.985 correlation with the grades of readers who have 100 percent comprehension of the materials.²⁷ In-class activities followed the lecture and included use of the Internet to locate patient education materials for a specified dental topic; determination of the level of literacy of patient education materials selected; modification of the document to reflect both a higher and a lower level of reading skill than would be necessary to understand the document; and presentation of their findings to the class. The purpose of the exercise was to provide students a tool that might be used to assess the level of literacy necessary to comprehend any given written document. Armed with this knowledge, the student (and future practitioner) would be able to adjust documents to the appropriate health literacy level of the patients seen in the practice or at least to be cognizant of the need to provide more purposeful assistance to patients who possess lower health literacy skills.

Methods

The purpose of this investigation was threefold: 1) to continue to gather data concerning the level of health literacy of the adult population seeking care at the Indiana University School of Dentistry using the S-TOFHLA; 2) to inform our graduating dental hygiene students concerning the consequences of inadequate health literacy; and 3) to familiarize our students with a means to identify those adults who may need additional assistance with oral health education.

As clinical patients were to be recruited and data collected and assessed, this exercise was reviewed and approved by the Institutional Review Committee for the Indiana University Medical Center campus prior to its initiation. Forty-eight second-year dental hygiene students were asked to recruit patients from their pool of assigned active patients to complete the S-TOFHLA during the fall semester of the 2008–09 school year. The patients were asked if they would be willing to participate by the students; if interested, they were given a letter of informed consent and an authorization for release of health information form to read and sign. Afterwards,

they were screened to ensure they met the inclusion/exclusion criteria which were 1) be a patient of the dental hygiene clinic of the IUSD; 2) be an adult (age eighteen and older); 3) have the visual acuity to read and complete the S-TOFHLA; and 4) allow a short questionnaire to be completed by the student to gather data not part of the patient record.

This was a single-visit study performed at chair-side as part of the patient's routine prophylaxis or periodontal maintenance visit by the student using the narrative provided as part of the S-TOFHLA packet. Subjects were asked if they could see the questions and read sections with either regular or corrected vision. Pens and other necessary writing supplies were provided. The test was timed by the student using a wall clock, and patient responses were recorded by the patient by circling the appropriate response on the test sheet. After collection of the examination, the student completed the questionnaire, which included the student's assessment of the patient's risk for the development of caries and his or her periodontal status based on accepted definitions of risk assessment for caries and periodontal health used within the IUSD dental hygiene clinic. Panelist identification information on the test was limited to a preprinted subject identification number, which was attached to the test and to the demographic questionnaire. Therefore, the identities of the student and patient were unknown to the investigators.

All data were reviewed by the data manager and processed through multiple verification and edit checking programs. The test was scored automatically using the responses recorded in the study database. The S-TOFHLA health literacy scores were treated as a continuous variable. Two-way contingency tables were used to summarize the relationships with each of the demographic and questionnaire responses. Spearman correlations were calculated to assess the relationships of age, education, brushing frequency, gum/tooth health, periodontitis, oral hygiene, and caries risk with the literacy scores. ANOVA was used to assess the relationships of gender, race, daily flossing, daily prescription dental products, dry mouth, dental insurance, and tobacco use with the literacy scores.

Results

Ninety-one patients agreed to participate in the investigation although the demographic questionnaire was completed for only sixty-seven participants. The mean S-TOFHLA score for all ninety-one subjects

was 31, with a range of four to thirty-six correct responses. Of these, seventy-nine (87 percent) were found to have Adequate health literacy. Five subjects (5 percent) scored in the Marginal category and seven (8 percent) in the Inadequate category (Table 1). In general, scores decreased by age category with those subjects eighteen to thirty-nine years of age (N=22) having a mean S-TOFHLA score of 33.7 (range sixteen to thirty-six correct responses) as compared to 28.7 (range four to thirty-five correct responses) for those seventy years of age and older (N=12). The mean score for males (N=28) was somewhat lower (32.0 correct responses) than females (N=39) (33.7 correct responses). For race/ethnicity, those self-identifying as Asian (N=2) had the highest mean score (35.5) compared to African Americans (N=6) (33.3), American Indians (N=2) (34.0), and whites (N=55) (33.1).

