

# Abstracts: Oral Free Papers

## Education

### Linking Dental Hygiene Admissions Criteria to Licensure Examination Pass Rates

Tammy R. Sanderson, RDH, MSDH; Marcia H. Lorentzen, RDH, MSED, EdD

**Problem Statement:** Research specific to dental hygiene is needed to discover admissions variables currently implemented by programs, and to validate these variables as predictors of student success as evidenced by successful completion of the National Board Dental Hygiene Examination (NBDHE) and regional clinic licensure exams.

**Purpose:** Dental hygiene research can provide programs guidance to implement the best admissions practices for the profession. This study sought to first identify the many admissions variables currently being utilized by dental hygiene programs. Secondly, this study looked for associations between these variables and program pass rates on national and regional clinical board examinations.

**Methods:** An online survey was sent via email to 309 dental hygiene chairs/program directors. The survey was comprised of eighteen questions to collect program demographic information, program admissions requirements, and program pass rates on both the NBDHE and regional clinical board examinations.

**Results:** One hundred thirty-nine respondents participated in the survey for a response rate of 45%. Twenty-nine admissions variables were analyzed and correlated to program pass rates on regional clinical board examinations (N=131) and program pass rates on the NBDHE (N=133). Program demographic information indicates that the two admissions variables most often used by dental hygiene programs are overall college grade point average (GPA) at 67.6% and college science GPA at 61.2%. Multiple regression analysis detected no statistically significant variables as positive indicators for neither the NBDHE nor regional clinical licensure examination pass rates.

**Conclusions:** Currently there are no defined variables associated with clinical and national licensure pass rates. Further research is needed to identify variables that are associated with clinical and national licensure pass rates.

### An Evaluation of the Effects of Blended Learning Pedagogy on Student Learning Outcomes

Luisa Nappo-Dattoma, RDH, RD, EdD

**Problem Statement:** The paradigm shift in healthcare reform has altered healthcare delivery and subsequently the role of the dental hygienist. It is imperative for dental hygiene education to incorporate engaging student-centered pedagogy to promote the critical-thinking and problem-solving skills required for the profession of dental hygiene.

**Purpose:** The purpose of this study was to evaluate the effectiveness of blended learning (BL) pedagogy on successful learning outcomes of sophomore dental hygiene students as compared to the learning outcomes of traditional face-to-face (F2F) teaching and learning.

**Methods:** Forty-one dental hygiene students in an Associate Degree program were enrolled in an IRB approved redesigned blended learning nutrition course required within the dental hygiene curriculum. Successful student achievement was evaluated by comparison of percent distribution of student final course grades between the redesigned BL course and the F2F traditional course from the previous academic year. Student scores on unit exams, final exams, in-class audience response system (ARS) clicker assessments, and pre-class online quizzes and puzzles were examined for student learning outcomes. Student engagement was determined by evaluating interaction and attendance in all online pre-class activities. To monitor student perceptions toward the BL pedagogy a mid-semester course evaluation was utilized.

**Results:** Blended learning was as effective as face-to-face learning in achieving successful student learning outcomes as evidenced by no significant difference between percent dis-

tribution of final course grades of A through C. Mean scores of exams illustrated similar results as compared to the previous year's F2F scores. Mean scores of in-class clicker assessments and pre-class online quizzes and puzzles demonstrated successful student learning outcomes.

**Conclusions:** Value added benefits of blended learning include increased pre-class preparedness, better attendance, enhanced student engagement, and active peer teaching and learning.

Funding for this project was provided by Title III- Students First Grant.

### Factors Associated With Clinical Skill Remediation in Dental Hygiene Education Programs

Donna F. Wood, RDH, MS; Tanya V. Mitchell, RDH, MS; Lorie A. Holt, RDH, MS; Bonnie G. Branson, RDH, PhD

**Problem statement:** Evaluation of students in a clinical environment can be difficult for a variety of reasons, including faculty calibration, patient conditions and institutional guidelines. Early identification of skill deficits is critical in order for remediation to begin early in the educational process before deficiencies become complex.

**Purpose:** The purpose of this study was to examine the challenges related to formal clinical remediation in dental hygiene programs, which include timing of student identification, policy development and the issues of methodology and scheduling.

**Methods:** A 23 item investigator-designed survey was electronically distributed to 303 United States entry-level dental hygiene program directors. This questionnaire included 23 forced-choice questions with the options to add comments to eight of the questions. One hundred eleven surveys were returned yielding a response rate of 36%. Descriptive statistics and Chi-square analyses were utilized to analyze relationships between responses and the degree earned from the dental hygiene program.

**Results:** All schools reported having a remediation policy; however, 13.6% of the respondents revealed this information was not readily

available to students. The majority of respondents (67.8%) reported identifying students with clinical deficiencies in the pre-clinical semester, and 15.5% of respondents identified students in the second year, second clinical semester. Instrumentation technique was identified as the area in greatest need of remediation (81%), followed by critical thinking skills (12%). Coordination of faculty and student schedules to conduct remediation was identified as one of the greatest challenges by one-fourth of the respondents (25.2%).

**Conclusions:** These findings indicate that respondents are well aware of the need for remediation policies in dental hygiene programs. The point in time varies when students in need of remediation are identified. Therefore, further research needs to be conducted to determine the reasons for this difference.

### Current Issues of Community Dental Hygiene Practice Education in Korea

Nam-Hee Kim, RDH, MPH, PhD; Yang-Keum Han, RDH, MD; Young-Kyung Kim, RDH, MPH; Hyun-Ju Lim, RDH, MPH, PhD; Yang-Ok Kwon, RDH, MPH, PhD; Han-Mi Kim, RDH, BA; Yeun-Ju Kim, RDH, BA; Jeong-Ran Park, RDH, PhD

**Problem Statement:** It has been 50 years since dental hygiene education started in Korea. Today, many dental hygienists are working in the clinical field; but more students wish to enter in the community field. On this context, we explore the practical training practice and issues regarding it in the current education program for community dental hygiene in Korea. We consider it is important to share the information with the dental hygienists around the world.

**Purpose:** We aim to find out the current issues of community dental hygiene practice education in Korea.

**Methods:** Cross-sectional study directed toward the 82 dental hygiene education institutions across the nation was conducted to explore this topic. We requested the cooperation of a faculty member of community dental hygiene for each institution. The data were collected via online with Survey Monkey, a web survey development program. Among the recipients, those who rejected to answer and who answered do

not participate in practical training for community dental hygiene was excluded from the final analysis. 46 faculty members (response rate: 60%) from 79 institutions were included in the analysis. Statistical analysis includes the descriptive and frequency analysis using SPSS 20.0 program.

**Results:** The 60% of the dental hygiene education programs in Korea are currently conducting the community health center practical training, which is mainly operated during the junior or senior of the students. The main curriculum of the practical training allows students to experience government-leading dental hygiene projects, including fluoride and scaling. Through the community health center training, the students are able to experience their institution's dental hygiene field, meet members of the community to examine their oral health need and design the promotion plans for them. Since the curriculum mainly consists of exposure to the field and hands-on experience of the everyday practice of the field, the program is helpful in building up field experiences.

**Conclusions:** Showing actual practice and having students to have hands-on experience help students to accumulate the field experience. However, the program needs to be enhanced in terms of basic planning capability of the students, where they can capture the needs of the community, decide priorities, set goals, conduct the projects to achieve those goals and assess the results, all under the continuously changing needs of the community dental hygiene project.

Funding for this project was provided by the Korean Association of Dental Hygiene Professors.

### E-Model of Online Learning Communities

Ellen J. Rogo, RDH, PhD; Karen M. Portillo, RDH, MS

**Problem Statement:** The literature is limited on the phenomenon of learning communities in an online program.

**Purpose:** The intent of this inquiry was to explore graduate students' experiences with learning communities as they progressed through an online dental hygiene curriculum.

