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As Assessment of Online Learning in a Dental Hygiene Baccalaureate Degree Completion Program

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The Ohio State University's Dental Hygiene Program recently implemented a baccalaureate degree completion program (BDCP) in a web-based online format. In 2005, The Institute for Higher Education Policy set 24 benchmarks to ensure quality of internet-based distance education. To meet these benchmarks, the BDCP is continually reviewed to ensure quality learning.

Objectives. The objective was to assess student perceptions of the quality of learning and effectiveness of the online BDCP to meet the teaching/learning and course structure benchmarks.

Methods. A 16-item, 5-point Likert scale questionnaire was administered to enrolled dental hygiene students (n =13).

Results. Seventy-seven percent of students felt as equally challenged in an online course as in a traditional classroom course, and 85% replied that the online program is more convenient than a traditional program. One hundred percent felt the courses expanded their dental hygiene knowledge while 92% stated the online curriculum contained content not previously studied. The course objectives were clear (92%) and the syllabi contained the expectations of the assignments, deadlines, and grading criteria. Participants strongly agreed that peer interaction is important and that the courses developed critical thinking skills (92%). In discussion forums, the students felt the online learning was enhanced by other students' discussions and helped them see other viewpoints (92%). Fifty-four percent noted they are more willing to discuss topics online than in a traditional course. One hundred percent of students felt assignment feedback was constructive and provided in a timely manner.

Conclusion. Students feel the quality of learning and effectiveness of the online program is as equally challenging and satisfying as a traditional classroom learning format. This response demonstrates that the program strives to meet the benchmarks set to ensure quality internet-based education while providing advanced degrees to dental hygienists.

Integrating Dental and Dental Hygiene Students in an Oral Anatomy Course

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The purpose of this study was to assess dental hygiene (DH) students' perceptions regarding their oral anatomy course that integrates DH students in the first quarter of the curriculum with entering undergraduate dental students. The oral anatomy course is given to both DH and dental students in their first quarter at the same point in time. The intent of combining the classes is to foster cooperation and collaboration as well as efficiently utilizing dental and DH faculty resources. Research indicates that 2 differences between entering pre-doctoral students and beginning DH students are maturity and complexity of thought processes. With this in mind, DH students are given supplemental recitation experiences, additional quizzes, and extra lab experiences, which results in a separate grade assignment. All students attend lectures and laboratories together. At the completion of the oral anatomy course, DH students (N=33) were given a 10-item survey, using a 4-point Likert scale and open-ended questions concerning their perceptions of the combined class. Ninety-seven percent either agreed (A) or strongly agreed (SA) that they liked the integration of students while 100 % either A or SA that the lecture material was aimed at both DH and dental students. One hundred percent either A or SA that the extra lab experiences including practice tooth ID exercises were helpful. Seventy-three percent either A or SA that the recitation sessions were helpful and 88% felt the difficulty level was appropriate for DH students. A student commented, "I loved having lecture with dental students." "It makes us feel as one unit, but it is nice breaking up into a small group on Thursday mornings." The DH students appear to like the integration with dental students in the oral anatomy course. Comments did reveal some DH students felt that the additional quizzes in recitation were more difficult than those given with the dental students. Students also indicated that the additional lab exercises and practice tooth ID's were very helpful.

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Dental Hygiene Clinical Assessment Incorporating Graded and Nongraded Feedback: Design, Implementation and Results

Elaine M Sanchez Dils, RDH, MA

Clinic is a vital part of the dental hygiene curriculum. It is imperative to integrate systems that meet current educational paradigms, determine and attempt to meet the needs of the learners while adhering to the established protocols of an accredited dental hygiene program. Students expressed several concerns about their clinical experiences. In order to address these concerns, an innovative clinical assessment protocol was developed and integrated.

In this protocol, designated clinical requisites are divided into graded (assessed) and non-graded (feedback) requirements. Students determine on a case-by-case basis if their patient will be graded or nongraded. Assessed cases are graded according to the established Standards for Clinical Performance Criteria. Each standard has a set number of errors which constitutes a score of clinically acceptable or clinically unacceptable. The sum points attached to each acceptable or unacceptable standard gives a percentage score for the individual case. Cases that are selected to be nongraded are given formative and summative qualitative comments based upon the Standards. An additional requirement of this system is that instructors must give written remarks on each student's daily activities regardless if the patient is assessed.

A 14- item survey evaluating student experiences with the assessment protocol was conducted. The key findings suggest significant changes in the learning environment: 1) 91% of the total responses showed that stress was always or frequently reduced from having nongraded patients; 2) more than half of the students reported having an excellent increase in instructor feedback when compared to previous semesters; and 3) all respondents reported a greater ability to ask questions of instructors on nongraded cases. Additionally, students reported experiencing a greater sense of control of their clinical education by having the ability to choose when a patient is to be graded. This assessment system has addressed the aforementioned clinical concerns.

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Evaluation of Group Assessment in a Didactic Dental Hygiene Course

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Experts in curriculum design and educational methodologies encourage faculty to incorporate new strategies into their courses and practice the scholarship of teaching. One emerging strategy is group assessment. The goals of this new program were to enhance student learning and assist students in developing interpersonal relationships early in the curriculum by engaging students in collaborative and active learning strategies. Key features of the program included a group assessment strategy where 29 (n=29) dental hygiene students took 8 (n=8) individual assessments (quizzes) immediately followed by completion of the same assessment in a 5-member peer group as part of a didactic dental hygiene course during their first semester. A 2-Factor ANOVA and F-test statistical design compared student performance on individual and group assessments. At the end of the semester, students provided self-reflection data regarding their perceptions of the process. Faculty reflection and graduate student observations were recorded. Qualitative analyses were used to analyze the data. Results suggest that group scores were higher than individual scores. Students perceived the group assessment strategy as positive, helping them learn from each other, receive immediate feedback, and retain knowledge through repetition. Fairness and time constraints were raised as concerns. Group assessment benefited individual preparation, interaction with peers, and students' relationship with faculty. The group assessment strategy used in this dental hygiene course had a positive impact on student learning and student perceptions of learning. However, faculty must consider the issues regarding perceived fairness and the impact of shared assessments in determining the overall course grade.

