

# Abstracts for Poster Presentations

## Professional Education and Development

### Measuring the Short Term Effects of Incorporating Academic Service Learning Throughout a Dental Hygiene Curriculum

Melanie Simmer-Beck, RDH, MS; \*Cynthia C. Gadbury-Amyot, MSDH, Ed.D; Nancy T. Keselyak, RDH, MA; Karen B. Williams, RDH, PhD; Bonnie Branson, RDH, PhD

**Problem Statement:** Academic dental institutions have been called upon to serve as safety nets for the underserved, and contributors to the well-being of their communities through accessible oral healthcare services. Academic Service Learning (ASL) provides the venue for dental education to take oral health care services directly into communities while at the same time promoting professional responsibility within their student bodies.

**Purpose:** The purpose of this study was to quantitatively examine change in preexisting attitudes and behaviors of dental hygiene students with regard to providing oral health care to low income, unserved and/or underserved populations following the incorporation of academic service learning activities throughout a dental hygiene curriculum. **Methods:** Ninety first year dental hygiene students from the classes of 2006 to 2008 were recruited during their first semester in the program. Student participants (n=77) completed the UMKC SSIRB consent. A survey instrument developed by Shiarella, based on Schwartz's Helping Behaviors Model, was used to assess students' attitudes towards community service. Additionally, questions were developed using Shinnamon's Methods and Strategies for Assessing Service-Learning in the Health Professions. **Results:** Data were entered into SPSS software for descriptive and inferential analyses. Internal estimates using Cronbach Alpha were computed on subscales and all were above 0.8. Wilcoxon Signed Ranks Test was used to analyze change over time. Results of the study revealed enhanced learning (p=0.000), self-awareness (p=0.000), volunteerism (p=0.007), sense of individual responsibility (p=0.038) and costs (p=0.000) were statistically significant. Seriousness, connectedness, benefits, career benefits, normative helping behaviors, awareness and intentions were not statistically significant. Further in-

vestigating these domains revealed minimal to no changes in median values and interquartile range.

**Conclusion:** The largest change in perceptions over time related to enhanced learning, self-awareness, and costs followed by volunteerism and sense of professional responsibility. In concert with the literature on ASL these experiences throughout the curriculum resulted in students' increased awareness of community need and their roles as oral health professionals.

### National Survey of Oncology Teams' Knowledge, Education and Patient Management Regarding Oral Care in Cancer Therapy

Rebecca Tranmer RDH, BS; \*Linda D. Boyd RDH, RD, EdD; Bernadette Howlette MS, PhD; Tara Johnson RDH, PhD; Denise Bowen, RDH, MS

**Problem statement:** Oral health professionals are largely missing from oncology teams in the U.S. The responsibility of oral health education and prevention strategies has fallen on the oncology team.

**Purpose:** To describe U.S. oncology team members' (registered/oncology nurses, licensed independent practitioners [LIP], dietitians) oral health knowledge, management of oral complications and comfort level in providing oral care. **Methods:** A randomized sample (n=113) of individuals from Oncology Nursing Society (ONS) completed a cross-sectional, descriptive, web-based survey. Quantitative methods were used to assess oncology team members' knowledge/oral health education in oral complications associated with cancer care, management of oral complications during cancer care and comfort level of respondents performing oral care to cancer patients. **Results:** Frequency distributions were calculated for 5 point, Likert-type and multiple choice items on the survey questionnaire. Most respondents (89%) received oral health training in their specialty oncology education. The majority (90%) of respondents performed oral examination for high risk patients; however, 20.21% (n=23/94) used no indices to assess oral complications. The most common index used was the World Health Organization's Mucositis Index (n=66/94, 70%). The majority of respondents (n=61, 53.98%) reported less than 1 hour of oral health continuing education

in the last year. **Conclusions:** This study shows a need for continuing education to increase consistent implementation of existing evidence-based oral health protocols and to provide oral health education for oncology members without specialized oncology training.

### **Incorporating Oral-Systemic Evidence into Patient Care: Knowledge and Opinions of North Carolina Dental Hygienists**

\*Kathryn P. Bell, RDH, MS; Ceib Phillips, PhD; David W. Paquette, DMD, MPH, DMSc; Steven Offenbacher, DDS, MS, PhD; Rebecca S. Wilder, RDH, MS

**Problem Statement:** Although associations between periodontal and systemic health have been consistently reported, little data are available on the knowledge and attitudes of dental hygienists (DH) regarding this relationship. **Purpose:** To determine the knowledge levels of North Carolina DH regarding oral-systemic evidence, and assess their attitudes and confidence toward incorporating this evidence into practice. **Methods:** An IRB approved survey was developed, pilot tested, revised and mailed to 1,665 licensed DH in North Carolina. **Results:** After 3 mailings, the response rate was 62%, with 52% (n=859) meeting inclusion criteria. Only descriptive statistics are reported. DH most often identified "poor oral hygiene" as a risk factor for periodontitis (98%), cardiovascular disease (CVD) (75%), adverse pregnancy outcomes (62%) and diabetes (62%). Risk factors for systemic conditions were correctly identified less frequently (only 33% identified alcohol use as a risk factor for osteoporosis, and only 24% identified race as a risk factor for adverse pregnancy outcomes). Almost all (94%) agreed or strongly agreed that DH should be trained to identify risk factors for oral-systemic disease, and 78% felt that DH should be trained to actively manage patients with systemic disease. More than 75% reported being confident about discussing potential oral-systemic risks with patients who have CVD and diabetes. Far fewer were confident (36%) that they had the skills to ask patients about their alcohol consumption habits, although 48% were confident about counseling patients about the effect of alcohol on systemic health. Eighty-eight percent felt that dental and medical professionals should be taught to practice in a more collaborative way, and 75% felt that medical providers should be trained to screen patients for periodontal disease. **Conclusions:** In-depth, interprofessional and continuing education on oral-systemic health are indicated to improve DH knowledge levels and confidence in translating

the evidence to patient care.

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### **Constructing a Dental Hygiene Education: A Survey of Educational Methods**

\*Marcia H. Lorentzen, RDH, MEd, EdD

**Problem Statement:** Educational methods implemented in dental hygiene education impact student learning. Changes in educational methods may be necessary to address the needs of today's dental hygiene students and the society for whom they will provide care. **Purpose:** To examine the educational methods used by dental hygiene faculty and determine if methods implemented supported the construction of learning. **Methods:** A snowball purposive sample of 308 accredited dental hygiene programs was utilized. The educational methods survey was modified with permission from research conducted in nursing programs. The new electronic survey was field-tested with a convenience sample of dental hygiene educators prompting modifications addressing reading ease, fluidity of content and response selection format. All survey responses remained confidential. Descriptive statistics and Spearman's rho were used to analyze quantitative data. Qualitative data was organized and analyzed thematically. IRB approval was obtained from the University of Bridgeport. **Results:** Two-hundred and thirty educators participated in the research. Lecture was always or often used for teaching (85.1%). Case studies were sometimes or often used by 86.9%. Problem-based learning was often or sometimes used by 55.1% to reinforce or assess student learning. Cooperative learning was often or sometimes used by 72.5%. More than half (50.8%) never used concept mapping. Games and computer-assisted instruction were never used by 35.2% and 30% respectively. Metacognitive strategies were equally often, sometimes and never used (25.6% to 28.6%). There was significance between lecture and years teaching ( $p=.034$ ), and nearing significance between metacognitive strategies and years teaching ( $p=.051$ ). Challenges to using constructive learning methods were lack of commitment, support and training. Strategies for implementing constructive learning methods included stimulation, technology and institutional support. **Conclusions:** Faculty chose active-learning educational methods to help students construct their education. With leader encouragement, faculty development and institutional support faculty may choose to implement and maintain student-centered learning methods.