**Methods:** Approval was granted by the IRB (HSC #3618) before implementation of the qualitative case study. A cross-sectional approach was used to recruit participants. The interviewer was a recent graduate of the program and was responsible for completing informed consent procedures. A semi-structured interview was employed to gain deeper responses related to the phenomenon. Interviews were audio recorded, transcribed and then verified to assure accuracy. Data analysis was completed by a three step process involving open coding, focused coding and theoretical coding.

**Results:** Seventeen participants completed interviews. The data revealed that learning communities followed four stages throughout the graduate program (1) building a foundation for the learning community; (2) building a supportive network within the learning community; (3) investing in the community to enhance learning; and (4) disconnecting from the learning community. Three key elements were constructed from the analysis to create the e-model: experience with strengthening online relationships through fellowship, collective and synergy; metamorphosis through the affective domain from the awareness level to the highest level where values guide actions in the online learning community; and metamorphosis through the cognitive domain from the remembering level to the highest level of creating knowledge.

**Conclusions:** The interrelationship between the experience with strengthening online relationships, affective development and cognitive advancement are the essential factors needed for maximizing the potential of learning communities in an online program. Dental hygiene students and educators need to be mindful of these factors when participating in and designing an online curriculum.

Funding for this project through American Dental Hygienists' Association.

### Assessing The Cultural Competence/ Faculty Development Needs among Florida's Allied Dental Faculty

Linda S. Behar-Horenstein, PhD; Frank A. Catalanotto, DMD; Cyndi W. Garvan, PhD; Yu Su, MEd candidate; Xiaoying Feng

**Problem Statement:** The Council of Dental Accreditation (CODA) requires that prospective

dental health care providers become culturally competent, socially responsible practitioners. However little is known about the skills of the State of Florida allied dental faculty who train the state's workforce.

**Purpose:** The purpose of this study was to assess the cultural competence and faculty development needs among Florida's allied dental faculty.

**Methods:** Participants were asked to take the Knowledge, Efficacy and Practices Instrument (KEPI), (RR= 117/193 or 61%) and the faculty development assessment survey (RR = 115/204 or 74%). The KEPI, a validated measure, provides mean scores for three subscales: efficacy of assessment, knowledge of diversity, and culture-centered practice. The faculty development assessment measures knowledge of and priorities in teaching, scholarship, and career advancement. IRB approval was obtained from the University of Florida.

**Results:** Mean scores for KEPI subscales are 3.30 ( $\alpha=.88$ ), 3.58 ( $\alpha=.88$ ) and 2.85 ( $\alpha=.74$ ), (4 is highest) respectively. Participants indicated low knowledge and high priority needs in 18 of 25 faculty development assessment measures.

**Conclusions:** Professional schools are typically diligent in ensuring students' technical and procedural skills. However, rarely do they assess if faculty meet the needs of ever-changing, diversified student body. This problem is further exacerbated by a lack of training in pedagogy and assessment methods. Given the CODA mandates, it is crucial to assess faculty needs and priorities. Previous studies have shown that there is an inverse relationship between knowledge areas and priorities. Similar findings were observed in this study, though participants showed higher mean scores on the KEPI compared to the dental faculty. The findings suggest the faculty development assessment needs among allied dental and dental faculty are similar and that allied faculty seem inherently more culturally competent than dental faculty. Whether the latter result is due to training or socialization into the profession is unknown.

Funding for this study was provided by the Health Resources and Services Administration Award # 1 D86HP24477-01-00.

## The Impact of Clinicians' Interpersonal Skills: Differences between Dentally Anxious and Non-Anxious Patients

Laura J. Dempster, RDH, MSc, PhD

**Problem Statement:** The clinician/patient relationship has important implications for patient care. Evidence supports the importance of this relationship based primarily on clinicians' interpersonal skills, less on technical skills. Interest lies in the impact of this relationship for patients in general and dentally anxious patients in particular.

**Purpose:** To investigate patients' perceptions of clinicians' interpersonal skills related to communication, trust, control and ethical behavior.

**Methods:** Third year dental students randomly selected patients at the University of Toronto, Faculty of Dentistry to complete a paper questionnaire regarding their thoughts and feelings about dental treatment. Dental anxiety was assessed (Modified Dental Anxiety Scale (MDAS), Dental Fear and Avoidance Scale (DFAS)), plus patients' perceptions of clinician behavior based on the Revised Dental Belief Survey (R-DBS) scored 1 (never)- 5 (almost always). Data was confidential with all personal identifiers removed when reported. Ethics approval was received from the University of Toronto.

**Results:** 281 patients participated (60.2% female; mean age 55.3 years; range 14-86 years). Patients reported the following issues: communication (17.7%; mean(sd) 2.0 (0.6)); ethics (20.3%, mean(sd) 1.8(0.50)); trust (17.3%, mean(sd) 1.7 (0.6)); and lack of control (2.1%, mean(sd) 1.8 (0.6)) as occurring somewhat/often/nearly always. 39.1% of subjects (n=110) reported dental anxiety based on the MDAS (score >15) and DFAS (scoring >5 for fear and avoidance) with significantly higher ( $p<0.05$ ) mean(sd) scores and percentage of communication, trust, control and ethical issues for the majority of questions with the exception of 3 ethics related questions.

**Conclusions:** Clinicians' interpersonal skills appear important to patients in general, but more so for dental anxious patients. All patients reported concern that clinicians do not provide all the information needed to make good de-

cisions for treatment; are reluctant to correct unsatisfactory work; and do not take the time to talk to patients. This should be noted by clinicians as well as educators to ensure inclusion of curriculum related to interpersonal skills.

### **Guiding Dental Hygiene Students in Creating Employment E-Portfolios That Can Help Hygienists Find Jobs**

Sharon L. Mossman, RDH, EdD

**Problem Statement:** The assessment portfolio used in the entry-level degree dental hygiene curriculum at Delaware Tech Community College validates the effectiveness of the students' training but offers limited use for their employment search. This oral presentation identifies the need to develop student employment e-portfolios for use in job searches from the employers' perspective.

**Purpose:** The goal of this study was to assess the usefulness of student portfolios in the dental hygienists' employment search. In order to assist dental hygiene students with this endeavor, it is necessary to identify what types of resources students have available to them.

**Methods:** A qualitative research approach investigated how the current portfolio could be modified to meet employment search initiatives. The data collection used a combination of literature/document review, surveys with 20 senior dental hygiene students/7 dentists and face-to-face interviews with thirteen dentists. Interviews were audio-recorded; notes were transcribed and emailed to the participants for content approval. The interviews captured information about desirable content, navigation strategies and how the employment portfolio could be used in the hiring process. An inductive data analysis was used to identify coding frames. A systematic technique was designated to determine subdivisions in the transcripts that contain common themes. Two doctoral candidates provided a peer debriefing strategy to confirm accuracy of common themes identified in the analysis of the interview transcripts.

**Results:** The data analysis supports the use of electronic portfolios for the students' job search. Desired content was recommended based on the interview results. This included education/honors, professional experience, validation of licensure and references.

**Conclusions:** The development of a professional tool to assist students and employers in the hiring process aligns with the college's mission to prepare students for successful employment.

### **Theory Analysis of the Dental Hygiene Human Needs Model**

Laura L. MacDonald, DipDH, BScD(DH), MEd

**Problem Statement:** Over 20 years ago, dental hygiene scholars challenged the profession to identify dental hygiene concepts and theories purporting to be dental hygiene-knowing (epistemology) and dental hygiene-being (ontology). The Dental Hygiene Human Needs Model (DH HNCM) offered by Darby & Walsh (1995) informs curricula and practice of many dental hygiene programs; the model guides student knowing of the profession's way of being.

**Purpose:** The purpose of this scholarly activity was to conduct a theory analysis on the DH HNCM using the Walker and Avant Theory Analysis (2011) method. This methodology focuses on concepts, relations, and propositions of a profession's phenomenon of interest; it promotes scholarship and professional accountability to advancing professional theoretical underpinnings.