Because of the relatively small sample size, no significant differences were seen by self-reported educational attainment although, interestingly, of those claiming to have achieved a college degree or trade school certificate or higher, the S-TOFHLA scores ranged from twenty-one to thirty-six correct responses indicating that educational attainment and literacy were not well correlated^{3,6} in this sample. Lower S-TOFHLA scores were also associated with higher age category, lower educational attainment, the

Table 1. Percentage of subjects by S-TOFHLA category

Literacy Category	N	%
Adequate	79	87
Marginal	5	5
Inadequate	7	8

presence of periodontitis, and perceived symptoms of dry mouth (Table 2). No association was found to having dental insurance, caries risk status (high, moderate, or low), or self-reported frequency of tooth-brushing or flossing (Table 3). Again, because of the small sample size, no generalizations could be made.

Following data collection, students were asked to comment concerning the following statements during their exit interview from the course: "I felt awkward or uncomfortable approaching my patients to take a literacy test" and "I found that the S-TOFHLA took an excessive amount of time to administer," both on a scale of 0=no response, 1=strongly disagree, 2=disagree, 3=agree, and 4=strongly agree. Of the forty-eight students who responded to the exit survey, opinions were evenly divided as to their level of comfort approaching their patients and as to whether they felt the test took an excessive amount of time during the appointment. Of the personal comments provided,

Table 2. Spearman correlations with S-TOFHLA score

	Correlation	p-value
37. Age on last birthday	-0.32	0.0087
40. Last grade completed	0.29	0.0154
41. How often do you brush your teeth each day?	0.14	0.2751
47. How would you rate the health of your teeth and gums?	-0.21	0.0879
48. Periodontitis	-0.30	0.0091
49. Oral hygiene	-0.19	0.0965
50. Caries risk	-0.05	0.6522

Table 3. S-TOFHLA comparisons (ANOVA or two-sample t-tests)

	p-value
38. Gender	0.2129
39. Race	0.3488
42. Do you floss your teeth daily?	0.5221
43. Do you use any prescription dental products daily?	0.3924
44. Does your mouth often feel dry?	0.0117
45. Do you currently have dental insurance?	0.6837
46. What has been your tobacco use today or in the past?	0.6751

some students felt their patients were offended to be asked to complete a literacy survey. However, the majority felt that their patients had no qualms about taking the assessment and were interested in the connection between literacy and their own dental health.

Discussion

It should be recognized that there were several limitations to this investigation. First, this was a small pilot study using a convenience sample of adult patients who consented to taking the S-TOFHLA. Although the students were asked to keep a tally as to how many of their patients they approached to take the S-TOFHLA versus how many consented, this was not done consistently. Based on the exit interview comments, many of the patients approached did not wish to participate. Therefore, it is difficult to conclude that the results of the investigation are truly reflective of the medical health literacy of all adults treated in the dental hygiene department or the school as a whole. However, if we assume our sample was representative of the dental hygiene clinic's population, then approximately 390 of the 3,000 individuals treated in the clinic in 2008 had less than adequate health literacy skills. Taken a step further, our data would indicate that, of the 22,000 active adult patients treated at the Indiana University School of Dentistry in 2008, we could expect approximately 3,000 individuals to have less than adequate health literacy skills. These data are similar to previous results concerning older adults (71.0±5.9 years) conducted through the Oral Health Research Institute of the Indiana University School of Dentistry.²⁸ In that study, of the ninety-nine recruited adults who participated in several of our clinical studies, 13 percent had less than adequate health literacy as measured by the S-TOFHLA. The results of these two studies mirror the conclusions of Jones et al. that a sizable proportion of private practice patients also have inadequate health literacy skills.²⁶