## Dental Hygiene Student Service-Learning, Assessment of Future Intentions For Civic Engagement: A Pilot Study

\*Brenda L. Armstrong, RDH, MDH; Kathleen J. Newell RDH, PhD

**Problem Statement:** Dental hygiene educators recognize the importance of preparing their students in civic and professional engagement as future members of their profession. The pedagogy of service-learning has been employed to increase the student's awareness of professional and civic responsibilities. Central for the understanding of civic engagement is reflection. Reflection promotes the program goals and helps clarify for students both social issues and personal values, while also examining their role in various communities. Although service-learning and reflection have been utilized to some extent in dental education, little has been reported in the literature on the effects both have on students' intentions for future civic engagement. **Purpose:** The intent of the study was to determine if service-learning, with reflection, was associated with dental hygiene students intended future civic engagement. **Methods:** Subjects included a convenience sample of 23 University of Minnesota senior dental hygiene students who participated in a 2 week long service-learning with reflection experience at a rural dental clinic. Data were collected using a researcher designed questionnaire including close-ended and open-ended items as well as audio-recorded discussions. A 2-sided paired t-test was used to analyze the quantitative data, along with descriptive summaries. Qualitative analysis, of written reflections and audio discussions, was utilized to help answer the research question. **Results:** There was no statistical difference from pre- to post-test; however, student written reflections and audio discussions revealed various categories and supporting themes of intent for civic engagement. **Conclusions:** In order for there to be a better understanding of civic intentions of dental hygiene students, civic engagement needs to be defined along with behaviors that exhibit engagement.

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## Using the Health Sciences Reasoning Test to Assess Development of Dental Hygiene Students' Critical Thinking

\*Jacqueline Freudenthal, RDH, MHE

**Problem Statement:** Dental hygiene programs strive to select students who possess critical thinking and reasoning skills hoping these students will

further develop the skills necessary to provide comprehensive patient care; however, valid measures of critical thinking are needed. **Purpose:** The purpose of this study is to evaluate The Health Sciences Reasoning Test (HSRT) as an assessment tool to measure progress of baccalaureate dental hygiene students' critical thinking and reasoning skills from admissions through graduation and licensure examinations. **Methods:** The sample consisted of the admissions and academic records of dental hygiene applicants from 2008 to 2011. The HSRT was administered to qualified applicants (n=175) and as a posttest (n=46) to senior students one month prior to graduation. The HSRT measures 5 parameters (inductive and deductive reasoning, analysis, interpretation, inference and evaluation). A total score represents a measure of overall critical thinking skills. **Results:** Pearson Correlation indicated a moderate predictive relationship between cumulative gpa (r=0.320, p=<0.001), natural science gpa (r=0.295, p=<0.001) and the pretest HSRT score. A paired samples t-test showed dental hygiene students' (n=46) HSRT scores increased, but not significantly, (p=0.160) between admission and graduation. The HSRT score at admission was moderately predictive of the post HSRT (r=0.658, p=<0.001). Paired sample t-tests demonstrated a change in the subscale "Evaluation" from pre-test (4.54/6.00) to post-test (5.00/6.00). Significant correlations (r=0.295) were not found with pre- or post-test HSRT scores and National Board Dental Hygiene Examination scores. Other correlations were weak and non-significant (p≥0.05). **Conclusions:** The data indicate a positive change in these students' ability to evaluate the logical strength of a situation. Additional data are required to assess whether the HSRT is a reliable and predictive assessment tool.

## Basic Science

### Dentin Permeability of Two Commercially Available Anti-Sensitivity Dentifrices - Colgate® Sensitive Pro-Relief™ Vs. Sensodyne® Rapid Relief

\*Rahul Patel, Suman Chopra, Diane Cummins, Mark Vandeven, Rishabh Shah

**Purpose:** The in-vitro effects of 2 commercial sensitivity relief toothpastes, one containing 8.0% arginine and an insoluble calcium compound (Colgate® Sensitive Pro-Relief™) and 1 containing 8% strontium acetate (Sensodyne® Rapid Relief) in occluding dentin tubules and reducing fluid flow were compared using hydraulic conductance (Flodec). **Method:** Human dentin segments were cut from extracted molars, mounted on acrylic blocks, etched

and connected to a Flodec to measure hydraulic conductance. Segments were divided into 2 groups (n=6) and treated with either the arginine/calcium carbonate or strontium-containing toothpastes. The blocks were rinsed and conductance was measured. Between treatments, blocks were rinsed and incubated in PBS for at least 2 hours. There were a total of 3 one minute treatments (first finger-tip and next 2 using toothbrush). After third treatment, blocks were incubated in PBS for overnight and conductance was measured. The 2 groups were further divided into 3 sets of 2 segments each, which were challenged for 1 minute with either 6% citric acid, Orange Juice or Grapefruit Juice. **Results:** This study showed that the toothpaste containing arginine/calcium carbonate provided a significantly higher percent reduction in fluid flow immediately after finger-tip application, as well as after 2 brushing cycles compared to the strontium-containing toothpaste ( $p < 0.05$  in all cases). Even after acid challenges, the percent reduction in fluid flow of dentin treated with the arginine/calcium carbonate containing toothpaste was significantly higher than the strontium-containing toothpaste. This is consistent with results from a clinical study which showed that the arginine-containing toothpaste provided instant relief of dentin hypersensitivity, whereas the strontium-containing toothpaste did not. **Conclusions:** Based on this in-vitro hydraulic conductance study, toothpaste containing arginine/calcium carbonate and an insoluble calcium compound is significantly more effective in occluding dentin tubules than toothpaste containing strontium acetate. Further, the superior occlusion obtained with the arginine toothpaste is resistant to acid challenge.

This project was sponsored by the Colgate-Palmolive Company.

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### The Effect of 5000 PPM Fluoride Dentifrices With and Without $\text{KNO}_3$ Providing Resistance to Acid Exposure

\*Marilou.T. Joziak, A.M. Morgan, M. Prencipe

**Purpose:** Determine the calcium loss from acid exposure to hydroxyapatite disks (HAP) treated with 5,000 ppm and 1,450 ppm fluoride dentifrices with and without  $\text{KNO}_3$ . Determine the resistance to pH change of 5,000 ppm and 1,450 ppm fluoride dentifrices from addition of an acid solution. **Methods:** HAP disk acid treatment - Saliva coated hydroxyapatite disks were treated with a dentifrice slurry consisting of 1 part dentifrice, 2 part water and rinsed 2 times with 5 mL deionized water. Disks were then exposed to acetic acid at pH 2.4 for 30 minutes and

the acid solutions analyzed for total calcium using atomic absorption spectroscopy. The test dentifrices were: a) 5,000 ppm fluoride + 5%  $\text{KNO}_3$ , b) 5,000 ppm fluoride, c) 1,450 ppm fluoride + 5%  $\text{KNO}_3$  and d) water control. Three replicates of each were tested. Resistance to pH change from acid addition - A slurry consisting of 1 part dentifrice, 2 part water was prepared. A solution of 0.1  $\text{NHCl}$  was added until the pH of the slurry reached approximately 3.5. **Results:** HAP disk acid treatment: The calcium data indicated that the 5,000 ppm fluoride dentifrices released statistically significantly less calcium into the acid solution indicating greater acid resistance ( $a=b>c>d$ ;  $p < 0.05$ ). Additionally, the presence of 5%  $\text{KNO}_3$  in the 5,000 ppm fluoride dentifrices did not significantly affect its acid resistance ability. Resistance to pH change: A greater volume of acid was required to lower the pH for the 5,000 ppm fluoride formulas indicating greater acid resistance than the 1,450 ppm fluoride dentifrice. **Conclusions:** These experiments suggest that 5,000 ppm fluoride formulas provide superior resistance to acid challenge than a 1,450 ppm fluoride + 5%  $\text{KNO}_3$  formula. The addition of 5%  $\text{KNO}_3$  to a 5,000 ppm fluoride formula did not impact its acid resistance properties.