**Method:** A single scholar used the Walker and Avant seven step theory analysis to explore the DH HNCM: 1) origins; 2) concept(s) relationship(s); 3) logic of structure; 4) usefulness to practice; 5) generalizability; 6) parsimony; and 7) testability.

**Results:** The DH HNCM was deductively derived from a middle range nursing theory, the Yura and Walsh (1983) Human Needs and Nursing Process Theory. It was constructed based on the four dental hygiene concepts (client, health/oral health, environment, and actions). Respecting humans have needs and dental hygienists are positioned to facilitate the client in satisfying these needs, the DH HNCM provides logic, ease and generalizability independent of practice setting. It is parsimonious and testable, though it remains theoretical in nature at this time.

**Conclusion:** Conceptual models, schematics of a theory, depict relationships between concepts and constructs of the theory. The Darby and Walsh DH HNCM is a depiction of a middle

range dental hygiene human needs theory. The Walker and Avant Theory Analysis of the DH HNCM affirmed the model is reasonable and insightful, adding greatly to the epistemology and ontology of the dental hygiene profession.

### Dental Hygiene Student Practicum Experiences In A Hospital-Based Dental Clinic

Minn N. Yoon, PhD and Sharon M. Compton, RDH, PhD. University of Alberta, Canada

**Problem Statement:** To prepare dental hygiene students to serve the dental needs of medically complex populations, it is crucial students have experiences to develop familiarity and comfort with a variety of practice settings such as hospital-based clinics, and develop confidence in their skills to treat such populations.

**Purpose:** The aim of this study was to gain an understanding of the dental hygiene student perspective of experiences in an external practicum at a hospital-based dental clinic.

**Methods:** This study was approved by the University of Alberta Human Research Ethics Board. Reflective journals submitted by senior dental hygiene students were subjected to content analysis to identify major themes. Questionnaires were presented using an online tool, which asked students to self-report their level of comfort and confidence in domains of practice readiness on a 4-point Likert scale.

**Results:** The presentation will overview the practicum and findings from the reflections in which students expressed initial fear of the experience, an enhanced understanding of current disparities in oral health and oral care for vulnerable and medically complex clients; a working through of physical and emotional reactions to the experience; and an appreciation for the learning they have obtained. An overview of the previously validated Readiness for Practice Survey will be provided as well as how it was adapted to address the dental hygiene student population. The domains of practice readiness: comfort and confidence with both clinical and relational skill performance and the development of professional identity of the dental hygiene students will be outlined.

**Conclusion:** Providing a clinical learning en-

vironment that exposes students to more medically complex and vulnerable populations can impact the level of comfort and confidence of dental hygiene students' capacity to treat such clients and enhance their understanding of complexities involved in treatment.

Funding for this project was provided in kind by the University of Alberta.

## Basic Science

### Identification and Characterization of Novel Human Papillomaviruses in Oral Cancers

Juliet Dang PhDc, MS, RDH; Nancy B. Kiviat, MD; Qinghua Feng, PhD; Stephen Hawes, PhD; Greg Bruce, PhD

**Problem Statement:** To identify novel human papillomaviruses (HPVs) using high throughput sequencing technology in oral lavage samples (OLS) collected from oral squamous cell carcinoma (OSCC) and oropharyngeal squamous cell carcinoma (OPSCC) patients.

**Purpose:** In our previous study, we identified and cloned 3 full-length novel HPVs in OLS collected from healthy individuals. We hypothesize that novel oncogenic HPVs can be detected in OLS collected from OSCC/OPSCC patients.

**Methods:** We collected OLS from 110 healthy subjects and 100 from OSCC/OPSCC patients. HPV 16 and 18 were detected using type-specific real-time PCR Taqman assays. Multiply-primed rolling circular amplification (MP-RCA) was performed on 49 OSCC/OPSCC samples to preferentially amplify circular HPV genomes. Four pooled samples were selected to undergo Next Generation Sequencing (NGS) using the HiSeq 2500 platform, and sequence data was analyzed using VELVET and BLASTN search.

**Results:** Only one control sample (1/110) was positive for HPV 18 and none were positive for HPV 16. Twenty-three OSCC/OPSCC samples (23/100) were positive for HPV 16 (p-value <0.001), and none were positive for HPV 18. We identified five potentially novel HPV types in OSCC/OPSCC samples using NGS.

**Conclusions:** HPVs can be detected in OLS, which could be used for oral cancer detection in

the future. Novel HPV types are identifiable in OSCC/OPSCC samples using NGS after MP-RCA enrichment. Future studies are needed to determine whether the novel HPV types we identified are oncogenic.

Funding for this project was provided by the ITHS TL1 Training Program and the University of Washington Royalty Research Fund.

## Access to Care

### Effects of Power Toothbrushing on Caregiver Compliance and Oral and Systemic Inflammation in a Nursing Home Population

Salme E. Lavigne, RDH, MSDH, PhD(c); Malcolm B. Doupe, PhD; Anthony M. Iacopino, DMD, PhD; Salah Mahmud, MD, PhD; Lawrence Elliott, MD, MSc

**Problem Statement:** Oral care in nursing homes is deplorable and caregiver compliance problematic. Power brushes may improve oral hygiene and caregiver compliance.

**Purpose:** The purpose of this study was to investigate whether twice-daily use of a rotating-oscillating power toothbrush (Oral-B Professional Care 1000™) with nursing home residents will improve caregiver compliance with oral care and reduce oral and systemic inflammation.

**Methods:** In this repeated measures single-blinded randomized controlled trial, after receiving IRB approval from the University of Manitoba, 59 residents of a nursing home in Winnipeg, Canada, were randomized to receive either twice daily brushing with a power toothbrush or standard care. Consent was obtained from either residents or their proxies. Participants had some natural teeth; oral inflammation; non-aggressive behaviour; no communicable diseases; non-smokers and non-comatose. Baseline and 6 weeks outcome measures included: oral inflammation (Lobene); bleeding (Loesche); plaque (Turesky); systemic inflammation (hsCRP); caregiver compliance (daily care chart); and an 11-item caregiver survey. Oral & systemic data were measured by ANOVA and Wilcoxin and Mann-Whitney tests; compliance and survey data using descriptive statistics.

**Results:** No significant differences were found between groups in oral or systemic outcomes;

both groups significantly improved oral parameters ( $p < 0.0001$ ). Caregiver compliance was 41% with no difference between groups. Caregivers preferred (69%) the power brush and 78% found it easier to use.

**Conclusions:** Power toothbrushes may be preferred options for use in nursing homes but caregiver compliance remains an issue.

Funding was provided by the Canadian Foundation for Dental Hygiene Research and Education; power toothbrushes were provided by P&G.

### Transforming the Culture of Oral Care in Long-Term Care

Mary F. Bertone, RDH, BScDH

**Purpose:** Older adults residing in long-term care are at high risk for compromised oral health due to frailty and dependence on others for oral care.

**Significance:** Several studies have cited significant barriers to the provision of oral care for older adults including: lack of knowledge among nursing staff, competing care needs taking greater priority, limited oral care supplies and limited access to oral care services (BC Seniors' Oral Health Secretariat, 2011; Samson, Berven & Strand, 2009).

**Approach:** This presentation shares preliminary findings on a pilot study of a new model of care that includes a dental hygienist on the interprofessional care team in a 175 bed long-term care home. This conceptual model is based on oral health promotion strategies built on the pillars of standards, commitment, education and training, assessment and professional care, and daily mouth care. These pillars are supported by the principal actions of assessing strengths and challenges, collaboration, engaging personnel effectively and applying best practices. The outcomes of a dental hygienist providing oral health education, training and mentorship on staff knowledge will be discussed. The pilot, currently in progress, is testing a "new" oral health assessment tool and daily care plan. The role of the dental hygienist in improving access to dental treatment will be assessed.

