CANADIAN JOURNAL OF DENTAL HYGIENE · JOURNAL CANADIEN DE L'HYGIÈNE DENTAIRE
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CJDH JCHD

FEBRUARY 2018 · VOL. 52, NO. 1

Implementation of an enriched ultrasonic curriculum into a Canadian dental hygiene program

Granuloma gravidarum associated with pregnancy

The effects of power toothbrushing on C-reactive protein levels in nursing home residents

Proceedings of the global dental hygiene conference

EDITORIAL

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The mission of the *Canadian Journal of Dental Hygiene* is to publish high-quality, credible, and accessible research to inform practice, education and policy, and promote the oral health and well-being of the public.

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FEBRUARY 2018 VOL. 52, NO. 1

The *Canadian Journal of Dental Hygiene* is the official peer-reviewed publication of the Canadian Dental Hygienists Association (CDHA). Published in February, June, and October, the journal invites submissions of original research, literature reviews, case studies, and short communications of scientific and professional interest to dental hygienists and other oral health professionals. Bilingual *Guidelines for Authors* are available at www.cdha.ca/cjdh.

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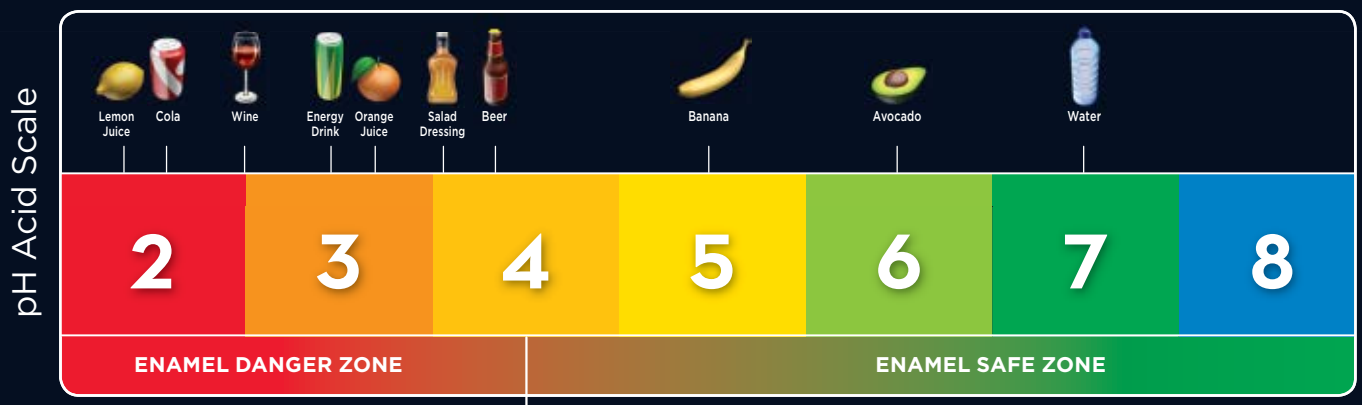

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Reflections from the global dental hygiene conference

Salme Lavigne*, PhD, RDH; **Rebecca Wilder**[§], MS, RDH

The planning of a joint conference between 2 separate organizations in 2 different countries is not an easy task. The birth of this idea took place 3 years ago at the 3rd North American/Global Dental Hygiene Research Conference held in Bethesda, Maryland, by the National Center for Dental Hygiene Research & Practice (NCDHRP). A meeting between the Canadian Dental Hygienists Association (CDHA) Research Advisory Committee and the NCDHRP Advisory Committee during that conference led to the decision to co-host an international meeting in Ottawa in October 2017 during Canada's 150th birthday celebrations. What they didn't realize at the time was how much of a success this conference, *Translating Knowledge to Action*, would actually be and that attendance would be "maxed out" with just over 500 participants. This was indeed a record for both groups! The international presence was not just from Canada and the United States; representatives from 14 other countries were in attendance!

Salme Lavigne

Rebecca Wilder

There were 60 poster presentations and 29 oral presentations informing attendees of the latest dental hygiene research findings. One of the goals of our profession for almost 50 years has been to increase the research base specifically as it relates to dental hygiene knowledge in order to be truly considered "a profession." One of the primary caveats of a true profession is to have a body of knowledge that is unique to the profession. We believe this conference has indeed helped to add to our body of knowledge.

Not only did this conference highlight the latest research findings for attendees, but it also provided an opportunity for collaboration and networking with international colleagues. The dental hygiene profession globally is relatively small in comparison to most other health professions such as nursing and physiotherapy and, as such, this conference brought together colleagues from around the world. Attendees from Canada, the United States, United Kingdom, Japan, Australia, Italy, Portugal, The Netherlands, and many other countries were seen mingling and networking in the cozy restaurant area of the conference facility. The richness of such an experience raised an awareness of how similar dental hygienists are around the world, yet also allowed everyone to explore the differences in their professional practices. We all belong to the same community and we believe this conference brought us much closer together.

As dental hygiene journal editors representing both Canada and the US, we had the privilege of working together on a conference presentation about manuscript preparation and submission, and were both so impressed with the 100% attendance as well as the calibre and mix of attendees who were truly interested in dental hygiene research and publication. We believe the collaboration and learning experiences gleaned from this conference are just the "tip of the iceberg" and should be the beginning of many more opportunities to network and learn from each other.

We hope you will take the time to read the numerous and diverse conference abstracts published simultaneously in the *Canadian Journal of Dental Hygiene* and the *Journal of Dental Hygiene* whether you attended the conference or not. At conferences as diverse as this one, it is impossible for attendees to see all of the presentations and to visit all of the posters. Enjoy the reading!