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## Access to Care/Health Disparities

### Dental Hygienist Attitudes toward Willingness to Volunteer Care for the Underserved Population

\*Lynn A. Marsh, RDH, EdD

**Problem Statement:** The social responsibility of oral health care providers regarding care for the underserved population has become an area of growing awareness and importance relative to its impact on communities and personal welfare. **Purpose:** The purpose of this study was to investigate registered dental hygienists' attitude toward community service, sensitivity to patient needs, job satisfaction and their frequency to volunteer care for the underserved population. **Methods:** A 60 question survey instrument was developed which addressed social responsibility, spirituality, community service, sensitivity to patient needs, job satisfaction, and volunteerism. All items on the survey instrument were subjected to a factor analysis in SPSS version 19.0 utilizing 109 surveys to acquire distinct variables. Based on the factor analysis, the six original variables were reduced to three variables which included job satisfaction, attitude toward community

service and sensitivity to patient needs. **Results:** Results of this research study indicated that for registered dental hygienists their level of education, membership in their professional association, attitude toward community service and sensitivity to patient were associated with their frequency of volunteering care for the underserved population. Additionally, a discriminant analysis indicated a strong prediction among registered dental hygienists attitude toward community service and job satisfaction to their frequency of volunteering care for the underserved population. **Conclusions:** This investigation of the factors that influence registered dental hygienists' frequency of volunteering care indicates how important oral health care preparatory norms and dispositions are to the underserved population. Understanding what persuades registered dental hygienists to volunteer care provides valuable information to registered dental hygienists as well as dental hygiene programs regarding volunteering care for the underserved population and the importance of attitudes toward community service, sensitivity to patient needs and job satisfaction.

### Developing an Oral Health Education Program for Personal Care-Providers Using an Interactive Consultative Approach

\*Janet Munn, Karen McNeil, Mary McNally, Sandra Crowell

**Problem Statement:** Oral health directly impacts the health and well being of many seniors living in long-term care, but there continues to be an issue of access to care in many rural areas. There are no comprehensive oral care policies established, which makes providing care in rural areas extremely challenging. **Purpose:** To establish an education program for personal care providers that includes support, tracking and evaluation strategies. This knowledge translation/exchange initiative is part of an ongoing interdisciplinary community based research project in Nova Scotia, Oral Care in Continuing Care Settings: Collaborating to improve policies and practices. In January 2010, dental hygienists as part of a research team developed materials to provide education, training, policy change and evaluation to support personal daily mouth care practices for frail older adults living in three long-term care facilities. **Methodology:** Using an interactive consultative process, personal care providers were engaged in focus groups, an action planning workshop and informal discussions to establish relevant education topics and special support required to enhance the provision of personal daily mouth care. Ideas were modified with direct feedback from end

users. Evaluation forms and periodic diary studies were collected. **Results:** Educational topics were established and dental hygienists presented four oral health education topics at each site: 1) Oral Health: The Basics; 2) Caring for Adults with Dementia; 3) Palliative care –oral care and 4) Oral Hygiene Tools and techniques. An oral health toolkit prototype was developed that includes a process for individualizing patient requirements using detailed, color-coded "care cards". Evaluation of the program was positive. **Conclusions:** Relevant knowledge translation products were developed that include: oral health education modules (Power Point presentation and DVD) for each education topic; direct messaging posters; individualized oral health tool kits for each resident; a comprehensive program resource binder and website. "This research is funded by the Nova Scotia Health Research Foundation."

### Visits to U.S. Emergency Departments for Oral Health Problems

\*Becky DeSpain Eden, RDH, MEd, MPH(c)

**Problem Statement:** People with limited access to oral health care seek routine and urgent dental care in hospital emergency departments, despite the high cost of care in these facilities, inadequacy of most to provide appropriate treatment and the recognized issue of overcrowding. **Purpose:** This study determined the relationship between emergency department visits (EDV) for oral health problems (DV) and characteristics in 3 domains associated with EDV: demographics, source of payment and visit features. **Methods:** Data from the ED component of the National Hospital Ambulatory Medical Care Survey (NHAMCS), which uses a nationally representative probability sample, were analyzed using Stata 11. Descriptive statistics were tabulated and variables meeting National Center for Health Statistics criteria for reliability were retained. Explanatory variables for DV were identified by Pearson  $\chi^2$  ( $p$  value $<0.05$ ). **Results:** NHAMCS recorded 142 799 EDV between 2002 and 2005, representing 448.5 million EDV nationwide. Analysis shows that DV accounted for 2.24% of all EDV ( $n=3313$ ) or an annual average of 2.5 million visits. Adults 18 to 64 years made 80% of DV and 57% of all complaints were for toothache or abscess. DV differed significantly from non-dental EDV for variables of age, race, ethnicity, institution resident, payment source, visit day, injury related and receiving medications ( $p$  value $<0.01$ ). **Conclusions:** Results suggest inefficient use of ED for oral health problems. Adults with toothache or abscess receive medications but few procedures, indicating lack of definitive treatment for complaints. Solutions to this problem are

needed and may include new programs that provide urgent dental care outside of ED and increase adults' access to preventive oral healthcare. Further analysis is needed to determine interactions of independent variables.

The University of North Texas Health Science Center-Fort Worth IRB exempted this study from review. This investigation supports ADHA research priorities A.4, A.6, and B.1.

## Clinical Dental Hygiene Practice

### Expanding HIV Rapid Testing In the Dental Setting: HIV Knowledge and Attitudes Among Senior Dental Hygiene Students

Anthony Santella, DrPH, MPH; Bhuma Krishnamachari, PhD, MS, CGC; Janet Tuthill, RDH, MA; Marilyn Cortell, RDH, MS, FAADH; \*Winnie Furnari, RDH, MS, FAADH; Susan Davide, RDH, MS, MSEd

**Problem Statement:** In the U.S., an estimated 25% of people living with HIV/AIDS do not know their positive HIV status. Expanding HIV rapid testing in the dental setting may increase the number of people who know their HIV status and can begin appropriate treatment early. The dental hygienist, with proper knowledge and training, may fill this potential role. **Purpose:** The purpose of this pilot study was to explore the hypothesis that senior dental hygiene students with high knowledge about HIV should have more favorable attitudes toward caring and educating HIV-infected persons. **Methods:** Cross-sectional survey data were collected via convenience sampling from 148 senior dental hygiene students attending accredited dental hygiene programs in New York City using a modified survey from previously validated instruments. Individuals with high knowledge (scores above 80%) were compared with those with lower knowledge. Unconditional logistic regression was used to calculate age, gender and race adjusted odds ratios evaluating the relationship between knowledge level and stigma/attitude. **Results:** Out of a total test score of 18, the high knowledge group had a mean test score of 16.4 and the lower knowledge group had a mean score of 11.9. Those with a high knowledge score were less likely to indicate that they would refer HIV infected patients elsewhere, if they could do so

without professional recrimination (OR=0.33, 95% CI 0.13, 0.85). Those with high knowledge scores were also more likely to be comfortable interacting on a social level with an HIV infected individual (OR=4.54, 95% CI=1.46, 14.18). **Conclusions:** High knowledge about HIV was associated with a willingness to interact with HIV-infected persons in a professional and social content. Thus, senior dental hygiene students with required training may be willing and able to conduct HIV rapid tests. Additional research is needed to explore willingness to conduct rapid HIV testing.