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Expanding School-Based Sealant Programs to Realize Treatment Cost Savings in Colorado

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Children of lower socioeconomic status suffer a disproportionate amount of dental caries compared to their higher income counterparts. Dental sealants have been shown to be effective in preventing caries in permanent molars. Targeting school-based sealant programs using free and reduced lunch participation as a proxy for income is cost-effective in reducing decay in populations at greater risk for dental disease.

In 2004, the prevalence of dental sealants in first permanent molars among third-graders in Colorado was determined using a random sample of 44 schools. Approximately 34% of third-graders were found to have at least one sealant, significantly less than the desired Healthy People 2010 objective of 50%. In 2005, the Colorado Oral Health Program, Be Smart and Seal Them, embarked on an expansion of school-based sealant programs focused on meeting the Healthy People 2010 objective and incorporating the use of CDC-developed software (SEALS) to evaluate efficiencies and monitor program impact. The ground work for this expansion was based on a yet unpublished cost-effectiveness study by health economist Joan O'Connell, PhD, et al in 2004. Sealant delivery, targeted to second-graders in greatest need of oral disease prevention, was secured through contractual agreements with independently practicing dental hygienists.

In 2006, the efforts of the Colorado Be Smart and Seal Them program doubled the percentage of schools participating in the program and the number of children served increased by 55%. An estimated 2200 occlusal caries were averted saving an estimated \$212 000 in treatment costs of single surface, occlusal, amalgams. In 2005-2006 Be Smart and Seal Them developed in capacity (contractors, coordinator, schools, students); uniform data reporting (SEALS coordinating all contractor activities); and meeting the greatest oral health needs (disparities reduced, disease averted, cost savings). Contractors and the state coordinator reported areas of growth and improvement and identified further needs.

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Evaluation of Online Learning with Rubrics

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Degree completion dental hygiene students often find it difficult to adapt to a totally online environment because there is no face-to-face communication. How to study and "uncovering" material is very important in the computer-based environment. One method to enhance learning-centered teaching is the use of rubrics. A rubric is a scoring tool that provided the specific requirements for an assignment by describing the specific parts of an assignment and what constitutes acceptable and unacceptable levels of performance for each part. This poster will demonstrate sample rubrics for theory-based and service-learning within the online environment. The requirements for an effective rubric will be described. Rubrics can save teachers many hours of grading while providing meaningful and timely feedback to students. Students may use rubrics for self-evaluation of their own work before submission of their assignments. Rubrics provide a "fair" way of evaluating student learning. Rubrics have been shown to allow online students to adapt to the degree completion program and to have a better understanding of what is expected of them as critical thinkers and evidence-based learners.

Patient Knowledge of the Link Between Diabetes and Periodontal Diseases

Missy M Please, RDH, MS

Knowledge of possible complications associated with disease is generally viewed as a precursor to positive health behaviors. The purpose of this investigation was: 1) to determine the knowledge of individuals with diabetes of the potential risk of periodontitis due to their disease; 2) to identify if a relationship exists between the frequency of positive oral self-care behaviors and knowledge related to diabetes; and 3) to ascertain if diabetics are receiving information regarding the risk of periodontal diseases from members of their health care team. The study was approved by the University of New Mexico, School of Medicine, Internal Review Board. Fifty-two persons meeting predetermined eligibility requirements were asked to participate in the study as they presented for health care appointments at participating health care sites; three were ineligible and four declined to participate (n=45). Data were collected via a 22-item, self-reported questionnaire. Data analyses including frequencies and tests of association were conducted by the statistical software program MINITAB® Release 14. The key findings of this investigation were: 1) the majority (91%) of the subjects reported a belief that oral health could be affected by diabetes; 2) the knowledge of the oral-diabetes link is not associated with frequent tooth brushing and flossing, but is associated with having a dental cleaning within the previous 12 months and the use of an OPT device ($p<.05$); and 3) less than half of the participants were advised by a health care provider that they should practice preventive oral-self care behaviors or received information regarding the relationship between diabetes and periodontal diseases. Findings support the need to investigate the motivational and behavioral methods related to preventive oral health practices and incorporate such strategies into diabetes educational programs and clinical settings.

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The Role of Service Learning Throughout the Dental Hygiene Curriculum

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The dental hygiene curriculum at the University of South Dakota is primarily service-oriented and students provide dental hygiene services in various settings as course requirements. In addition, many service-learning projects are embedded throughout the curriculum. Beginning in their preclinical course, students develop and complete a service-learning project, then reflect on what they've learned about themselves and those assisted. Projects range from basic toothbrushing instructions for preschool children to interactive education for prenatal and "Baby & Me" classes and leading an interdisciplinary team of professional students in applying fluoride varnish to over 200 elementary children. SADHA members' civic involvement has improved the quality of life of soldiers by sending kits overseas and of inmates by delivering holiday sacks. As up to 90% of the graduating class receives their BS degree, all must meet a 15-hour service-learning requirement for USD's signature IdEA (Interdisciplinary Education and Action) program. Currently, dental hygiene students in this course are making fleece blankets for those less fortunate. This project involves grant writing, matching funds, speaking at a board meeting, and comprising a budget and timeline. Students learn everyone has a role, and coordinate activities to achieve a common purpose.

Faculty have found students stretch beyond the classroom and learn from these real world experiences. As such, they are provided with diverse learning experiences, a goal of our program. The written reflections following completion of the projects are positive indicating greater self-esteem, more awareness of societal inadequacies, and a desire to be involved in a community as they begin their professional careers. We believe service learning enhances dental hygiene education and is an integral part of our curriculum.

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Outcomes Assessment of an Education Program to Enhance Ethics and Professionalism in Dental Hygiene Practice

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This project is the culmination of a long-term program to enhance student competence and program outcomes related to ethical reasoning and professionalism. The process included: 1) developing 5 supporting competencies; 2) assessing related course content and evaluation methods; 3) incorporating ethics and professionalism throughout the curriculum; 4) implementing faculty development using core values for assessing students' professional judgment in clinic; 5) evaluating students' professional judgment during patient care; and 6) surveying graduating students and recent alumni in practice.