**Evaluation:** Baseline data, oral health as-

assessment tools and nursing education and mentorship strategies will be shared. This innovative and collaborative strategy brings together nursing and dental professionals to advance care approaches and improve the oral care of older adults in long-term care.

Funding for this project was provided by Rivera Retirement Living.

### Oral Cancer Awareness among Community-Dwelling Senior Citizens in Illinois

Ewa Posorski, RDH, MS; Linda Boyd, RDH, RD, EdD; Lori J. Giblin, RDH, MS; Lisa Welch, RDH, BS, MSDH

**Problem Statement:** Low oral cancer (OC) survival rates are disproportionally over represented in the low SES population. While the socioeconomically disadvantaged individuals are at highest risk for OC, they are also typically the population without access to preventive and screening care.

**Purpose:** The study assessed participant awareness of oral cancer, risk factors, signs and symptoms, and history of an OC screening exam and whether a relationship exists between these factors and the participant's age, level of education, SES, ethnicity, and gender.

**Methods:** The study was granted a Certificate of Exemption by the MCPHS University Institutional Review Board. It was a descriptive survey research with a non-randomized sample. Participants were a convenience sample of seniors participating in a congregate dining program. Data was collected through a written, self-administered survey. The survey was validated by Dodd et al., the original authors.

**Results:** Ninety-three individuals were approached to participate, and 62 surveys were completed. Statistical tests included; frequency distribution, mean, standard deviation, t test, and Spearman rank Correlation. A statistically significant relationship was found between the level of education and awareness of OC risk factors ( $r=0.26$ ;  $p=0.04$ ). An inverse relationship was found between the level of education and the level of OC awareness questions, "have you ever heard about OC?" ( $r=-0.37$ ;  $p=0.004$ ), and "how much do you know about OC?" ( $r=0.35$ ;  $p=0.008$ ). A trend toward signif-

icance was noted for the level of education and awareness of OC signs and symptoms ( $r=0.24$ ;  $p=0.06$ ).

**Conclusion:** The levels of OC awareness in the surveyed seniors were low. Additional research is needed to determine how to best communicate OC awareness, and design and implement programs specifically for this high-risk group.

### The Integration of Dental Hygienists as Part of the Primary Healthcare Team: A Strategic Analysis of the Barriers to Direct Dental Service Delivery by Federally Qualified Healthcare Facilities

Trisha M. Johnson, RDH, MHA

**Problem Statement:** The gross necessity for oral healthcare providers and the general lack of dental programming in underserved areas is not being fulfilled due to current workforce policy in Indiana.

**Purpose:** This study identifies the barriers to dental health access and suggests opportunities to expand access to care. It explores the feasibility of dental hygienists working collaboratively in a primary care setting.

**Methods:** This qualitative, aggregate interview process focuses on three of Indiana's nineteen Federally Qualified Health Centers. Key informant interviews were conducted with the Chief Executive Officer of each health center, and the results were developed into a SWOT analysis based on the predominant themes from each facility, and their access to care.

**Results:** Dental professionals in the primary care setting are necessary and desired. If practice act changes are implemented, all of these facilities would be willing to implement a dental hygienist into the primary care setting to achieve more comprehensive care for their patients. Within a Federally Qualified Health Center, a model based on these results would satisfy the necessity for dental concerns to be addressed and managed more appropriately.

**Conclusions:** This study will aid in a dental program to be designed for Federally Qualified Health Centers to implement a dental hygienist into a primary care setting and for other outlets, such as local dental students, to receive rotation-like experiences in these medically underserved areas.

This study has provided the qualitative data that will be needed to assist in implementing a model for hospital systems, long-term care facilities, and any health care setting.

### Oral Health Knowledge of Eating Disorder Treatment Providers

Lisa Bennett Johnson, RDH, MSDH; Linda D. Boyd, RDH, RD, EdD; Lori Rainchuso, RDH, MS

**Problem Statement:** Individuals with eating disorders require significant preventive and/or restorative dental treatment as a result of this disorder, and many lack access to appropriate oral care during treatment.

**Purpose:** The aim of this study was to assess oral health knowledge among professionals who specialize in treating eating disorders, and identify to what extent their education and training addresses oral health care delivery and recommendations for individuals with eating disorders.

**Methods:** A research instrument was developed by comparing question agreement between six experts; a question with item agreement average of 0.80 was deemed valid and included in the survey, and then piloted by an unrelated group of experts (n=6). A descriptive, exploratory survey of licensed behavioral and medical health providers assessed level of oral health related education, knowledge, and treatment recommendations. An invitation to participate in a web-based survey was sent via electronic newsletters and/or list-servs to three professional eating disorder organizations. An inability to track the use of electronic media within the study time frame precluded an exact number for the study population; however the proportion of respondents directly corresponds to the framework of the eating disorder treatment team.

**Results:** Of the 107 respondents who completed surveys, a majority (64.4%) reported dissatisfaction with their level of oral health education, and 19.5% reported no oral health education. Respondents consider their knowledge of clients risk for oral disease as average or above (84%), and ranked tooth erosion as the greatest reason for oral care (63%) while dry mouth led in the rankings for least significant (33%). Referral for oral care was found to be more common after reports of complication (55%).

**Conclusions:** Eating disorder professionals may lack understanding of associated oral risk factors and current oral guidelines. Oral care providers should be considered for inclusion within the eating disorder treatment team.

### A Comparison of Dental Hygienists' and Dentists' Clinical and Telehealth Screening for Dental Caries in Urban Children

Susan J. Daniel, RDH, PhD

**Problem Statement:** Telehealth has been identified as an effective and efficient means of increasing access to care for screening, referral, and treatment. Use of telehealth in some states is restricted and dentists must provide a clinical examination prior to the delivery of oral care services. There is no comparison of dentists' and dental hygienists' clinical and telehealth screening for caries and restorations in the literature.

**Purpose:** The purpose of this study was to determine whether or not there was a difference in dental hygienists' and dentists' screening for dental caries with either clinical or telehealth methods.

**Methods:** A convenience sample of 82 children 4–7 years of age was selected for the study. The clinical dentist's screenings were required for an urban mobile preventive program. Two clinical examiners, dental hygienist and dentist, and two telehealth examiners, dental hygienist and dentist, screened for dental caries and existing restorations. Each professional's findings were recorded on separate charts. Photographs of each child's teeth were obtained using the iPhone 4S, images were stored in an album by participant number, uploaded to the Cloud® for retrieval, checked for quality and uploaded to a course in Blackboard® accessible by the two telehealth examiners. The telehealth examiners reviewed photographs for caries and restorations, and charted findings. Caries and restorations on the four charts for each child were converted to decayed filled surfaces (DFS) scores used to compare the professionals' screening.

**Results:** Seventy-eight children met inclusion criteria. Spearman's correlation between the clinical screening of the dental hygienist and dentist was 0.99;  $p=0.001$ . Spearman's correlations in other group relationships with the clinical

dentist were 0.75;  $p=0.001$  (telehealth dentist) and 0.81;  $p=0.001$  (telehealth dental hygienist). No significant difference was found between the telehealth dental hygienist and the clinical dentist ( $p>0.10$ ) using the Wilcoxon Signed Ranks.

**Conclusions:** Dental hygienists' telehealth or clinical screening for dental caries is not significantly different from screening performed by a clinical dentist.

## Clinical Dental Hygiene Practice

### Exploring Dental Hygiene Clinical Decision Making: A Mixed Methods Study of Potential Organizational Explanations

Joanna Asadoorian, RDH, PhD; Evelyn L. Forget, PhD; Mahmoud Torabi, PhD; Lesley F. Degner, RN, PhD, FCAHS; Joan Grace, PhD

**Problem Statement:** Dental hygienists are targeted for practice expansion to improve public access to oral health care, but they have not established their decision making capacity within alternative practice models.

**Purpose:** This mixed methods study aimed to identify and test the impact of influential factors in dental hygiene decision making capacity.