### Patient Related Outcomes of Initial Periodontal Treatment

\*Kerstin Öhrn, PhD, RDH; Birgitta Jönsson, PhD, RDH

**Problem Statement:** Dental hygiene treatment often results in improvement in periodontal status, but very little is known if patients are of the opinion that there is an improvement. **Purpose:** The objective with the present study was to evaluate patients' perspective of initial periodontal treatment (information, instruction, scaling and root planing). **Methods:** A total of 97 of 113 patients (86%) with periodontal disease completed the UK oral health-related quality of life questionnaire (OHRQoL-UK) and a check list of questions on their rating and satisfaction with general and oral health before and after initial periodontal treatment. The OHRQoL-UK is a 16 item questionnaire. Scoring uses a 5 point Likert scale from very bad (1) to very good (5). The differences were analyzed with paired t-test. **Results:** After completion of the initial periodontal treatment, the patients' reported an overall improvement in their OHRQoL (57.0 vs 52.5,  $p < 0.001$ ) indicating that initial periodontal treatment provided by dental hygienists is effective as assessed by the patients. There was a significant improvement in scores for 10 out of the 16 questions. In addition, patients rated their oral health as better after treatment, and they were more satisfied with their general health and their teeth after the treatment. **Conclusion:** Initial periodontal treatment improved OHRQoL and patient satisfaction with general and oral health, indicating initial periodontal treatment provided by dental hygienists is effective as assessed by patients. The abstract was submitted and accepted to the IFDH symposium in Glasgow 2011 and the poster was shown.

## Endoscopic vs. Tactile Evaluation of Subgingival Calculus: A Calibration Trial

\*Joy B. Osborn, RDH, MA; Pat A. Lenton, RDH, MS; Christine M. Blue, RDH, MS; Scott Lunos, MS

**Problem statement:** Endoscopic technology has been developed to facilitate subgingival imagery for diagnostic and therapeutic phases of periodontal care. However, no research could be found on training and calibration using this technology. **Purpose:** The purpose of this study was to compare the reproducibility levels of 2 clinical examiners to detect subgingival calculus, using both tactile (manual explorer) and endoscopic methodology. **Methods:** Two dental hygienists underwent training for using endoscopic technology (Perioscope™). Training activities reinforced the required two-handed technique, acclimated examiners to subgingival images at 24-48x magnification and allowed practice with periodontal patients. A convenience sample of 6 subjects with periodontitis and subgingival calculus were recruited from the University of Minnesota School of Dentistry. A calculus index (0 to 3) was used for both the Perioscope™ and tactile evaluations. Intra- and inter-examiner agreements were determined by using a weighted kappa statistic as well as percent agreement. **Results:** The within-examiner Kappa statistic for the 2 examiners was 0.71 and 0.64 using tactile and Perioscope™ methods, respectively. The between-examiner Kappa statistic for the 2 examiners was 0.48 and 0.38 using tactile and Perioscope™ methods, respectively. Percent inter-examiner agreement (+1) for repeated tactile measures ranged from 96.1% to 96.7%, and 92.2% to 93.2% for repeated perioscope measures. These were not significantly different (GEE model;  $p=0.19$ ). **Conclusions:** A high percent of agreement within and between examiners was achieved for both tactile and Perioscope™ calculus detection methodologies. These are comparable to generally accepted levels for periodontal calibration studies in the literature.

This project was funded through the Oral Health Clinical Research Center, University of Minnesota.

## Plaque Removal by Two Different Power Brush Heads

\*Rebecca VanHorn, RDH, BA; Malgorzata A. Klukowska, DDS, PhD; Julie M Grender, PhD

**Problem Statement:** There is a need to understand whether there are differences in performance of store brand (Private Label (PL)) power brush

heads versus branded power brush heads. **Purpose:** The purpose of this study was to evaluate the plaque removal efficacy of 2 power brush heads after 6 weeks of wear. **Methods:** A randomized, examiner-blind, crossover design study with 2 study parts (home wear phase and single-use crossover phase) was conducted. During the first phase subjects used each of 2 power brush heads (PL or Oral-B Precision Clean (OPC)) with the same Professional Care Series handle for 6 weeks at home. During the second phase subjects reported to the clinic and plaque removal of both brush heads after 6 weeks use were examined in a randomized four period crossover design. Plaque was scored before and after brushing using the Modified Quigley-Hein Plaque Index. **Results:** Forty-eight subjects were enrolled and 47 subjects completed both phases. Baseline whole mouth plaque scores were 2.157 and 2.120 for the branded brush head and store brand treatments, respectively, and did not differ significantly from each other ( $p=0.074$ ). The adjusted mean plaque reduction (baseline minus post-brushing) was 1.022 (47.4% reduction vs. baseline) for the OPC and 0.828 (39.1%) for the PL brush head. An analysis of covariance showed that the OPC brush head provided statistically significantly higher plaque reduction for the whole mouth (23.4%), approximal (30.1%) and in mid-tooth regions (13.0%) than the PL brush head ( $p<0.001$ ). **Conclusions:** The branded power brush head removed statistically significantly more plaque (whole mouth, approximal and mid-tooth) as compared to a store brand product after 6 weeks of wear. Both brushes were well tolerated.

Funding was provided by P&G.

## Multi-Factorial Predictive Research to Assess Daytime Plaque Levels of Dental Professionals

\*J. Leslie Winston, DDS, PhD; Matthew L. Barker, PhD; Amy A. Walanski, BS

**Problem Statement:** Dental professionals are viewed as oral hygiene experts by their patients. Given their high expectations this study was designed to examine whether there was homogeneity in plaque levels amongst dental professionals and the impact of demographic characteristics. **Purpose:** The purpose of this study was to assess the relationship between daytime plaque levels relative to time since brushing, age, gender, geographic location and profession type. **Methods:** Dental professional volunteers from 6 dental conventions were given IRB approved consent prior to completing a brief survey and digital image. The survey questions determined location of meeting, dental profession type, age, gender and time since last brushing. After completing the survey, subjects

swished with 5 mL of a 1,000 ppm fluorescein rinse to disclose plaque and a digital image was collected using standardized lighting by a trained digital imaging technician. The images were remotely masked and analyzed. Multiple regression analysis was performed to determine which survey factors were related to the daytime plaque area coverage. **Results:** The mean (SD) age of 454 subjects was 39.8 (12.3) years ranging from 18 to 74, and 76% were female. Sample size per meeting varied from 69 to 88 subjects. Daytime plaque area % ranged from 0.3 to 59.0, with a mean of 11.4 (SD=9.6). Time since last brushing ranged from a few minutes to 18 hours, with a median of 4 hours. Significant ( $p<0.05$ ) predictors of plaque area were gender (males higher), age (slope=0.076, SE=0.038), time since last brushing (slope=0.33, SE=0.14), and meeting location (location #2 had more plaque). Profession type was not a significant factor in the model (directionally hygienists lowest, dentists highest). **Conclusions:** This research demonstrates that daytime plaque levels of dental professionals were related to gender, age and geographic location more than profession type. The results indicate heterogeneity in plaque control and opportunities to set a better example for patients.

Funding was provided by P&G.

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### Effect of Light on Tooth Whitening: A Split Mouth Design

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**Problem Statement:** Tooth whitening is a popular clinical procedure in dental offices. Current research on whitening with the use of a light is conflicting and previous studies often use small patient numbers. With the many choices of whitening materials and procedures it is important for the clinician to know the benefits and risks of whitening with a light. **Purpose:** The purpose of this study was to determine if the use of a sodium arc bulb lamp during in-office whitening affected the whiteness of teeth or the length of time the teeth maintained their shade. **Methods:** This randomized split-mouth design study utilized a sample of 49 subjects who responded to the study advertisement and met established criteria. Subjects received an in-office whitening treatment on anterior teeth with 25% hydrogen peroxide and were randomly assigned to receive whitening with the light on the right or left side of the mouth. The shades of the teeth were evaluated with the Vita Easyshade. Shades were recorded during the screen-

ing visit, immediately before whitening, immediately after whitening, 1 week after whitening, and 2 weeks after whitening. Ordinal values were assigned to recorded shades. Values will be analyzed using SAS software using ANOVA, paired t-test, and Wilcoxon signed rank tests at the 0.05 level of significance. Approval was obtained from the IRB at the Ohio State University. **Results:** While statistical analysis has yet to be completed, preliminary clinical results show no difference with or without use of the light in shade or duration that shade was maintained. **Conclusions:** While this project is currently in progress, the preliminary results lead us to currently conclude that whitening with a light may not clinically be different than whitening without a light. Therefore helping clinicians make evidence based choices about what whitening treatment they offer to their patients.