Affective and tangible components of ethical reasoning and professionalism can be competitive with financial and production expectations in practice. Students must be taught ethical decision-making and critical thinking skills to resolve competing interests and provide patient-centered care. To ascertain if competence is retained effective evaluation is needed throughout the curriculum, at graduation, and after entry into practice.

Outcomes assessment of ethics and professionalism included graduating seniors' exit interviews (N=25) and alumni surveys one and 3 years post-graduation (N=29). Qualitative differences after program implementation were notable with 100% exit interview comments positive regarding education in ethics and professionalism, no suggestions for improvement made, and all interviewees reporting competence and confidence in ethical reasoning and decision making. Comments (49%) prior to curricular change and faculty development suggested changes needed in this aspect of their education. One year and 3 years post-graduation respondents (100%) strongly agreed or moderately agreed with the following: 1) their reasoning ability about ethical and professional dilemmas was enhanced by their dental hygiene education; 2) they demonstrated professional conduct in practice using ethical decision making and problem solving skills; and 3) their professional decisions were consistent with dental hygiene standards of care and legal regulations. This project documents long-term effectiveness of one approach for increasing awareness and competency in ethics and professional responsibility during patient care.

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Developing Instructional Materials: An Independent Study Practicum for Dental Hygiene Students

Melanie L Simmer-Beck, BSDH, MS and Nancy T Keselyak, BSDH, MA

With the recent advancements in technology, dental hygiene students are learning didactic knowledge in a much different way. Platforms such as Blackboard allow students to learn and study core classroom materials at remote sites. The goals of this practicum were to create interactive instructional videos for junior dental hygiene students based on established teaching competencies, to engage students in peer mentoring, and to explore alternative career options for dental hygiene graduates. The key features of this practicum were for 3 (n=3) senior dental hygiene students to: understand the elements necessary to develop quality educational materials using current technology, experience the process of developing instructional and evaluation resources, and participate in classroom and clinic teaching activities using the resources they developed. The practicum defined content area, reviewed current literature for evidence to support the content of the videos, developed a logical sequence for teaching the instructional information, and collaborated with content experts to create instructional videos. Each video was evaluated by the practicum students, faculty mentors, and content experts and revisions were made. The practicum students produced teaching videos for cubical preparation, the intra- and extra-oral examination, wheelchair transfer techniques, use of the explorer, and use of the probe. The practicum students will evaluate their work by surveying the Dental Hygiene Class of 2008 to determine how instructional materials were used, frequency of use, and ways to improve in the future. The faculty mentors will evaluate the goals of the practicum at the end of the semester through a focus group session with the practicum students.

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Quantitative Analysis of Learner Performance in a Distance Educational Program

Jodi L Olmsted, RDH, PhD

Colleges and universities are using various distance learning (DL) formats for program and course delivery. Around the country, health education, including dental and dental hygiene training programs, are employing these types of program delivery models. University of Missouri-Kansas City (UMKC), 35 undergraduate, and 12 graduate programs in the US use various forms of DL for degree completion (ADHA, 2006). Several programs, including Waukesha County Technical College (WCTC), offered their entire lecture classes in dental hygiene via distance technology. Interactive television (ITV) was the distance media used. From a program perspective, quantitative evaluation of student performance on benchmark assessments was necessary to identify if students located at a distance were performing statistically differently than students taking courses with an instructor using a traditional face-to-face format.

Three research questions were asked: a) Were there statistically significant differences in learner performance on the National Board of Dental Hygiene Examination (NBDHE)?; B) Were there statistically significant differences in learner performance when considering GPAs?; and C) Did statistically significant differences in performance exist relating to individual course grades? A longitudinal assessment for a 10-year period was conducted to answer these questions.

T-tests were used for data analysis. While examining benchmark data from a cumulative perspective, and year-by-year, no statistically significant differences were apparent for the NBDHE and GPAs. From a cumulative perspective, similar results were found for individual courses. Interactive Television (ITV) was considered effective for delivering education to learners if similar performance outcomes were the evaluation criteria.

Mixed results were identified when individual course data by year and course-by-course data were considered. These various mixed results identify potential future research.

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A Delphi Study to Update the American Dental Hygienists' Association National Dental Hygiene Research Agenda (NDHRA)

Ann Eshenaur Spolarich, RDH, PhD and Jane L Forrest, RDH, EdD

Objective. The purpose of this study was to update the NDHRA to reflect current research priorities aimed at meeting national health objectives and to systematically advance dental hygiene's unique body of knowledge.

Methods. 49 dental hygiene experts and key opinion leaders representing all domains of the profession agreed to participate in a Delphi study to update and gain consensus on the NDHRA. IRB approval was obtained from USC. The study was carried out electronically in 3 phases: a development phase, 2 rounds of mailed questionnaires to gain consensus on topics, and one round to prioritize topics. Responses were analyzed using descriptive statistics, and instrument reliability was analyzed using the Pearson Product Moment Correlation Coefficient and Cronbach's Alpha for internal consistency.

Results. 112 topics reflecting 5 research agenda categories were identified during phase one. Through phase 2, 36 topics were eliminated and consensus was reached on 40 of the remaining 76 topics. Return rates of 100% and 95% were achieved for the 2 survey rounds. Instrument reliability was established at .76 and internal consistency at .87. Priorities for the 5 NDHRA categories were identified based on the importance of the topic to improving the health of the public and to advancing dental hygiene.

Outcomes. Each category comprising the NDHRA was well represented by the 40 topics. Thus, consensus on the national agenda was achieved. Identified priorities will be used to revise the NDHRA, direct future research efforts, identify research funding initiatives and guide education and practice.

This project is funded by the ADHA.