**Methods:** An ethically approved, mixed methods two-phased study was conducted. PHASE I: A series of focus groups were conducted with a purposive sample of dental hygienists in Manitoba. Using a semi-structured interview guide, data was collected until reaching saturation. Data underwent coding and thematic analysis and a qualitative decision making model, including key predictor variables and outcome variable (decision making capacity), was developed to guide Phase II. PHASE II: Aspects of the qualitative model were tested via an electronic survey questionnaire of a census of Manitoban dental hygienists and through key informant interviews. Statistical and qualitative thematic analyses were conducted respectively and findings merged for interpretation.

**Results:** Focus group data yielded 75 codes and 6 themes plus 1 theme from the literature comprising the model and guiding the survey. The Phase II survey was completed by 161 dental hygienists (38%). Moderate to weak correlations

were demonstrated between predictor variables and outcome measure. Rather, the final statistical model demonstrated individual characteristics and graduating from a 3-year program together significantly predicted decision making capacity. Thematic analysis of key informant data revealed 8 broad environmental influences on decision making capacity. When data were merged, individual characteristics were shown to be a product of broad environmental factors and educational preparation had a particularly strong influence.

**Conclusions:** Individual characteristics and education are predictive of decision making capacity but are outcomes of broad structural influences. Modifications to these structures are recommended to support dental hygiene decision making capacity within expanded practice scopes and/or settings.

### Efficacy of Novel Brush on Paste "MI Paste Plus One Step"

Annette Scheive, RDH, MS; Linda Bellisario, RDH, BS; Gina Durkin; Sayako Hotta, DH, PhC; Takuya Sato; Yoko Ishihara; Tomohiro Kumagai

**Problem Statement:** CPP-ACP (RECALDE-NT™) known for its anti-caries and anti-sensitivity effect, contains high level of bioavailable ions. To improve patient compliance with this material, we developed CPP-ACP topical cream with "One-Step" brush on concept.

**Purpose:** Purpose of this study was to measure content of bioavailable ion and to evaluate efficacy of this new product against tooth sensitivity.

**Methods:** Three materials examined in this study were MI Paste Plus One Step (MOS, GC Corp.), MI Paste Plus (MIP, GC Corp.) and Clinpro tooth cr me (CTC, 3M ESPE). Slurry (10 wt %) was prepared and centrifuged at 12,000g for 15 min. Supernatant (water soluble) was collected for analysis. Levels of calcium and phosphate ion were determined by atomic absorption spectrometer (Z-2300, HITACHI High-Technologies) and molybdenum acid colorimetric method respectively. Level of fluoride ion was measured by ion meter (pH / ION METER F-23, HORIBA). Block specimens ( $n=4$ ) for evaluation of the effect against dentin sensitivity were made of bovine maxillary incisor root dentin. Blocks were

embedded in resin and polished with SIC paper. Each Paste was applied to test samples and immersed in water for 30 min with gentle shaking. Then, test samples were observed with SEM (SU-70 FE-SEM, HITACHI High technology). The levels of dentin blockade were measured using image analysis software (ImageJ). Data were statistically analyzed with ANOVA and Turkey test ( $p < 0.05$ ).

**Results:** Mean values of each bioavailable ion level of MOS and MIP were not statistically different. Bioavailable calcium and phosphate was not detected from CTC containing TCP. Level of dentin blockage of MOS (63% ; SD 8.4) was same as MIP (49% ; SD 8.3) and significantly higher than CTC (3% ; SD 2.1).

**Conclusions:** MOS has high level of bioavailable ion. Effect against dentin sensitivity of MOS is expected to be better than CTC.

Funding for project through GCC.

### **An In Vitro Comparison of the Effects of Various Airpolishing Powders on Enamel and Selected Esthetic Restorative Materials**

Caren M. Barnes, RDH, MS; David A. Covey, DDS, MS; Hidehiko Watanabe, DDS, MS

**Problem Statement:** Specially processed sodium bicarbonate was the only airpolishing powder available until 2004, when aluminum trihydroxide was introduced for sodium intolerant patients. Since 2004, four airpolishing powders have been introduced: glycine, a second type of sodium bicarbonate powder, calcium carbonate, and calcium sodium phosphosilicate.

**Purpose:** The purpose of this study was to compare the effects of each airpolishing powder on the surface characterization of enamel (E), composite resin (CR) and glass ionomer (GI).

**Methods:** Six airpolishing powders, sodium bicarbonate A and B, aluminum trihydroxide, calcium carbonate, glycine and calcium sodium phosphosilicate were investigated on surfaces of E, CR and GI samples. Samples were uniformly polished using 1200 grit abrasive paper. Each type of airpolishing powder was applied with the same airpolishing unit. Each type of powder was used for 1, 2 and 5 seconds on 5 samples each of E, CR and GI samples, for a total of 225 samples. Custom equipment was fabricated to hold each

sample 4 mm from the airpolishing nozzle and airpolishing was applied using a constant circular motion. Each sample was analyzed with a profilometer, gloss meter and scanning electron microscope.

**Results:** A three-way ANOVA model was used to determine differences in outcome based on type of powder, material, and time. The model included interaction terms for powder type and material and powder type and time. Based on the ANOVA model, there were statistically significant interactions between type of powder and material for difference in gloss, roughness. There was a statistically significant difference between roughness and gloss at 5 seconds of treatment.

**Conclusions:** Overall analysis of roughness revealed order of abrasiveness of airpolishing powders to be (least to most abrasive): glycine sodium bicarbonate B, sodium bicarbonate A, calcium carbonate, aluminum trihydroxide and calcium sodium phosphosilicate.

Funding for this project is through EMS.

### **Utilization of an American Diabetes Association Adopted Diabetes Risk Survey to Identify Patients at Increased Risk for Type 2 Diabetes Mellitus in Asymptomatic Patients**

Lori J. Giblin, RDH, MS; Lori Rainchuso, RDH, MS

**Problem Statement:** National data indicates the incidence and prevalence of Type 2 Diabetes Mellitus (T2DM) is on the rise. T2DM is a preventable disease with early diagnosis.

**Purpose:** To implement an American Diabetes Association (ADA) adopted diabetes risk survey to assess patients at increased risk for T2DM and rate of compliance for A1c screening in a dental setting. This descriptive cross-sectional study contributed to the feasibility of implementing a diabetes risk survey and rate of compliance for A1c screenings in dental settings.

**Methods:** The Institutional Review Board of MCPHS University ensured the protection of the subjects engaged in this study. Participants consisted of a purposive sample of Forsyth School of Dental Hygiene patients, 18 years or older not diagnosed with prediabetes or diabetes. The ADA diabetes risk survey determined patients at in-

creased risk for developing T2DM were offered an opportunity for a point of care A1c screening.

**Results:** To date: 160 of 422 solicited patients agreed (compliance rate 38%, 95%CI: 33% - 43%). As per the ADA survey 77 patients were at increased risk for T2DM for an at-risk prevalence of 48% (95%CI: 40% - 56%). The 77 at-risk patients were asked if they would take an A1c test of which 45 agreed (compliance rate 58%, 95%CI: 47% - 70%). Results of administered A1c tests are in the process of being aggregated.

**Conclusions:** Implementation of the ADA diabetes risk survey determined a 38% rate of compliance and 58% of patients at increased risk agreed to an A1c screening.

Funding for this project through a MCPHS University faculty development grant.

### Capability of a Dental Hygienist to Perform a Clinical Oral Diagnosis in Various Settings: A Multi-Level Analysis

Kelly T. Williams, RDH, MSDH, CDA; Joyce M. Flores, RDH, MSDH

**Objective:** The purpose of the systematic review was to identify the capability of a dental hygienist to perform a technically competent clinical oral diagnosis in various settings.