Funding for this project was provided by the OSU Dental Hygiene Department. Whitening supplies were provided by Discus Dental, Inc. (Culver City, CA).

### Accuracy of Specific Digital Arm and Wrist Manometers

\*Danielle Furgeson, RDH, MS; Nancy Foster, RDH, EdM

**Problem Statement:** Digital manometers are a standard of care in dental hygiene education clinics as part of the medical history assessment. Increased reliance on aneroid and digital manometers makes it imperative to ensure accurate blood pressure measurements. **Purpose:** The purpose of this study was to determine the accuracy of the automated digital arm and wrist cuffs utilized by students. **Methods:** 121 subjects were recruited from the clinic patient population. Patients were randomized into the test modalities upon check-in. Initial blood pressure measurements were taken with an aneroid control device by a principal investigator (PI) followed by a second measurement taken with the assigned arm or wrist manometer 5 minutes later. The control device was calibrated before and after data collection at Eastern Maine Medical Center. All readings were taken according to manufacturers' instructions to ensure technique consistency. Analysis will include descriptive statistics, chi-square and t-tests. IRB approval was obtained from UMA. **Results:** Initial results indicate a difference  $>5$  mmHg for each modality, with  $p=<0.000$  for the wrist modality and  $p=<.019$  for the arm modality. Initial results also indicate a difference between the mean PI control systolic and diastolic readings that may be related to number of hypertensive (HTN) patients, 18% versus 33% with a HTN diagnosis. **Conclusions:** Based on initial analysis and the British Hy-



pertension Society guidelines of mean difference of <5mmHg, these automated digital manometers should be used with caution as a screening tool in the dental setting, particularly in situations where administration of pharmacological agents such as local anesthesia may be used during the course of treatment.

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### **Efficacy of A Combined In-Office and At-Home Treatment Program For Dentin Hypersensitivity Relief**

D. Hamlin, L.R. Mateo, \*E. Delgado, Y.P. Zhang, W. DeVizio

**Purpose:** This double-blind clinical study evaluated the efficacy for the reduction of dentin hypersensitivity following dental scaling with sustained relief for 24 weeks from a treatment regimen consisting of a professionally applied 8.0% arginine and calcium carbonate desensitizing paste and daily brushing with an 8.0% arginine and calcium carbonate toothpaste and a sensitive toothbrush. **Methods:** One hundred adults with confirmed air blast and tactile-induced dentin hypersensitivity were randomly assigned to receive a rotary-cup-applied single treatment with one of two in-office pastes as the final polishing step to a dental scaling: Colgate® Sensitive Pro-Relief™ desensitizing paste (test regimen) or Nupro-M® pumice prophylaxis paste (negative control). Hypersensitivity was re-examined immediately after product application and after 8 and 24 weeks of brushing twice daily with Colgate Sensitive Pro-Relief Toothpaste and Colgate® 360° Sensitive Pro-Relief™ toothbrush (test regimen), or with a calcium carbonate toothpaste and Oral-B® Indicator® toothbrush (negative control). **Results:** A total of 95 subjects completed the study. No statistically significant differences in tactile or air blast hypersensitivity scores were indicated at baseline between the 2 groups. Immediately after professional product application, and after subsequent twice daily brushing for 8 and 24 weeks, subjects assigned to the test regimen treatment demonstrated statistically significant improvements in dentin hypersensitivity compared to subjects assigned to the control regimen treatment in tactile (49.8%, 57.5% and 32.9%, respectively) and air blast (26.0%, 38.4% and 34.3%, respectively) sensitivity scores. **Conclusions:** The professionally applied 8.0% arginine and calcium carbonate desensitizing paste provided a statistically significant reduction in dentin hypersensitivity as compared to the control prophylaxis paste immediately after a single treatment following

a dental scaling. The instant sensitivity relief afforded by the professional application was maintained by twice daily brushing with the 8.0% arginine and calcium carbonate toothpaste and the specified sensitive toothbrush for at least 24 weeks.

This project was sponsored by the Colgate-Palmolive Company.

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### **The Oral Hygiene of Patients with Cerebrovascular Diseases at an Emergency Hospital**

\*Takafumi Ooka, DDS, PhD; Shoko Ooka, DH; Naoko Kimura, DH; Kunie Hiyama, DH; Yoshitaka Kii, MD; Masahiro Watanabe, DDS, PhD; Yoshiharu Mukai DDS, PhD

**Problem Statement:** Many patients are ventilated mechanically and cannot be fed via oral cavities, and these conditions could make oral hygiene worse in the acute and subacute stage of cerebrovascular diseases (CVD). **Purpose:** The aim of this study was to compare the oral condition of patients with acute CVD admitted to an ER setting to patients in the general ward in order to establish a standardized protocol for oral health care. **Methods:** 85 patients (49 males and 36 females) who were placed in an emergency hospital participated in the study. All of them had CVD and the oral health care team including some dentists, dental hygienists, nurses and medical doctors had intervened in the oral health care activity on the ward. The actual oral conditions of the participants were evaluated by the team. Then, findings such as oral dryness, sticking sputum, tongue coat and oral mucosal problems were added up and analyzed after finishing the series of interventions of the dental staff. **Results:** Approximately forty percent of patients who were in the emergency room indicated some distinguished problems such as oral dryness, sticking sputum and tongue coat. In contrast, patients in the general ward showed higher incidences of these symptoms, with 50% having oral dryness and 70% having tongue coat. Additionally, the oral hygiene condition was worse in participants who were fed via nasogastric or gastric tube than participants who were fed orally. **Conclusions:** These results suggested that the patients with CVD in acute stage presented with a variety of oral hygiene problems, and symptoms differed and depended on the ward and feeding condition. It may be essential to establish a consistent and standardized protocol in oral health care.

## Oral Condition and Effectiveness of Dental Interventions in the ICU

\*Shoko Ooka, DH; Takafumi Ooka, DDS, PhD; Shino Murata, DDS, PhD; Yoshitomo Rikukawa, DDS

**Problem Statement:** It is known that oral care effectively prevents pre-operative medical complications such as aspiration pneumonia and ventilator-associated pneumonia (VAP). Critically, patients in Intensive Care Units (ICU) have many needs regarding oral hygiene. **Purpose:** The purpose of this research was to test the effectiveness of professional oral care in relation to the cleanliness of the oral mucous membrane sponges of patients in ICU. **Methods:** The effectiveness of the cleaning was tested by taking plaque samples from the buccal mucosa, tongue and pharynxes of each patient before and after oral care. These plaque samples were transferred to glass plates. After they were dried, the plates were placed in a plaque disclosing solution. Differences between the amounts of plaque present were compared at this stage. Dental plaque samples containing bacteria collected from the oral mucosa were compared using blood agar colony. This was to determine whether there was change in the concentration of bacteria in the dental plaque. They were divided into 3 categories: reacted only slightly, reacted owing to a large amount of plaque being present and reacted strongly to the solution. **Results:** Changes in oral care before and after dyeing concentration were from 2.0 to 0.45 in the buccal mucosa, from 2.2 to 1.0 in the tongue and from 2.2 to 1.68 in the pharynx. The mean of the plaque score was significantly lower in each category. The mean of the results of the category in patients who received professional oral health care became significantly lower in all points of the oral cavity. The majority of samples, which had been taken after oral care, reacted much less than those taken before it. However, the results show that it is impossible for ICU patients to demonstrate cough up and swallowing reflex. Additionally the bacteria after cleaning are expected to stagnate in the throat area. **Conclusions:** Oral care removes plaque for certain categories of patients in ICU. Early dental intervention is essential to prevent complications.