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Assessment of Clinic Journal Writing

Winnie Furnari, RDH, BS and Lerilei Kirby, RDH, BS

Journal writing is utilized as a teaching method. It is a reflective project, which should reveal gaps in student understanding yet encourage learning the skills of the profession. The purpose of this study was to garner graduate and faculty input to determine the degree of value, satisfaction, and worth each put on the requirement. Graduates were asked if they thought journal writing gave a clearer picture of patient needs, if it contributed to preparation to practice dental hygiene, if it stimulated an intellectual effort, if useful and positive feedback was given and received, and if journal writing should be a part of the dental hygiene program. Data were collected with 2 survey instruments, one for the graduates and one for the faculty. The response rate for the graduates was 46% and for the faculty 67%. Twenty-five percent of the graduates saw enhancement of their clinical experience, or were able to see a clearer picture of their patients' needs than those who weren't. Half of the graduates felt it should not be a part of the program, yet 86% of the faculty did. The variation in answers from graduates may indicate that the numbers are too small to draw any robust conclusions. We conclude that 41% of the faculty were not stressing the value or the performance of this task. The differences in the responses indicate a need to have students utilize the journal writing to their benefit and the need for more faculty members to be involved with the requirement. With more faculty involvement, we anticipate students utilizing this task as an additional learning tool for their clinic experience. A review of the requirement and its benefits will be instituted and necessary for the students to utilize it for its intended purpose.

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The Role of the Student Professional Organization in Mentoring Dental Hygiene Students

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The purpose of this study was to determine the role of the Student American Dental Hygienists' Association (SADHA) in mentoring dental hygiene students for the future. This project also assessed attitudes of SADHA advisors towards the utilization of SADHA as a mechanism for mentoring dental hygiene students' professional development to meet the oral health needs of the public, and the goals of the ADHA. These goals include promotion of education beyond the baccalaureate level to develop qualified faculty, encouraging dental hygiene research, and promoting leadership.

After IRB exemption, a pilot-tested questionnaire was administered using Survey Monkey, an online survey website, to 277 individual contacts at American Dental Association (ADA) accredited dental hygiene (DH) programs. A response rate of 68% was achieved with 186 individual responses. Eighty percent of respondents indicated offering no mentoring opportunities while incongruously, 58.3% felt they actively mentor through SADHA. When asked what the main focus of SADHA should be, SADHA advisors ranked community service/philanthropy as number one. SADHA chapters at institutions that offer a Bachelor of Science in Dental Hygiene (BSDH) degree completion program offer more mentoring opportunities ($p < .001$). Programs offering the BSDH offer a wider variety of topics from guest speakers ($p = .038$). SADHA chapters in western states have a higher graduate conversion rate than other regions ($p = .018$).

The majority of SADHA chapters are not offering mentoring opportunities outside of the traditional curriculum for leadership and career development. What is clear is that both students and advisors desire more interaction with the local ADHA organizations. In order to address these issues, efforts should be made to provide networking support among SADHA advisors, and increase perception of the importance of the student professional association through the development of Best Practices for SADHA. This could benefit students by increasing mentoring opportunities and partnerships with local ADHA organizations.

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Effects of Five Different Finger Rest Positions on Arm Muscle Activity During Scaling

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With the increased incidence of repetitive strain injuries in dental practitioners, dental hygienists must make informed decisions regarding instrumentation practices and procedures. The use of finger fulcrums may impact on muscle activity when scaling and influence the ergonomic practice of dental hygiene. The purpose of the research was to determine the effects of 5 different finger rest positions on forearm muscle activity during a simulated periodontal scaling experience. A convenience sample of 32 consenting senior dental hygiene students who met inclusion criteria participated. Using a 4 x 5 counter balanced research design each participant used a Gracey 11/12 curet to scale up to one cc of artificial calculus from the first permanent molar typodont teeth (#3, 14, 19, 30). Five different typodonts were set up for each participant with a different fulcrum randomly assigned for use on each typodont. Muscle activity was measured by surface electromyography. Data analysis with 2-way ANOVA revealed no statistically significant interaction effect between area of the mouth scaled and fulcrum used. The upper right quadrant produced the most muscle activity ($p=0.0101$) and the lower left quadrant produced the least ($p<.0001$). When comparing the overall muscle activity generated with each fulcrum only the cross arch fulcrum when compared to the opposite arch fulcrum produced statistically significant results ($p=0.0110$). Based on the results of this simulated clinical study similar muscle activity is produced while scaling when using all of the 5 fulcrums tested in each area of the mouth. Clinicians appear to experience minimal ergonomic advantages in terms of fulcrums used and area of the mouth scaled during a simulated scaling experience. Characteristics of the patient may be more important when choosing a fulcrum than the amount of muscle activity generated.

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Digital Radiography: Is it the Technique of Chicago?

Christine A Dominick, RDH, MOcEd

***Purpose.** To assess the level of implementation of digital radiography in dental hygiene programs. To find out if the placement of digital radiology instruction in the curriculum influences user preference.*

***Hypothesis.** Introducing instruction in digital radiography technique before film will result in increased student usage of digital radiography.*

***Method.** Observation of current instruction methods (digital first) in first-year radiology lab inspired the author to see if similar results were being witnessed in other programs. Electronic surveys were created to gather data from first-and second-year students, recent graduate hygienists, and dental hygiene program directors.*

***Results.** 141 surveys were sent to program directors, 44 were completed; 91 were sent to students, 41 were completed. 93.1% of hygiene schools teach radiology the first year; 72.7% teach digital radiography to laboratory competence; 84.8% of these programs use sensors. 100% teach film technique first. Of the programs allowing students to choose technique on patients(34.3%) 92.9% chose film. Students responded (45% yes, 40% no) when asked if learning one technique first influenced their preference. When allowed to choose technique, students choose film (60%) over sensors (42.5%). 87.5% expect to take digital radiographs when they are employed. 26.8% reported feeling comfortable, 53.7% fairly comfortable with digital.*

***Conclusion.** Teaching digital before film does not influence student acceptance. Students overwhelmingly expect to take digital radiographs when employed. Dental hygiene programs (3:1) have implemented hands on instruction in digital.*

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Interdisciplinary Collaboration: The Dental Hygienists' Role

Kelli Swanson Jaecks, RDH, BSDH

Recent scientific studies show strong correlations between oral and systemic disease, creating a crucial need for increased communication between the medical and dental professions. Interdisciplinary collaboration between medical and dental providers is emerging as a critical component to effective patient care. The role of the dental hygienist in interdisciplinary collaboration has been under-utilized and understudied. The objectives of this research are to assess dental Hygienists' perceptions of (1) their role in interdisciplinary collaboration, (2) the barriers to effective collaboration, and (3) communication skills needed to better participate in interdisciplinary collaboration. After Institutional Review Board approval from Oregon State University, data were gathered using a quantitative survey instrument. Variables measured regarding the dental hygienist's role included experience, confidence, importance, leadership, knowledge utilization, and the future of interdisciplinary collaboration. Participants consisted of a volunteer sample of Oregon dental hygienists (N=103), recruited from 2 large dental hygiene meetings. The overall response rate was 60%. To better understand the nature of relationships between variables, and to make comparisons among groups, statistical analyses included correlation analysis and t-tests.