**Search Strategy/Selection Criteria:** Electronic databases were searched to identify relevant articles. Searches were limited to the English language and publication date from the earliest available date for each database to March 31, 2014. Literature searches were conducted using APA, Alexander Street, EBSCO, Elsevier, FirstSearch, Gale, ISI, JSTOR, Oxford, OVID, ProQuest, PubMed/ Medline, Thomson Reuters, and VIVA databases. The search strategies included subject headings and subheadings, combined with keyword searching. Search focus included such words as dental hygiene diagnosis, dental diagnosis, oral diagnosis, and dental therapist diagnosis. The study identified 1,576 unique articles with 43 meeting the inclusion criteria. Inclusion criteria were quantitative studies that compared technical competency between groups of dental hygienists and/or dental therapists and dentists and/or dental specialists. Capability in this study is defined as the process utilized to achieve a technically competent

outcome utilizing critical thinking and evidence based decision-making.

**Data Collection and Analysis:** A meta-analysis was used to calculate the results of each study, and calculate an average of those results. We performed meta-analysis for overall associations by head and neck assessment, intraoral soft and hard tissue assessment, radiographic, and clinical settings. This meta-regression will be used to determine the homogeneity between the studies.

**Main Results:** Results will reflect the degrees of complexity and variability among the studies.

**Conclusions:** The dental hygienist appears to be as effective as a dentist in their capability to perform a technically competent clinical oral diagnosis in various settings.

### Soft-Rubber-Interdental-Cleaner Compared To an Interdental Brush on Plaque/Gingivitis/Gingival Abrasion

D.E. Slot, RDH, MSc; D. Ekkelboom, RDH, BoH; E. Van Der Sluijs, RDH, BoH; S.C. Supranoto, RDH, BoH; G.A. Van Der Weijden, PhD

**Problem Statement:** Different interdental devices are available for dental professionals to recommend; however, it is not clear as to which is more effective or acceptable to patients.

**Purpose:** To determine the effectiveness of a rubber bristled interdental cleaner (RIBC) as compared to an interdental brush (IDB) on gingivitis, plaque and gingival abrasion scores, and to evaluate participants' attitudes towards these two devices.

**Methods:** After IRB approval, an examiner-blind, randomized split-mouth design was used. After a dental prophylaxis, 42 subjects refrained from brushing their mandibular teeth for 21 days to allow for the development of gingivitis. During a subsequent 4-week treatment phase, participants resumed twice daily toothbrushing. Contralateral quadrants were assigned to the use of either the RIBC or the IDB. Plaque, gingivitis and gingival abrasion were assessed at baseline (Day 0), after 21 days of no oral hygiene, and after 1, 2 and 4 weeks of once daily product use.

**Results:** After experimentally-induced gingivitis (EIG), use of both interdental devices (N=42) resulted in a significant decrease in bleeding and plaque scores. Mean plaque scores at day 21 reduced from 3.29 to 2.49 for the IDB, and from 3.32 to 2.44 for the RIBC. Mean bleeding scores changed from 1.06 to 0.52 for the IDB, and from 1.09 to 0.45 for the RIBC. At the end of the treatment period, there was no significant difference between the two interdental cleaning devices. For the intermediate assessments at 2-weeks, a significant difference in favor of the RIBC was observed for gingivitis ( $p < 0.05$ ). The mean gingival abrasion score at the end of treatment was 0.26 for the IDB and 0.22 for the RIBC. Out of the 42 participants, 27 preferred the RIBC over the IDB.

**Conclusions:** When used in combination with toothbrushing, there were no statistically significant differences between the 2 interdental devices in reducing plaque and gingival inflammation. Less gingival abrasion occurs with the RIBC, and participants preferred using this device.

Study products were provided by SUNSTAR, Japan/Switzerland, and funding support was provided by ACTA Dental Research BV.

### Effect of Chemotherapeutic Agents and Mechanical Tongue Cleaning on Morning Bad Breath

Eveline Van Der Sluijs, RDH, BoH; Dagmar E. Slot, RDH, MSc; Sam C. Supranoto, RDH, BoH; Fridus A. Van Der Weijden, PhD

**Problem Statement:** The specific anti-halitosis mouthwash containing amine fluoride, stannous fluoride, 0.2% zinc lactate and oral malodour counteractives has not been evaluated in combination with tongue cleaning and tooth brushing using a dentifrice formulated with similar ingredients as the mouthwash.

**Purpose:** To assess the effect of a regimen using this specific mouthwash and a dentifrice with chemotherapeutic agents, and a tongue cleaner on Morning Bad Breath (MBB) in periodontally healthy subjects.

**Methods:** In total, 66 non-dental University students participated in a 3-week parallel single-blind, randomized, controlled clinical trial. After

selection, the subjects were provided with a toothbrush and randomly assigned to the test ( $n=32$ ) or the control regimen ( $n=34$ ). Those in the test group used the tooth/tongue gel, mouthrinse, and a tongue cleaner, whereas those in the control group used only fluoride toothpaste. Written lifestyle instructions regarding food intake and personal use of cosmetics were provided regarding use prior to the breath analyses being performed. Clinical measurements were taken between 7:30 am and 12:00 pm, at baseline, overnight (day 1), day 7 and day 21. The primary outcome was the mean of duplicate Organoleptic scores (ORG) by trained examiner. The secondary outcome was Volatile Sulphur Compounds (VSC) measurements assessed using Oral Chroma (H<sub>2</sub>S, CH<sub>3</sub>SH and (CH<sub>3</sub>)<sub>2</sub>S) and Halimeter (HM) readings.

**Results:** At baseline, according to ORG, H<sub>2</sub>S and HM, there was no statistical significant difference between the regimens. At day 1, a statistical difference ( $p < 0.05$ ) was obtained in favor of the test treatment regimen for ORG, H<sub>2</sub>S and HM measurements. On day 7, this effect according to H<sub>2</sub>S and HM was still maintained. At day 21, only the HM readings showed a statistical difference ( $p < 0.05$ ) in favor of the test regimen.

**Conclusions:** MBB was significantly reduced overnight with the test treatment regimen for several parameters. At day 21, the prolonged effect on VSCs of the test treatment was only detectible with the HM readings.

The study was performed with a grant from the ACTA Dental Research BV. GABA, Switzerland initiated the study project and provided study products. ACTA Research BV received financial support for their commitment to appoint this study to the ACTA Department of Periodontology.

### Oral and/or Peri-Oral Piercings Are Not Without Risks!

Nienke L. Hennequin-Hoenderdos, RDH, BoH, CRC; Dagmar E. Slot, RDH, MSc; Fridus A. Van Der Weijden, PhD

**Objective:** Oral complications of oral and/or perioral piercings have been documented, although knowledge of the prevalence of piercings and related complications is lacking. To date, the estimated effect size of this phenomenon is not known.

## Occupational Health

### The Effect of Stainless Steel vs. Silicone Dental Instrument Handles on Hand Strength and Comfort

Melanie J Hayes, BOH, BHSc(Hons), PhD

**Search Strategy/Selection Criteria:** To systemically search the literature to determine the prevalence of oral and perioral piercings in young adults; the incidence of complications associated with lip and/or tongue piercings; and, to provide an overview of case reports describing adverse effects.

**Data Collection and Analysis:** This systematic review was performed in accordance with PRISMA guidelines. The MEDLINE-PubMed, Cochrane-CENTRAL and EMBASE databases were comprehensively searched to identify appropriate studies (case reports, case series, case controls and cohort studies). Independent screening by 2 reviewers of 1500 unique titles and abstracts resulted in 13 publications that provided information concerning prevalence; another 13 publications evaluated incidence of complications; and 67 case reports described complications concerning hard and/or soft tissues of the oral cavity and/or effects concerning general health. Data extraction regarding the three different purposes was performed by 2 reviewers. Data was summarized in a meta-analysis, and quality of the selected studies was graded.