## New Program

### Incorporation of Caries Management by Risk Assessment (CAMBRA) Into a Dental Hygiene Program

M. Diane Melrose, MA, BSDH; Lupe Arevalo, RDH, BS; Karen Matsumura-Lem, DDS, BSDH; \*Donna M. Smith, MSEd, BSDH, RDHAP

**Purpose/Goals:** The purpose of this project is to describe how Caries Management by Risk Assessment, CAMBRA, is incorporated into a dental hygiene program. **Significance:** CAMBRA is a program designed to diagnose, treat and prevent the progression of caries by assessing the patient's risk level and level of caries activity to determine appropriate treatment strategies. CAMBRA is based on the principle that conventional restorative treatment is ineffective to treat the etiology and risk factors of caries. The goal is for patients to take an active role in the prevention and management of dental decay. The second goal is to prepare students to use this approach in clinical practice. **Approach/Key Features:** During the data collection appointment all patients complete a Caries Risk Assessment Form resulting in identifying their caries risk level: low, medium, high or very high. If the patient is at high risk, a salivary test may be conducted to determine flow rate and pH. For patients with inadequate salivary flow, their CAMBRA risk increases to very high. Patients who are in the high and very high risk categories are offered enrollment in the program and receive a specifically designed CAMBRA kit, including 1.1% NaF toothpaste, xylitol mints or gum, 0.12% CHX mouth rinse, dental floss and a toothbrush. Patients receive home care instructions, nutritional counseling and are placed on a 3 to 4 week evaluation schedule to assess their progress and adherence to the program. **Evaluation:** The program was implemented January 2011 and has enrolled approximately 140 of 500 patients who were identified to be at high risk. Program evaluation will initially include a 2 week, 4 month and 8 month follow up. Assessment of patient compliance and the reduction of risk factors will be determined at these intervals.

## Occupational Health and Safety

### Interprofessional Education in Clinical Ergonomics: Collaboration of Dental Hygiene and Occupational Therapy

\*Colleen Whitt, RDH, MS; Marilyn Heyde, RDH, MPH

**Problem Statement:** Throughout their careers, dental hygienists encounter problems due to cumulative traumatic disorders (CTDs) and musculoskeletal disorders (MSDs). CTDs and MSDs impact dental hygienists (DHs) on physical, emotional and financial levels. **Purpose:** The purpose of this study is to increase student awareness of factors associated with MSD and CTD symptoms and to identify factors which affect ergonomics in the clinical setting. **Methods:** A review of the literature substantiated the need to focus on the importance of ergonomic education in the dental hygiene clinical setting. The study began with a Likert-type survey assessing 42 students' knowledge of ergonomics. The written survey contained 5 questions with closed-ended responses and an opportunity to comment. This single-blinded study ultimately utilized 21 students who were unsuspectingly evaluated and photographed by occupational therapy (OT) students during a clinic session. All students at Loma Linda University sign a waiver allowing them to be photographed during their time at the school. The OT students were able to evaluate the DH students' ergonomics including the seating, head and neck, and hand/wrist positions. A month after the clinic session, an OT educator hosted a seminar with the photographs of the DH students in "compromised positions" which opened the door for further education and research between the disciplines of dental hygiene and occupational therapy. Each DH student received an "Ergonomic Evaluation Worksheet" composed by OT students. **Results:** Individualized ergonomic evaluations are an invaluable learning tool for both OT and DH students and their instructors. Many factors associated with CTDs and MSDs can be reduced, modified, or eliminated when new habits are learned, encouraged, and acquired. **Conclusion:** DH educators and students acknowledge the need for seminar-style programs encouraging

collaboration between OTs and DHs where we can learn to recognize, intercept, and reduce risks for student MSDs and CTDs.

## Technology

### Evaluation of a Colorimetric Assay Strip's Ability to Detect Periodontitis

\*Patricia A. Lenton, RDH, MA; Maureen C. Leesman, Pharm D; Scott W. Lunos, MS

**Problem Statement:** Colorimetric assay strips have the demonstrated ability to detect cytotoxic volatile and non-volatile thiol compounds in oral fluids. These strips demonstrated good correlations between strip value and the presence of periodontal pockets in a dog study ( $p < 0.001$ ). It is not known if these strips are able to assess gingival status in humans. It is important to determine the utility of these strips to be used as a potential screening device by health professionals. **Purpose:** To determine the assay strip color scores ability to differentiate human subjects with periodontitis vs. gingivitis. **Methods:** This single-blind study used a convenience sample of 85 patients from the University of Minnesota Dental School who responded to posted study flyers. A calibrated examiner recorded full-mouth periodontal measures. Using criteria developed a priori, 14 were classified as having gingival health, 21 with gingivitis and 25 with periodontitis. Thiol levels were measured using assay strips sampled at 3 locations: facial maxillary gingiva, facial mandibular gingiva and sublingual mucosa. A blinded examiner rated strip scores. The Student's t-test compared mean scores among classifications. **Results:** Mean color scores for the periodontitis and gingivitis groups did not differ significantly at any of the sampling sites: maxillary (mean (SD): 3.6 (1.5) vs. 4.3 (1.9),  $p = 0.15$ ), mandibular (4.0 (1.5) vs. 4.3 (1.8),  $p = 0.62$ ) or sublingual (1.6 (1.0) vs. 2.2 (1.6),  $p = 0.14$ ). **Conclusion:** Further assessment of variables such as smoking and salivary pH levels, that might affect strip results, are being investigated to improve the performance of the test strips in evaluating gingival health in humans.

Study funding was provided by ALT BioScience, Lexington, KY, USA.

## Clinical Efficacy And Safety Of A Novel Interproximal Cleaning Device

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**Problem statement:** Interproximal cleaning is an important aspect of daily oral hygiene that many patients continue to struggle with. **Purpose:** The objective of this IRB-approved study was to evaluate the safety and efficacy of a novel interproximal cleaning device (ICD) on interproximal plaque removal and gingivitis reduction. **Methods:** 148 adults (98 female, 50 male, mean age: 39.5 years) with moderate gingivitis were enrolled in this single-blind, 4 week, parallel, randomized controlled clinical trial. Subjects were randomized to manual toothbrush (MTB, 2 minutes, twice a day) with or without adjunctive use of ICD (once daily, evening). Safety was assessed through oral examination, prior to other assessments at baseline, 2 weeks and 4 weeks. Gingivitis was measured with Modified Gingival Index (MGI) and Gingival Bleeding Index (GBI). The amount of interproximal plaque was evaluated by analyzing the protein concentration of plaque samples collected from 4 posterior sites and 2 anterior sextants. At week 2, plaque removal efficacy was assessed by collecting plaque samples directly after subjects used their assigned treatment regimen. **Results:** While both regimens reduced gingival inflammation, ICD resulted in a significantly greater reduction in MGI, GBI and number of bleeding sites after 2 and 4 weeks of use ( $p < 0.01$ ). Interproximal plaque evaluated after single-use showed that ICD removed significantly more interproximal plaque than MTB alone ( $p < 0.01$ ). Both products were safe to use. **Conclusions:** The novel interproximal cleaning device was safe to use, removed more interproximal plaque, and resulted in significantly greater reductions in gingivitis over 4 weeks of use.