Results show that dental hygienists perceive their role in interdisciplinary collaboration as valuable, both now and in the future. Barriers to collaboration include insufficient time and insufficient knowledge of medical diseases. Speaking, listening and leadership skills are necessary to effectively participate in interdisciplinary collaboration. Analyses of these findings elucidate a call for greater education in communication skills. The results of this study will be used to develop skill-building interventions to train dental hygienists in effective interdisciplinary collaboration.

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Computerized Digital Imaging Analysis of the Effectiveness of a Locally Applied Anti-Plaque Agent

Janet M Wehrli, RDH, Floyd C Knoop, PhD, Frank A Driscoll, DDS, MS and Stephen M Gold, DDS

This study utilized advanced computerized digital imaging software to evaluate photographs of the teeth and gums of subjects after their typical oral hygiene routine ('before') and compared them to subsequent photographs taken after the introduction of a tray-delivered anti-plaque agent for a 2-week time period ('after'). The scope of this study was limited to analysis of the photographic data of 27 subjects (54 photographs). The method used to gather data required that subjects apply the anti-plaque agent (Oraparx®) to both sides of a preformed foam dental tray. The tray was placed over the dental arches covering all teeth for a period of 10 minutes. Instructions emphasized that no other changes were to be made in their normal oral hygiene routine. The before and after photographs were analyzed using a modified Quigley-Hein Plaque Index correlated with the Navy Plaque Index. Computerized digital imaging analysis was performed on a typical photograph. Analysis produced mathematical comparisons of all photographs. Computerized pixilated images measured both the area of plaque-covered tooth surface and the density of the plaque. All photographs showed a visual, clinical, and mathematically significant decrease in dental plaque biofilm. The mean and median reduction in biofilm was 48% and 43%, respectively. Specifically, subject photographs that demonstrated normal daily oral hygiene 'before' showed a significant absence of dental plaque biofilm 'after' use of the anti-plaque agent. The results of this study demonstrate that the addition of a tray-delivered anti-plaque agent is significantly more effective in the removal of dental plaque than normal oral hygiene methods alone.

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A Study of Aseptic Techniques in a Dental Hygiene Educational Clinic

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Infection control is a critical component in the process of care for patients. Dental hygiene students must receive thorough instruction concerning aseptic techniques. Ongoing evaluations must be utilized to determine if students are performing these techniques. The purpose of this study was to evaluate possible areas of cross-contamination in a dental hygiene clinic and to determine if improvements needed to be made in the infection control protocols taught to the students. The study was conducted in an educational setting with IRB approval given on an exempt status. A dental hygiene clinic at a local University provided a purposive sample. Weekly, surfaces were cultured to determine the presence or absence of Staph or Strep spp. Pre test and post test swabbings were taken. The results of the study indicated that cross-contamination was evident in the radiology room and on the dental radiographic processor. On a percentage basis, cross-contamination was evident on 5% of the environmental surfaces during Week 1, with the lead apron showing positive for Staph spp. Week 2 results showed 10% of environmental surfaces contaminated with Staph spp. (lead apron and radiographic processor). Weeks 3 and 4 both had positive tests with 5% of the environmental surfaces showing cross-contamination of Staph spp. SPSS was used to design tables showing the Weekly Log Reports for the environmental surfaces cultured for the presence (+) or absence (-) of Staph and Strep spp. Results indicated that the cross-contamination may have occurred due to insufficient aseptic techniques by the students during the cleaning process. It was concluded that ongoing training in aseptic techniques should be taught to students in the clinical setting.

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Bactericidal Effects of Cold Plasma Technology on *Geobacillus Stearothermophilus* and *Bacillus Cereus* Microorganisms

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*Cold plasma is a state of matter that contains a large number of particles that are electrically charged. Plasmas generate chemically reactive species and ultraviolet radiation making them useful in decontamination applications (Kong & Laroussi, 2003). Research regarding the inactivation of gram-positive bacteria by cold plasma has been studied by Laroussi et al (2003); however, there is limited research regarding the germicidal effectiveness of cold plasma on *Geobacillus stearothermophilus* and *Bacillus cereus* microorganisms. The purpose of this study was to determine if cold plasma technology inactivates *Geobacillus stearothermophilus* and *Bacillus cereus* vegetative cells and spores. This study consisted of 981 samples; 762 experimental samples exposed to cold plasma at various times and 291 controls. Experimental samples were inoculated and exposed either directly or indirectly/remotely to cold plasma. After exposure the samples were incubated for 12 to 16 hours and colony forming units (CFU) were quantified. The percentage kill and log concentration reductions were calculated from the CFU counts. Data was analyzed using one-way ANOVA, Kruskal Wallis and Tukey's tests at the .05 level. There was a statistically significant difference in the inactivation of *Geobacillus stearothermophilus* vegetative cells for indirect exposure ($p=.0001$), direct exposure ($p=.0013$), as well as for *Bacillus cereus* vegetative cells and spores ($p=.0001$). Exposure of *Geobacillus stearothermophilus* spores to cold plasma demonstrated no statistically significant differences in inactivation for indirect exposure ($p=.7208$) and direct exposure ($p=.0835$). Results indicate that cold plasma exposure significantly inactivated *Geobacillus stearothermophilus* (vegetative) and *Bacillus cereus*; however, *Geobacillus stearothermophilus* spores were not significantly inactivated. Funding for this project was provided by ADHA IOH.*