**Main Results:** The mean prevalence of oral and/or peri-oral piercings was 5.2%. Tongue piercing (5.6%) was most common, followed by lip piercing (1.5%). Gingival recession was the most frequently described complication. The incidence of gingival recession was 50% of subjects with lip piercings and 44% of subjects with tongue piercing. Tooth fracture was reported in 37% of subjects with tongue piercing. Oral and/or perioral piercings were observed in a relatively small percentage (5.2%) of young adults. Both lip and tongue piercings were frequently associated with risk of gingival recession and tooth injuries. Among the case reports, there were minor complications, but also more severe complications that were potentially life-threatening.

**Conclusions:** Oral and/or perioral piercings are not without risks. Dental care professionals are in an ideal position to offer information regarding safe piercings and to provide advice regarding oral hygiene, aftercare and possible complications.

This project was self-funded by the authors and their institutions and supported by a seed grant from the Dutch organization that promotes oral and dental health (Ivory Cross).

**Problem Statement:** Many dental hygienists experience musculoskeletal pain during the course of their careers, often as a result of the sustained grips and repetitive movements employed throughout the work day. Current research suggests that lighter instruments with a larger diameter reduce force and load on the hand during scaling tasks; therefore, the texture and weight of silicone handles is designed to decrease the strain placed on the hand and fingers.

**Purpose:** The purpose of the research is to investigate the effect of silicone instrument handles vs traditional stainless steel instrument handles on hand comfort and strength; it is hypothesized that the silicone handle design will be more comfortable to use, and have less impact on hand strength measures than traditional stainless steel instrument handles.

**Methods:** IRB approval has been obtained from the University of Newcastle (Approval no H-2014-0024). Using a crossover study design, a convenience sample of dental hygiene students ( $n=23$ ) participated in two simulated scaling sessions for 30 minutes, one week apart. During the first session, students were required to use traditional stainless steel instruments (10 mm diameter and 21-26 g weight), while during the second session students used instruments with silicone handles. Following each session students were required to complete a Hand Health Profile and undertake hand strength tests.

**Results:** Paired t-tests will be used to analyze the data as the same subjects will be tested in this cross-over design. The analysis will look for significant differences ( $p<0.05$ ) between the survey and hand strength measures after each session.

**Conclusions:** The study has the potential to broaden the current knowledge base on ergonomic instrument design and prompt the further investigation on the design of periodontal instruments. Future studies should consider random assignment to the intervention being tested to limit potential confounders.

## Technology

### Teledentistry-Assisted Affiliated Practice Dental Hygiene

Fred F. Summerfelt, RDH, AP, MEd

**Purpose:** The 2010 Patient Protection and Affordable Care Act (PPACA) calls for midlevel dental healthcare providers to work in underserved areas with underserved populations. In 2004, Arizona passed legislation allowing qualified dental hygienists to enter into an affiliated practice relationship with a dentist to provide oral healthcare services for underserved populations without general or direct supervision in public health settings. The Northern Arizona University (NAU) Dental Hygiene Department developed a teledentistry-assisted affiliated practice dental hygiene model that places a dental hygienist in the role of the midlevel practitioner as part of a digitally-linked oral healthcare team.

**Significance:** Utilizing current technologies, affiliated practice dental hygienists can digitally acquire and transmit diagnostic data to a distant dentist for triage, diagnosis, and patient referral while providing preventive services permitted within the dental hygiene scope of practice.

**Approach:** NAU has pioneered an innovative teledentistry-assisted affiliated practice dental hygiene model to answer the call of the PPACA to provide comprehensive preventive oral healthcare and diagnostic services for the growing population of underserved in both urban and remote areas. NAU's initial training endeavors show that teaching the data acquisition technologies to dental hygiene students and dental hygienists has been easily and successfully accomplished. With only six-hours of training, dental hygiene students and dental hygienists have demonstrated their ability to set up and manage remote patient-service facilities. While providing preventive oral healthcare services within the scope of affiliated practice, dental hygiene students and dental hygienists have acquired and forwarded diagnostically efficacious digital data from remote locations using both store-and-forward and cloud-based technologies.

**Evaluation:** NAU's teledentistry-assisted affiliated practice dental hygiene model has

proven qualitatively to serve the patient, the teledentistry-assisted affiliated practice dental hygienist, and the affiliated practice dentist. Wilcoxon Signed Rank Tests demonstrate hygienists' abilities to obtain diagnostically efficacious digital data from remote locations.

### Plasmadent: Advances in Plasma Medicine Provides Promise for Applications in Dentistry

Gayle B. McCombs, RDH, MS

**Problem Statement:** The need for developing new therapies to meet the challenges of dentistry opens the door to utilizing plasma as a medium to inactivate bacteria, enhance adhesion and whiten teeth.

**Purpose:** Plasma is one of the universal four states of matter, the others being solid, liquid, and gas. In nature, the sun is a superheated ball of plasma; however, in the laboratory, low temperature bio-compatible plasmas can be generated. Plasma is an ionized gas that has been charged/energized to excite particles such as electrons and ions, and produce reactive oxygen species (ROS). Plasma-cell interactions are complex, but studies show that ROS exhibit strong oxidative properties that bacteria were found unable to survive. PlasmaDent, the utilization of plasma in dentistry, represents a major paradigm shift from mechanical and chemical treatments, to device-based molecular therapies. Low temperature atmospheric pressure plasma (LTAPP) is under investigation as a medium to inactivate pathogenic microorganisms associated with biofilms, dental caries, periodontal diseases and root canal infections. Other applications are in development to enhance tooth whitening, adhesion, and surface modification.

**Methods:** An electronic search was conducted in PubMed, Medline and Google scholar. Key search words included: cold plasma, dentistry, and low temperature atmospheric pressure plasma. Literature revealed numerous studies related to LTAPP utilization in dentistry.

**Results:** Increased interest in plasma has brought about considerable research in the field. Studies have shown that various pathogenic microorganisms can be effectively reduced or rendered nonculturable after exposure to LTAPP. Literature obtained revealed some contradictions

and/or inconsistencies among studies; however, these may be due in part to the characteristics of individual microorganisms and configuration of the plasma equipment. Overall, preliminary data supports the use of LTAPP to inactivate bacteria associated with numerous oral conditions. LTAPP has also been shown to enhance tooth whitening and surface modification related to adhesion.

**Conclusions:** Based on success in plasma medicine, a myriad of plasma applications in dentistry are plausible.

## Health Literacy/Cultural Competency

### Cultural Competence Curriculum: Are We There Yet?

Cheryl M. Westphal Theile, EdD, RDH

**Purpose:** The goal of this project is to demonstrate outcomes which indicate effective curriculum content for building cultural competence.

**Significance:** There is a need to develop evaluation mechanisms designed to monitor knowledge and performance indicating the graduate is competent to communicate with diverse groups. The U.S. population is growing so diverse that by 2050 ethnic groups will make up 48% of the total U.S. population. In 2010-2011 white dental hygiene student population was 75.4% compared to 64% of U.S. population.

**Approach:** In order to evaluate the effectiveness of a curriculum two groups of students are compared in this study. The first group enrolled in a formal online course and participated in all assignments. Pre and post-tests were assigned and evaluated by the instructor. Qualitative and quantitative analysis was done to develop trends in responses and to evaluate each learning module. The comparison group is the current students in the program who have received only the experiential curricular content without structured lecture content. The two groups will be compared to determine which cultural content needs to be required for all students. An IRB is submitted for second group of students as they are still in the program. The first group has completed the course and the data is historical.

**Evaluation:** The first group indicated that all aspects of learning were positive. They demon-

strated effectiveness based upon self-assessment surveys and reflection. They were able to apply this course material to practice and developed culturally relevant case scenarios to integrate the unique ethnic data with the practice of dental hygiene. The comparison group is a work in progress. They have had clinical experiences to deliver care to diverse patient population yet not been evaluated to confirm the outcomes.

Funding for this project was through the Dental Hygiene Programs at New York University.

### Racial/Ethnic, Cultural, and Linguistic Diversity among the Dental Hygiene Students

Anna Matthews, RDH, MS; Susan Davide, RDH, MS, MEd; Anty Lam, RDH, MPH

**Problem Statement:** Data collected about students is usually limited to race/ethnicity and doesn't include students' cultural and linguistic background.