The S-TOFHLA only measures the level of functional literacy: the ability to read information and put it into a reasonable context of understanding. However, it is not designed to measure a person's understanding of the information. In addition, because there are no published validated instruments to assess oral health literacy, it was necessary to assess medical health literacy, which may or may not provide comparable information concerning the oral health literacy of the individual. One oral health literacy assessment

tool that appears promising is the Test of Functional Health Literacy in Dentistry (TOFHLiD), which has similar mechanics to the TOFHLA but uses descriptions of dental rather than medical procedures.²⁹ The scores for the reading and numeracy sections are weighted for a maximum of 100 points with higher scores representing higher literacy. It does require a trained interviewer and takes thirty minutes to administer, which may limit its utility in a busy school clinic environment. This test has acceptable reliability and acceptability, but further refinement is needed to increase its predictive validity. Also, it has not been validated in a Hispanic-speaking population, which limits its utility. The development of the Oral Health Literacy Instrument (OHLI) also holds promise as a means to assess oral health literacy in adults, both in terms of reading comprehension and numeracy.³⁰ The OHLI has shown good validity and reliability, and it has been suggested that it could be used in evaluating subjects involved in clinical research. Further work is needed to its predictive validity and sensitivity to change.

As a result of our preliminary investigations, it is apparent that a significant number of the patients of the IUSD have marginal literacy skills at best, so if we are to have an impact on the oral health of these individuals, a number of steps must be taken. We must expand our data-collecting activities to better estimate the extent of less than adequate literacy within our patient population. Included in this should be the caregivers of children seen in our pediatric dental clinic as low caregiver literacy is commonly associated with poor preventive care behaviors and poor child health outcomes.³¹⁻³³ Therefore, we will advocate to our administration for the incorporation of the measurement of oral health literacy using a valid instrument, such as the TOFHLiD or the OHLI when they become available for clinical use, as part of a new and/or emergency patient examination and that these data become part of the patient's electronic treatment record. Electronic collection, tabulation, and analyses of these data will provide necessary information as to the current health literacy level of our patient population base and provide students and faculty members an opportunity to tailor their patient education programs to meet the needs of the patient.

In addition, we will continue to offer the lecture material and activities as portions of the dental hygiene curriculum and will advocate that this same information be incorporated into the curriculum of our undergraduate and graduate dental students. To reach practitioners, efforts will also be made to

develop information for continuing education. The dental hygiene program will also expand its curriculum to include assessment of written informational/educational materials (informed consents, financial contracts, post-operative instructions, etc.) commonly provided to our patients using SMOG. Research indicates informed consents and many educational brochures require a high level of literacy, with many of these documents written to inform those persons having a high level of education.³⁴⁻³⁸

Similarly, our unpublished data of a random sample of twenty-nine U.S. dental school websites including our own indicates that fundamental information provided to prospective patients concerning services offered, clinic hours, contact information, fee management, and directions required a very high level of literacy (13.2±1.9 years, range 10.5 to 20.2) to understand.³⁹ Internet usage has grown dramatically over the past decade with the greatest growth among minority groups, single-parent households, and persons with lower incomes.⁴⁰ Many users search for health information online, and it is estimated that approximately 15 percent of these users search for dental health information⁴¹ and access to care. Dental schools should assess the information they are providing on their websites to favorably engage these potential patients. The inability to access basic information about the school and its policies could frustrate prospective patients with limited reading skills.

We will also advocate to the school administration that a standing Health Literacy Committee be organized consisting of voluntary faculty, staff, and students to regularly review the materials distributed by the IUSD to ensure that the materials meet the needs of our patient population. This committee will also be charged with regularly reviewing the literature to ensure that our academic community is kept abreast of the most current research concerning health literacy, suggesting improvements to methods of teaching and assessing health literacy, and disseminating this information so that our community remains current.

As an academic dental institution, we have the responsibility of providing immediate quality care to our patients, which includes educating them in maintaining and improving their oral health. The likelihood of this happening increases with the provision of skill-appropriate educational opportunities. These can only be provided if we are aware of the literacy skills of our patients and if our faculty members and students are actively engaged in assessing and

providing skill-appropriate educational opportunities to all our patients, particularly those with low literacy skills.

Conclusions

The results of this investigation indicate that a significant proportion of our patients have less than adequate literacy skills as measured by the S-TOFHLA. The Dental Hygiene Program of the Indiana University School of Dentistry has taken the initial steps in our school to increase awareness of the importance of health literacy and how to assess it in the clinical setting.

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