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Employment Trends of Dental Hygiene Graduates from a Southeast Georgia University

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The purpose of this retrospective study was to determine the existence of employment trends with respect to benefits, salary, and work environment of Armstrong Atlantic State University dental hygiene graduates within a 10-year period. Following IRB approval, an ex post facto review of the 1997 through 2006 graduate surveys (46 item) was conducted. A limitation was indicated regarding slight revisions to specific survey items due evolving trends in salary and adjunct duties. Analyzing nominal data, based on percentages, the sample (N= 126), revealed that the majority of graduates practiced in a small city (50 000-200 000 population), in one dental office, 32-40 hours weekly, treating 9 patients daily. Similarly, the majority of graduates were paid salary wages, with only a small percentage receiving commission or a combination thereof. Further, it was found that sick leave, paid vacation, holidays, and raises remained relatively constant from 1997-2004; from 2005, a downward trend was indicated. Likewise, from 1997-2004 there was a relative increase for the provision of medical and liability insurance, with a noticeable decline thereafter. The number of graduates receiving free dental care decreased by nearly half in 2006 as compared to the years of 1997 and 1998. Over the years, the number of graduates eligible for discounted dental care increased. Between the years 1997 and 2005, performance of adjunct duties (use of desensitizing agents, antimicrobials, local delivery antibiotics, and sealants) tended to fluctuate, where in 2006 there was a sharp decline. Nutritional counseling and treatment planning services demonstrated a declining trend over the 10-year span. In conclusion and unexplainable, the year 2004 indicated the most favorable results in the aforementioned categories. Further concluded, the terms of employment, throughout the years, reflected that graduates tended to work full time in one dental practice.

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In Vitro Evaluation of the Reciprocating Disposable Prophylaxis Angle Versus the Rotating Disposable Prophylaxis Angle in Extrinsic Stain Removal Effectiveness

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This study determined the extrinsic tooth stain removing effectiveness of a 90° counter-rotational disposable prophylaxis angle (DPA) with rubber cup compared to the traditional 360° unirotational DPA with rubber cup. Four randomly-assigned groups of cleaned, sterilized, extracted human teeth, artificially stained with coffee, tea, tobacco, and red wine, were polished on the buccal and lingual surfaces using one of the 2 DPAs. Each dependent variable (4 different stain types) was tested 4 times with each prophylaxis angle, using 4 prophylaxis paste conditions, and 3 different rpm; therefore, 2 trials x 2 angles x 3 speeds x 4 stains x 4 grits = 192 trials on 96 teeth. For each trial, a DPA attached to a handpiece controlled by an eStylus™ was mounted on a testing apparatus that together controlled handpiece rpm and rubber cup pressure against the tooth. Stain removal effectiveness was measured with a Bioform Color Ordered Shade Guide both before and after the DPA was used with one of three different grits of prophylaxis pastes and a trial using no paste at 1500, 2000, and 3000 rpm. The evaluator was blind to the treatment status. Data were analyzed using a 3-way analysis of variance at p= .05 level. Results revealed no statistically significant difference between the two DPAs in extrinsic tooth stain removal. There was a statistically significant interaction among rpm (3000) of the DPA and the grit abrasivity of the prophylaxis paste suggesting that additional study may be indicated since coarse prophylaxis pastes remove stain more rapidly, but in doing so, can scratch and roughen the tooth enamel. Extrinsic stain removal effectiveness of the 2 DPAs were comparable when using different abrasivity prophylaxis paste and different rpm.

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Vital Tooth Whitening: Effects on Tooth Color Satisfaction, Beliefs about Dentofacial Appearance, and Self-Esteem in Older Adults

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The purpose of this study was to explore the effects of vital tooth whitening on tooth color satisfaction, beliefs about dentofacial appearance, and self-esteem in a population 50 years of age and older. A 2-group, randomized, pre-test, post-test, single-blind design was utilized following IRB-approval. Sixty-two participants were enrolled. Fifty-three participants (N=53) completed the study with no adverse events reported. Both the control and experimental groups received instructions for a 3-week oral self-care regimen, a toothbrush, toothpaste, and floss. The experimental group also received a tooth whitening product (independent variable) to be used during the same 3-week period. Dependent variable measures collected at baseline and at week three were: (1) tooth color measured using the Trubyte New Hue Vitality Scale, (2) tooth color satisfaction measured using the Tooth Color Satisfaction Scale, (3) beliefs about dentofacial appearance measured using The Beliefs about Appearance Questionnaire (ASI-R Short Form), and (4) self-esteem measured using the Rosenberg Self-Esteem Scale. Statistical analysis revealed significant differences ($p < .001$) in the experimental group for tooth color improvements and tooth color satisfaction. Tooth whitening did not significantly ($p < .05$) affect beliefs about dentofacial appearance or self-esteem. Additionally, a correlation was not demonstrated among tooth color, tooth color satisfaction, beliefs about dentofacial appearance, and self-esteem in an older adult population. Overall, tooth whitening had little psychosocial effect in this sample of older adults.

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Dental Hygiene Faculty Calibration in the Evaluation of Calculus Detection

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The purpose of this pilot study was to explore the impact of a dental hygiene faculty calibration training program on intra- and inter-examiner reproducibility levels on calculus detection using an 11/12 explorer. Inconsistency among clinic faculty members is frustrating for students. After Institutional Review Board approval, 12 dental hygiene faculty members were recruited for participation in the study and randomized to two groups (experimental and control). All subjects provided pre- and post-test measurements twice on three typodonts. Measurements were recorded on answer sheets. The experimental group received 3, 2-hour, training sessions which consisted of practicing a prescribed exploring sequence and technique for calculus detection. Subjects immediately corrected their answers with a key, received feedback from the trainer, and reconciled missed areas. Intra- and inter-examiner reproducibility levels (pre- and post-) were measured using Cohen's Kappa and compared between experimental and control groups using repeated measures (split-plot) ANOVA. The experimental and control groups did not differ in their change in reproducibility (self-agreement) from pre- to post-training ($p = 0.64$). Also, the experimental and control groups did not differ in their change in agreement with true presence/absence of simulated calculus from pre- to post-training ($p = 0.20$). Although the results of this study failed to reject the null hypothesis that training has no effect on the reproducibility levels for simulated calculus detection, further studies of clinical faculty calibration need to be implemented with larger and more representative samples. The impact of calibration on students' learning and satisfaction should also be examined.