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## Clinical Monitoring of White Spot Lesions in Children: 18-Month Data

A George K. Stookey, PhD; Roger L. Isaacs, DDS; Valerie A. White, DDS; \*Amy J. Nuñez, BSDH; Bart D. Collins, BS; Justin S. Williams, BS; Susan Ofner, MS; Barry P. Katz, PhD; James S. Wefel, PhD; John D. Hennette, DDS

**Problem Statement:** Traditional methods for detecting caries (visual, tactile and radiographic) cannot detect early (non-cavitated) caries. Once

discovered, lesion reversal is impossible. Consequently, there is a need to detect early stages of demineralization, because non-cavitated lesions are completely reversible. **Purpose:** The study purpose is to determine the ability of visual and instrumental procedures to monitor changes in white spot lesions in children. **Methods:** Following IRB approval, 121 children (aged 7 to 17) presenting with two white spot lesions were recruited from a pediatric dental practice. Subjects were provided with fluoride dentifrice (Crest®) to use twice-daily. Evaluations of white spot lesion activity have occurred at all study visits both visually (using the ICDAS method) and instrumentally using light fluorescence (QLF/ Inspektor™ Pro; FluoreCam®). Beginning with the 6 month visit, subjects received fluoride varnish (Vanish™, 3M ESPE) at each visit. To date, subjects were seen at 0, 3, 6, 12 and 18 months. Subjects will be seen again at months 24 and 30. **Results:** At months 3, 6, 12 and 18, mean ICDAS indicated that lesions were not changing in severity but were decreasing in activity. Mean Inspektor™ Pro/QLF fluorescence measurements at 0, 3, 6, 12 and 18 months were 12.49, 12.07, 10.64, 10.79 and 9.45 with remineralization between month 0 to 6, 12 and 18 statistically significant. Mean FluoreCam® measurements were 11.22, 10.84, 10.11, 9.32 and 9.02 with remineralization between month 0 to 12 and 18 statistically significant. Plots of means revealed that FluoreCam® was more consistent in direction than Inspektor™. **Conclusions:** These preliminary data suggest that both fluorescence instruments are able to monitor early enamel changes, with Inspektor™ on average demonstrating more variation in direction than FluoreCam®.

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## In Vitro Efficacy of an Alcohol-Free Essential Oil Containing Mouthrinse

Donna Ilg; James Anthony McGuire, MS; Carolyn J. Mordas, PhD; Daniel Queiroz, Tara Foure, \*Sylvia L. Santos, RDH, MS

**Problem Statement:** Oral biofilm are difficult to control because of their diversity and variability on oral surfaces. Laboratory and clinical testing provides evidence of the broad spectrum activity of LISTERINE® Antiseptic. The aim of this study was to evaluate the germ kill potential of a new alcohol-free essential oil-containing mouthwash. **Purpose:** The purpose of this study was to evaluate the antimicrobial potential of an alcohol-free, essential oil mouthwash (AFEO) when tested versus human pooled saliva and against oral microorganisms using critical kill time (CKT) and an established multi-treatment biofilm model (MTBM).

**Methods:** CKT: Inoculum was exposed to commercially available alcohol-free (CAAF) rinses, such as LISTERINE® ZERO™, Meridol® and Crest® Pro-Health™, according to usage instructions. An aliquot was removed, neutralized, and plated on OOPs III agar or TSAB +HK to determine volatile sulfur compound (VSC) producing colony forming units (CFU/ml) or total organisms. CFU/ml from the AFEO mouthrinse were compared to a negative control for percent reduction. MTBM: Stimulated saliva was collected from donors, pooled, homogenized and dispensed into a 12-channel bio-cassette. A 96 peg lid was placed in the bio-cassette, media was added to the system, and biofilm formed on the pegs under continuous flow. The MTBM consisted of 5 30 second treatments with the CAAF rinses over the course of 60 hours. Biofilm were harvested by sonication, and analyzed for ATP-bioluminescence. Results were reported as mean log<sub>10</sub> relative light units (RLU). Plating was performed using OOPs III agar to enumerate VSC-producing colonies. **Results:** CKT: The AFEO rinse showed 99.9% reduction versus control for all organisms tested. MTBM: Calculated log<sub>10</sub> RLU for AFEO mouthrinse were not statistically significantly different than the CAAF mouthrinses tested. **Conclusion:** These results show that LISTERINE® ZERO™ was as efficacious as other alcohol-free mouthwashes tested in these models.

Funding for this project through Johnson & Johnson Consumer & Personal Products Worldwide, Division of Johnson & Johnson Consumer Companies Inc., Morris Plains, NJ, USA.

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### In Vivo Efficacy of an Alcohol-Free Essential Oil Containing Mouthrinse

Donna Ilg; Lauren Junker, PhD; James Anthony McGuire; Carolyn J. Mordas, PhD; Daniel Queiroz; Danette Ricci-Nittel, MS; \*Christine Charles, RDH

**Problem Statement:** A novel in vivo germ kill model was used to examine the antimicrobial activity of an alcohol-free, essential-oil (AFEO) mouthrinse on total microorganisms and malodor associated volatile sulfur compound (VSC) producing microorganisms. **Purpose:** The purpose of this study was to determine the potential of LISTERINE® ZERO™, an AFEO mouthrinse, to reduce the number of total and VSC microorganisms in the mouth after a single use.

**Methods:** This IRB-approved, single-use, randomized, observer-blind, supervised, controlled, parallel-design, clinical trial assessed the in vivo germ kill of an AFEO mouthrinse versus a brushing control. Thirty-seven subjects meeting inclusion/exclusion criteria entered a normalization period for 5 to 7 days of

brushing with an assigned toothbrush and ADA accepted fluoride toothpaste, twice daily. Subjects were randomized into a brush group or a brush and rinse group. At baseline, subjects rinsed with 5 mL of water for 10 seconds and collected expectorant plus 1 mL unstimulated saliva in a sterile tube. Subjects brushed their teeth with fluoride toothpaste for 1 minute and expectorated. Subjects rinsed with 5 mL of water for 10 seconds and collected the expectorant in a sterile tube. Subjects in the rinse group then rinsed with 20 mL of test product for 30 seconds and collected the expectorant. All expectorant samples were analyzed for total microorganisms and VSC organisms by spiral plating on TSA with blood and OOPs III agar. The CFU/mL from the AFEO mouthrinse were compared to baseline to quantify reduction. **Results:** The AFEO mouthrinse reduced total microorganisms by >99.9% and VSC producing organisms by >99.9% versus baseline. The brush group reduced total microorganisms by 65.3% and VSC producing organisms by 93% versus baseline. **Conclusions:** The results of this study demonstrate that the AFEO mouthrinse, when used as an adjunct to brushing, kills total and VSC microorganisms by millions (>99.9%) on contact.

Funding for this project through Johnson & Johnson Consumer & Personal Products Worldwide, Division of Johnson & Johnson Consumer Companies Inc., Morris Plains, NJ, USA.

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## Health Literacy/Cultural Competency

### Identification of Cultural Barriers to Care among a Population of Central American Women Seeking Care at a Public Health Dental Clinic

\*Beth E. McKinney, RDH, MS

**Problem Statement:** Cultural barriers to accessing care have recently become a focus of dental research. This study attempted to identify existing barriers among a group of 1,496 female immigrants aged 18 to 39 from Central American countries who sought dental care through a pregnancy program at a local health department. **Purpose:** The purpose of this study was to gather data which might be used to improve the program to make access to dental care easier for this population. **Methods:** A single reviewer looked at 1,496 dental records to ascertain patients dental health status at initial presentation. Data was collected regarding health history, dental history, missing teeth, caries, DMF and cultural dental procedures, and tabulated using an Excel spreadsheet. Periodontal disease was not looked at in regard to this study. **Main Results:**

Five areas of possible barriers to care were identified based on the chart review. They were: low basic literacy at a second grade reading level or less in their primary language (27%), caries management by extraction as evidenced by multiple missing teeth (70% of sample), the presence of active caries (80% of sample) and lack of prior restorations (32%), a cultural dental practice of open-faced gold jackets on upper anterior teeth for cosmetic reasons (14%), a cultural dietary practice of adding strawberry syrup to milk given to babies and the observation of one religious practice involving bracelets of red beads placed on the infants after birth. **Conclusions:** A number of possible cultural barriers to accessing and following through with recommended dental care and advice were identified in this study. The results will be used to educate county staff on cultural and health literacy issues in this population and to empower the dental program to better provide needed care to this group.