**Purpose:** to study the racial/ethnic, cultural, and linguistic diversity of the dental hygiene students; to determine the number of students who are first-generation Americans, their countries of origin and first/primary languages; and to investigate whether non-native English speakers experience language-related difficulties.

**Methods:** This study was approved by CUNY IRB #461429-2. In 2013 we administered a 24-question survey to 149 dental hygiene students. The survey consisted of two main parts: 1) basic demographics, including race/ethnicity, country of birth, cultural and educational background; and 2) questions for students whose first/primary language was other than English about their language use, preferences, and specific difficulties/concerns. Data was analyzed by descriptive statistics.

**Results:** Most students were female (n=133, 91.7%); average age was 27 years. Responders identified as: White – 52 (35.6%), Asian – 37 (25.3%), Hispanic/Latino – 31 (21.2%), Black/African-American – 13 (8.9%), and Mixed Race/Other – 13 (8.9%). Eighty-one responders (54.3%) were first-generation Americans born in 33 countries. Eighty-three students (56.1%) reported one of 26 different languages other than English as their primary. Although major-

ity reported using English while communicating at work (65.9%), reading (58.9%), watching TV (57.3%) and using internet (73.0%), 20.7% of these responders translated material when studying, 23.5% had difficulty understanding texts, and 42.0% felt they needed more time during tests. Additionally, 33.7% of responders had difficulty expressing their thoughts in writing and 32.5% orally.

**Conclusions:** Our dental hygiene students are very diverse racially/ethnically, culturally, and linguistically. Students who are non-native English speakers can experience language-related difficulties and barriers to success.

### **Iatro-Compliance: An Unintended Consequence of Excessive Autonomy in Long Term Care Facilities**

Melanie V. Taverna, MSDH, RDH; Carol Nguyen, MS, RDH; Rebecca Wright, MS, RDH; James W. Tysinger, PhD; Helen M. Sorenson, MA, RT

**Problem Statement:** Periodontal disease and caries remain the most prevalent preventable chronic diseases for seniors. Seniors transitioning into long term care facilities (LTCF's) often present with oral health challenges linked to systemic diseases, plaque control, psychomotor skills and oral health literacy. Many retain a discernible level of physical and cognitive ability, establishing considerable autonomy.

**Purpose:** This study examines the effect of autonomy on residents' ability to perform oral hygiene.

**Methods:** Descriptive data were developed utilizing mixed methodology on a convenience sample of 12 residents and 7 care staff of a LTCF. One-on-one interviews consisted of Likert Scale questions about demographics. Fixed data were analyzed using descriptive statistics to supplement qualitative findings. Qualitative information was analyzed using NVIVO 9™ in the constructivist tradition to develop themes about ageism, respect, and time constraints and their influence on resident autonomy in oral care practices.

**Results:** Data suggested shortcomings, such as a failure of the staff to ensure oral hygiene oversight and failure of the resident to ask for assistance. Autonomy, while laudable, was used

by residents to resist staff assistance, partially motivated by residents' lack of confidence in care staffs' oral hygiene literacy and skills. In turn, by honoring resident's independence, the staff enabled excessive autonomy to occur and did not provide oversight in oral hygiene; creating an environment of iatro-compliance.

**Conclusions:** While it is beneficial to encourage autonomy, oversight and education must remain an integral component of oral hygiene care in this population. Improved oral hygiene skills can be fostered in LTCF's by utilizing the current oral health care workforce. Registered dental hygienists (RDHs), under indirect supervision of a dentist, can fulfill the role of an oral health care director (OHCD) in LTCF's. A director's presence in a facility can decrease staff caused iatro-compliance and increase oral hygiene skills and literacy of the residents, while enhancing their autonomy through education and support.

## **Health Behaviors**

### **Association between Cigarette and Electronic Cigarette Use and Perceptions of Risks in Urban High School Males: A Pilot Cross-Sectional Study**

Elizabeth T. Couch, RDH, MS; Benjamin W. Chaffee, DDS, MPH, PhD; Stuart A. Gansky, DrPH; Gwen Essex, RDH, MS, EdD; Margaret M. Walsh, RDH, MS, MA, EdD

**Problem Statement:** Tobacco use, a major risk factor for oral and systemic diseases, is often established during adolescence. Although youth cigarette use has declined recently, electronic cigarette (e-cigarette) use is rising rapidly. Differences in perceived risks associated with cigarettes and e-cigarettes may contribute to adolescent use.

**Purpose:** To explore the association between perceived social risks (SRs) and health risks (HRs) and use of cigarettes and e-cigarettes among high school males.

**Methods:** A convenience sample of urban high school males completed a survey in this cross-sectional pilot study, in preparation for a larger prospective study. After obtaining IRB approval, permission from school officials, and parent/student consent, data were collected on-site via an anonymous, web-based survey. For cigarettes

and e-cigarettes, the survey assessed ever-use (lifetime) and participants' perceived probability (0 to 100%) that 6 specific SRs and 5 specific HRs would happen to them from using each product. Mean ranked perceived HRs and SRs were compared (Krusal-Wallis test) across 4 groups: (a) never users (b) ever-users of cigarettes only; (c) ever-users of e-cigarettes only; and (d) ever-users of both.

**Results:** Among 104 participants, 71% reported never-use, 9% only e-cigarette use, 8% only cigarette use, and 13% used both. Across all participants, perceived SRs and HRs were greater for cigarettes than for e-cigarettes. Perceived SRs and HRs of cigarettes were lowest among those reporting ever-use, but did not significantly differ across the 4 groups ( $p=0.33$  for SRs,  $p=0.12$  for HRs). For e-cigarettes, perceived SRs and HRs were lowest among self-reported ever-users and highest among never-users, with statistically significant differences detected across the 4 groups ( $p<0.001$  for SRs and HRs).

**Conclusions:** In this population, cigarettes were perceived to have greater SRs and HRs than e-cigarettes. For e-cigarettes, lower perceived SRs and HRs were associated with use.

Funding for this project provided by NIH/NCI/FDA P50CA180890.

### **Brush Off! Promoting Oral Hygiene Behaviors with a Game**

Joyce M. Flores, RDH, MS; Traci Leong, PhD; Stella Lourenco, PhD; Dov Jacobson; Jesse Jacobson; Stephanie Chergi; R.L. Jacobson, DDS

**Problem Statement:** The magnitude and severity of dental caries exists globally and is a pending public health crisis. World-wide epide-

miological data indicates a marked increase in the prevalence of childhood dental caries over the past decade. This trend is very close in prevalence to childhood obesity and shares similar influence from behaviors associated with both diseases. Moreover, a lack in behaviors such as brushing and exercise also attribute to these disease processes. Interactive gaming should be recognized as a tool to improve toothbrushing behaviors among children.

**Purpose:** The purpose of this study was to investigate effects of a collaboratively-designed interactive game on toothbrushing behaviors for 5-6 year old children.

**Methods:** This randomized, double-blinded study examined a convenience sample of 32 children who were asked to play a game with a rhythmic toothbrushing song. Game play included animated guidance and feedback from a toothbrush sensor in the form of a haptic controller, similar to the popular Wii® game platform. 7 and 14-day dose-effects were measured by calibrated examiners using pre and post-test data quantifying Time-on-Tooth Surface (TOTS) and metrics to evaluate toothbrushing techniques. IRB approval was obtained from Morehouse School of Medicine. Parametric tests were used to analyze the data.

**Results:** TOTS ( $p=.003$ ) and sulcular brush position ( $p=.014$ ) were toothbrushing behaviors most strongly affected by game play of 14-days.

**Conclusions:** A game using song, sensors and science should be considered as an intervention tool aimed at improving toothbrushing behaviors in children.

Funding for this project was provided by National Institute of Dental and Craniofacial Research, NIH R43 DE021334-01A.