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Bisphenol A Blood and Saliva Levels Prior To and After Dental Sealant Placement in Adults: An Exploratory Study

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Placement of dental sealants is an effective therapy for tooth decay prevention and is widely accepted as a standard of care throughout the United States. Sealants are manufactured using the resin component of composite dental materials, formed by reacting glycidyl methacrylate with bisphenol A. Bisphenol A (BPA) is a hormonally active, synthetic chemical that is part of a broad group of chemicals known as endocrine disrupting compounds, xenoestrogens, which mimic bioactivity of estrogen. Laboratory studies using rodents with BPA exposure as low as 2.5 ug/kg body weight/day have revealed increased fertility and mammary and prostate cancer. BPA can leach from a dental sealant if it is not completely polymerized and is released into the oral cavity as a degradation product resulting from enzymatic activity within saliva. This exploratory study examined the presence of BPA systemically in saliva and blood after the placement of pit and fissure sealants in 30 subjects, as measured by the use of a direct-competitive bisphenol A Enzyme Linked ImmunoSorbent Assay (ELISA) and spectrophotometry analysis. Subjects ranged in age from 18-40 years of age and were of mixed gender and ethnicity. Differences in bisphenol A comparing low-dose (1-sealant) and high-dose (4-sealants) groups were examined one hour prior, one hour post, 3 hours post and 24 hours after sealant placement. Data were analyzed using a parametric, 2-way analysis of variance for repeated measures. Results reveal presence of bisphenol A one-hour prior to sealant placement in all saliva samples tested. Salivary BPA concentration levels were highest at the one-hour post time period, remained high at the 3-hour time period and decreased at the 24-hour time period. Bisphenol A was not detected at statistically significant levels in the serum samples after dental sealant placement. Results for salivary BPA revealed statistically significant differences at all post sealant placement time periods for the high dose sealant group. Further research is needed to examine the cumulative estrogenic effects of BPA from dental sealants. Funding for this project through ADHA IOH.

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An Evidence-Based Self-Assessment Educational Module for Dental Hygiene Curricula

Sarah C Jackson, RDH, BS, Denise M Bowen, RDH, MS and Linda D Boyd, RDH, RD, EdD

Literature on self-assessment presents substantial evidence regarding the impact of self-assessment on practitioners and quality of care. Related dental hygiene research documents a need to enhance curricula; however, no published curriculum module exists to effectively teach self-assessment. The purpose of this study was to explore the impact of a self-assessment educational module for dental hygiene curricula designed using evidence from the literature and adult learning principles. This module was implemented with 33 junior dental hygiene students as a guest presentation with active learning strategies followed by a clinical practice time period. A one-group, pretest-posttest design was employed using a 2-part pretest and three-part posttest to determine if the module affected dental hygiene students' perceptions about self-assessment and their voluntary application of it in the clinical environment. The relationship between students' perceptions and voluntary application of self-assessment also was examined. In addition, students' comments on daily clinical self-assessment forms were evaluated to determine if the module affected the quality of those comments.

Results using the Mann-Whitney test indicated the self-assessment module was effective ($p < 0.05$) in improving the students' perceptions and voluntary clinical application of self-assessment. No statistically significant relationship was found between the students' perceptions and their application of self-assessment using Pearson's Correlation. The quality of self-assessment comments on the students' daily clinical evaluation forms was enhanced after module implementation ($p < 0.05$). This change in quality before and after module implementation was demonstrated by a quantitative analysis using a self-designed rubric and a qualitative thematic analysis of student comments to identify predominant themes. Students also were surveyed to determine which module components were most effective. Findings indicate a self-assessment educational module enhanced these dental hygiene students' self-assessment perceptions and skills. Future studies using other methods with other populations and educational settings are indicated.

Vital Tooth Whitening Effects on Quality of Life in Older Adults

Ann M Poindexter, RDH, MS(c), Michele L Darby, RDH, MS, Gayle B McCombs, RDH, MS and Carlene M Lynch, RDH, MSDH, MPH

This study's purpose was to determine if vital tooth whitening affects oral health-related quality of life (OHRQOL) in adults < 50 years old, and if tooth whitening influences regular professional dental care and increased participation in social activities. Using a 2-group, single blind, randomized, pre-test multiple post-test design, 62 participants were enrolled. The experimental group used a whitening product twice daily for 3 weeks (WG); the control group used no whitening products (NWG). The Oral Health Impact Profile (OHIP) served as the pre-test and post-test measure. The OHIP measures OHRQOL on seven subscales: functional factors, psychological disabilities, psychological discomforts, physical disabilities, social disabilities, handicaps, and physical pain. Additional questions measured the subjects' social activities and dental care encounters at baseline, 3-weeks, and three months. Data from 53 participants who completed the study were analyzed using paired t-tests and ANOVA at $p = .05$. Statistical significance was observed for the OHIP physical pain subscale ($p = .0029$) and the handicap subscale ($p = .05$). Pre- to post-test means of the physical pain subscale increased in the WG (4.84 to 7.10), suggesting a lower OHRQOL, most likely related to tooth sensitivity experienced by the WG. Means from pre- to post-test of the handicap subscale (1.96 to 1.19) reveal that the WG reported an improved OHRQOL and felt they were more willing to work. Repeated measures ANOVA and Tukey's post-hoc tests revealed that the WG reported significantly less ($p = .04$) social activities at the three-month post-test (3.92 to 3.45). No statistically significant between-group differences were observed in the overall OHIP score for functional factors, psychological disabilities, psychological discomforts, physical disabilities, and social disabilities. In conclusion, tooth color does not improve overall OHRQOL in older adults.