## Health Behaviors

### Two-Week Clinical Evaluation of Stannous Fluoride Dentifrice on Dentinal Hypersensitivity

\*Lois Barber, RDH, BSEd; Matthew L. Barker, PhD; Tao He, DDS, PhD; Naresh C. Sharma, DDS; Aaron R. Biesbrock, DMD, MS, PhD

**Problem Statement:** Patients desire short term benefits from the use of sensitivity toothpastes and there is limited data available to address their concerns. **Purpose:** To measure the desensitizing benefits of stannous fluoride (SnF<sub>2</sub>) dentifrice versus a sodium fluoride negative control over a 2 week period. **Methods:** This study was a randomized, parallel group, negative-controlled, 2 week clinical trial. Subjects reporting moderate dentinal hypersensitivity on 2 teeth were enrolled and randomized to either the 0.454% SnF<sub>2</sub> dentifrice or negative control used twice daily for 2 weeks. Subjects followed manufacturers' instructions for use. Thermal cold air assessments for the Schiff Index (examiner) and separately Visual Analog Scale (VAS, 0 low to 100 high, subject) were performed at baseline immediately after the first product use, day 3 and week 2. Treatment comparisons utilized ANCOVA. Tactile Yeaple probe assessments were performed at baseline, day 3 and week 2, and treatments were compared using ANOVA. **Results:** One hundred eleven subjects participated in the research with a mean age of 44 years and baseline mean scores of 2.83 Schiff, 77.8 VAS and 10 Yeaple. Relative to negative control, the SnF<sub>2</sub> dentifrice demonstrated significant ( $p < 0.0001$ ) mean

reductions in Schiff Index of 13.8% immediately after the use, 31.8% by day 3, and 61.3% by week 2. For subject-assessed VAS, significant ( $p < 0.0001$ ) mean reductions for the SnF<sub>2</sub> dentifrice relative to negative control attained 14.6% at immediate, 34.8% at day 3, and 66.6% at week 2. Significant ( $p < 0.0001$ ) mean improvements for Yeaple Probe were observed for the SnF<sub>2</sub> dentifrice versus control at day 3 and week 2. **Conclusions:** The stannous fluoride dentifrice provided instant and rapid relief in dentinal hypersensitivity versus a negative control.

Funding for this project was provided by P&G.

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## Other

### In-Home Use Test to Evaluate Ease of Use and Assess Compliance of Philips Sonicare Airfloss

\*A.S. Master, BDS; S. Krell, BS; A. Kaler, BS, MBA; J. Wei. Philips

**Problem Statement:** Interproximal cleaning is an important aspect of daily oral hygiene in addition to the regular use of a toothbrush. Dental floss presents patients with significant handling challenges resulting in infrequent use or complete omission. **Purpose:** To assess ease of use and compliance of Philips Sonicare AirFloss (PSAF) in a sample of irregular flossers after using the device at home. **Methods:** Two independent studies were conducted for ease of use and compliance, for 3 weeks and 1 month, respectively. Eligible participants included 115 adult irregular flossers. Compliance study (56 participants) - All received the PSAF, a daily-usage diary and product instructions. Participants reported frequency of usage of the product in the diary every day. In addition, feedback was recorded using an online questionnaire at the end of the month. Preference Study (59 participants) - A 3 period, randomized crossover study using 3 interproximal cleaning devices, PSAF, string floss and an oral irrigator. Participants reported to the clinic weekly to receive an alternate device to use at home. At Visit 4, an online survey link was sent to subjects to report their feedback for each product used. **Results:** On average, irregular flossers used PSAF 1.3 times a day, 96.1% of the participants used PSAF 4 or more days/week, 86% and 69% of study participants reported PSAF as easier to use than string floss or an oral irrigator, respectively, while 78% and 81% reported PSAF as being more gentle teeth and gums and providing better access to the back of the mouth than string floss, respectively. **Conclusions:** Among a sample of irregular flossers, Sonicare AirFloss significantly improved compliance and was reported to be a preferred alternative for interproximal cleaning,

relative to other commonly used modalities.

This research was supported by Philips Oral HealthCare.

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## Systematic Reviews

### Safety of Oscillating-Rotating Powered Brushes Compared To Manual Toothbrushes: A Systematic Review

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**Problem Statement:** Oscillating-rotating (O/R) power toothbrushes have been proven clinically efficacious. A comprehensive review of all clinical and laboratory investigations solely comparing the safety of these toothbrushes to the standard of care have not been documented. **Purpose:** The aim of this systematic review was to examine the literature concerning the relative soft and/or hard tissue safety outcomes with the use of O/R toothbrushes compared to manual toothbrushes. **Methods:** Electronic databases of PubMed-MEDLINE, Cochrane-CENTRAL and Excerpta Medical Database (EMBASE), were searched for in vivo and in vitro trials through May 2010 to identify appropriate studies that evaluated the safety effects of an O/R toothbrush compared to a manual toothbrush. Eligible trials incorporated a safety evaluation as a primary or secondary outcome parameter or used a surrogate parameter. Data extraction for the safety studies and a meta-analysis of the gingival recession data were performed. **Results:** Independent screening of 697 PubMed-MEDLINE, 436 Cochrane and 664 EMBASE papers resulted in 35 publications that met eligibility criteria. The mean change in gingival recession was not significantly different among groups in the two trials with safety as a primary outcome (weighted mean difference: 0.03). A meta-analysis of the 5 trials that evaluated safety with a surrogate parameter was not possible; however, there were no significant between-group differences at the study end in any trial. A descriptive analysis of the 24 selected studies assessing safety as a secondary outcome revealed few brushing-related adverse events. The heterogeneity in objectives and methodology of the four in vitro trials that met the eligibility criteria precluded generalization of the results. **Conclusions:** A large body of published research has consistently shown oscillating-rotating toothbrushes to be safe compared to manual toothbrushes, demonstrating that these power toothbrushes do not pose a clinically relevant concern to hard or soft tissues.

Funding was provided by P&G.

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### Association Between Obesity and Periodontitis: A Systematic Review

\*Jean Suvan; Francesco D'Aiuto; David R. Moles; Aviva Petrie; Nikos Donos

**Objectives:** Obesity and overweight have been suggested to be associated with periodontitis. Numerous studies investigating this association, with varying results, have been published. A number of narrative reviews have attempted to provide summaries of studies. This project presents results of a systematic review investigating the association between obesity or overweight (as defined by the WHO) and periodontitis in adults. **Search Strategy/Selection Criteria:** Search strategy included electronic and hand searching. Ovid MEDLINE, EMBASE, LILACS, and SIGLE (no year/language restrictions) were searched. RCTs, Cohort, Case Control and Cross Sectional study designs that included measures of periodontal disease and body composition were eligible. **Data Collection and Analyses:** Screening and data abstraction (including bias protection assessment) were performed independently, in duplicate. Meta-analyses were performed when appropriate using random effects models. **Main Results:** Five hundred and twenty-six titles and abstracts were screened, resulting in 61 full text articles and abstracts assessed for eligibility with 34 being included. Nineteen studies investigating the association between prevalence of periodontitis and body mass index (BMI) provided sufficient information for inclusion in meta-analyses. Meta-analyses indicated a statistically significant association between presence of periodontitis and BMI category obese OR 1.81(1.42, 2.30), overweight OR 1.27(1.06, 1.51) and obese and overweight combined OR 2.13(1.40, 3.26). **Conclusions:** This research supports the hypothesis of an association between body mass index categories overweight and obese and periodontitis although unclear as to the magnitude. Further prospective studies designed to quantify, and/or understand the mechanisms, of this association are merited. There is currently insufficient evidence to provide guidelines to clinicians on the clinical management of periodontitis in overweight and obese individuals. **Acknowledgements:** work was undertaken at UCLH/UCL who received a proportion of funding from the Department of Health's NIHR Biomedical Research Centres funding scheme. This project was supported in part by an educational grant provided by Johnson & Johnson Consumer Services EAME Limited.

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