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Who is the Dental Consumer? Dental Hygiene Students' Perspective

W. Gail Barnes, RDH, PhD and Janice Arruda, RDH, MPH

"To increase the proportion of children and adults who use the oral healthcare system each year by 83%" was the target goal set for Objective 10 during the Healthy People 2010 conference. At the end of the dental public health class, a survey was administered to the senior hygiene students (N=27) to determine who they perceived to be the dental consumer. The response rate was 100%. The survey consisted of quantitative questions (5 point Likert-type scale) and qualitative open-ended questions (to help with interpretation of the qualitative results) and was downloaded on the course's Assessment section of the Blackboard site. The mean for each question was automatically calculated by Blackboard. The hygiene students reported that "adults" were most likely to seek and receive dental care (N=11,42%) and "children" were 37% (N=9) likely to receive dental care. Conversely, the population category that the students reported that they perceived would least likely receive dental care was the "elderly" (N=23,84%); followed by "teenagers" (N=3,11%).

The results of the survey indicated that the dental hygiene students' perceptions and target goal of Objective 10 of Healthy People 2010 were significantly opposed. The researchers believe that creating opportunities for access to care will help bridge the divide that exists in regard to dental need. Future studies would be beneficial to investigate dental hygiene students' and their perceived role as practicing hygienists in addressing the issue of access to dental care. Also of interest would be a longitudinal study, at five year intervals, of practicing dental hygienists and their efforts in bridging the population gap of those receiving dental care.

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Distance Education and the Shortage of Graduate Degree Dental Hygiene Faculty

W. Gail Barnes, RDH, PhD

The profession of dental hygiene is experiencing an unprecedented faculty shortage in the US. To address this issue some hygiene programs are developing "homegrown educators" by recognizing and mentoring undergraduate students and encouraging them to pursue a graduate education. Another strategy is the use of distance education, in which the graduate student can practice full-time as a clinician or faculty member, would not have to relocate, and when learner-centered techniques are applied, there is no diminished knowledge base. To assess the students' perception of the faculty shortage and determine their likelihood of pursuing a hygiene graduate online degree, an Internet mail survey was developed and administered to the summer registrants of an online degree completion class (N=29). The survey consisted of 20 items. The data sample consisted of 22 useable responses (76%). Data were downloaded from the WEB and manually entered into SPSS 10.0. The results indicated that the students were aware of the faculty shortage (100%). Eighty-six percent (N=19) of the students indicated that they would "pursue a graduate hygiene degree online to alleviate the faculty shortage." Nine percent (N=2) indicated that they "might" pursue a graduate hygiene degree online. No student responded negatively to the question and one student did not respond.

According to the results of the present study, baccalaureate dental hygiene students are significantly aware of the dental hygiene faculty shortage in the US and would enroll in graduate hygiene programs via distance learning methodologies. This program format would address the personal concerns of future graduate dental hygiene students and the paucity of qualified dental hygiene applicants and faculty.

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Antimicrobial Effectiveness of an Herbal Mouthrinse Against Predominant Oral Bacteria Species In Vitro

Tina Yaskell, BS, Anne D Haffajee, BDS and Sigmund S Socransky, DDS

***Aim.** The aim of the study was to compare the antimicrobial effectiveness of 2 herbal mouthrinses, Listerine and Peridex (0.12% chlorhexidine gluconate) as determined by the Minimum Inhibitory Concentration (MIC) against predominant oral bacteria in vitro.*

***Material and Methods.** S. An agar dilution method was employed to assess the inhibitory effect of the test agents against 40 oral bacteria. Serial dilutions of the 4 test mouthrinses [The Natural Dentist Healthy Gums Oral Rinse, The Natural Dentist Healthy Gums Oral Rinse minus bloodroot (sanguinaria), Listerine and Peridex] were prepared at concentrations of 1, 2, 4, 8, 16, 32, 64, 128, 256, 512 μ g/ml. Filter-sterilized test agents were added to basal medium in petri plates and inoculated with suspensions of the test species using an MIC 2000 inoculator. Inoculated plates were incubated anaerobically at 35 degrees C and examined daily. The MIC was interpreted as the lowest concentration of the agent that completely inhibited the growth of the test species. MICs were performed in duplicate.*

***Results.** The 2 Natural Dentist formulations effectively inhibited the growth of the majority of the 40 test species. Compared with Listerine, The Natural Dentist Healthy Gums Oral Rinses exhibited significantly lower MICs (> a 2 fold difference in MICs) for Actinomyces species, periodontal pathogens, E. nodatum, T. forsythia and Prevotella species as well as the cariogenic pathogen, S. mutans. Peridex had the lowest MICs compared with Listerine and The Natural Dentist Healthy Gums Oral Rinse for all test species examined.*

***Conclusion.** Although less potent than Peridex, The Natural Dentist Healthy Gums Oral Rinse was a more effective antimicrobial than Listerine in inhibiting the growth of oral bacteria in vitro.*

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Knowledge, Attitudes, and Confidence Levels of Dental Hygiene Students Regarding Teledentistry

Brigette R Cooper, MS and Lynette M Engeswick, MS

*Teledentistry provides a viable option for dental professionals to increase care in underserved areas. Dental hygiene students at a state university complete a course in teledentistry that includes performing oral health screenings on Head Start children using intra-oral cameras and electronically submitting dental images to an off-site dentist for diagnosis. The objective of this study was to examine student knowledge, attitudes, and confidence levels regarding teledentistry. A 5-point Likert scale survey consisting of 10 items was administered to white females ages 22 to 25 (N=24) in a teledentistry course the first and last day of class. The survey included current knowledge of teledentistry and access to care, attitudes regarding effectiveness of teledentistry in identifying dental needs, the role dental hygienists play in access to care, and confidence in acquiring the necessary technical skills. Survey results analyzed by a matched pairs *t* test and Wilcoxon signed rank test found a significant increase in student knowledge, attitudes, and confidence level in 9 of the 10 questions ($p < .02$). Question 5 had a pre-test mean of 4.667 and a post-test mean of 4.875, demonstrating very little room for improvement. This survey supports that student attitudes were positively changed in their knowledge of the effectiveness of teledentistry in identifying dental needs in rural and underserved areas, the role dental hygienists play in access to care, and confidence in acquiring and submitting dental images. Research conducted in teledentistry supports continued implementation in dental hygiene education.*