*Scientific editor, *Canadian Journal of Dental Hygiene*
[§]Editor-in-chief, *Journal of Dental Hygiene*

Correspondence: Dr. Salme Lavigne; scientificeditor@cdha.ca

ISSUE AT A GLANCE

In addition to the *Translating Knowledge to Action* conference abstracts featured on pages 35-84, this issue of the journal includes an original research article by **Dani Botbyl** and **Marilyn J Goulding** on the implementation of an enriched ultrasonic curriculum in a Canadian dental hygiene education program (pp. 9–19); an original research article by **Salme E Lavigne**, **Malcolm B Doupe**, **Anthony M Iacopino**, and **Salaheddin M Mahmud** on the effects of power toothbrushing on C-reactive protein levels in nursing home residents (pp. 20–27); and a short communication on granuloma gravidarum associated with pregnancy by **Murtaza A Kaderi**, **Aditi B Mahajani**, **Neelamma A Shetti**, **Renuka M Metgud**, and **Jyoti M Ajbani** (pp. 28–33). Finally, the journal's editorial board is delighted to recognize the many clinicians, researchers, and educators who reviewed manuscripts for the journal during the previous year (p. 6).

PLAIN LANGUAGE ABSTRACTS

Botbyl D, Goulding MJ. Implementation of an enriched ultrasonic curriculum into a Canadian dental hygiene program. *Can J Dent Hyg.* **2018;52(1):9–19.**

Research shows that Canadian dental hygiene programs continue to emphasize hand instrumentation for periodontal debridement despite evidence of improved client outcomes with ultrasonic technology. This study evaluated the ultrasonic skills and outcomes of graduates of an accredited Canadian dental hygiene school over a 2-year period. Results revealed a statistically significant improvement in ultrasonic competency among graduates who received enriched preclinical and clinical instruction in ultrasonics. The revised curriculum produced more "consciously competent" graduates without compromising existing content or increasing program length or costs.

Lavigne SE, Doupe MB, Iacopino AM, Mahmud SM. The effects of power toothbrushing on C-reactive protein levels in nursing home residents: A randomized controlled trial. *Can J Dent Hyg.* **2018;52(1):20–27.**

Poor oral health has been shown to increase systemic inflammation, which can lead to more serious health complications and disease. Nursing home residents are particularly prone to poor oral health as staff often have an aversion to providing oral care. This study investigated whether the use of a power toothbrush would reduce oral, and thus, systemic inflammation in nursing home residents. Although no improvements in systemic inflammation were found after 6 weeks, as measured by C-reactive protein levels, the authors maintain that daily oral care remains vital for this population. They postulate that more invasive oral hygiene interventions, together with daily oral care, may help to reduce inflammation and improve overall health.

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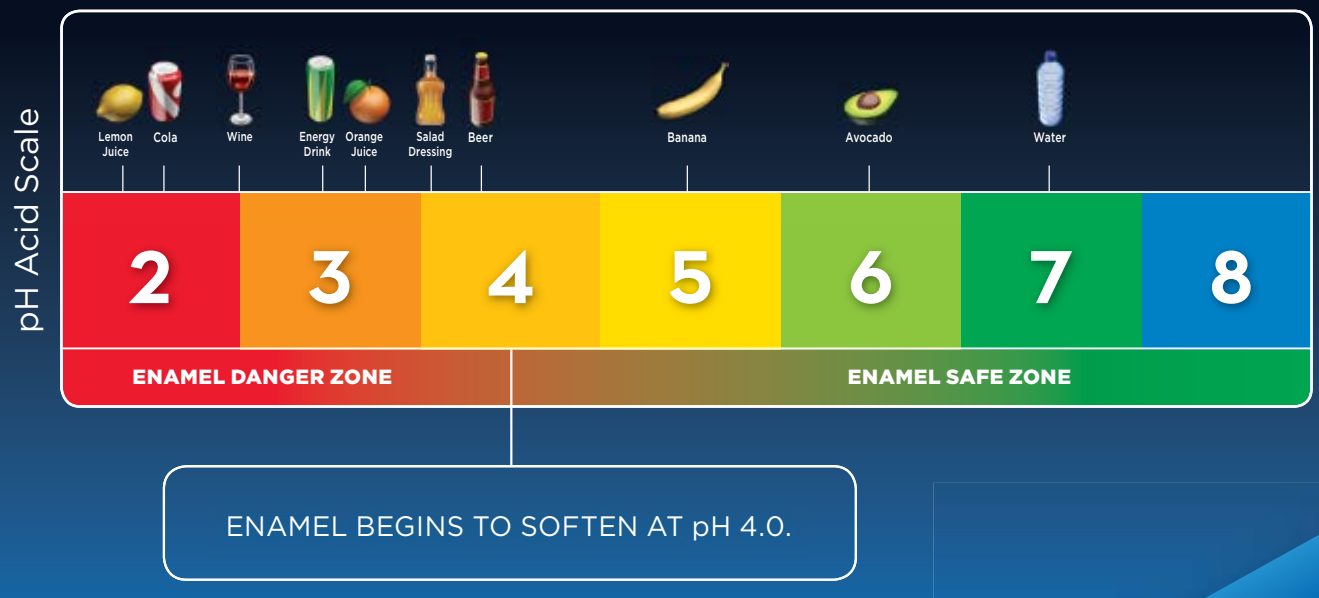

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Thank you to our reviewers

The *Canadian Journal of Dental Hygiene* brings the latest dental hygiene research to oral health professionals in Canada and abroad. The journal's high quality is dependent on the expertise of clinicians, researchers, and educators who carefully review our manuscript submissions, probing the soundness of evidence and its relevance to dental hygiene practice. Their thorough reviews, which often embody hours of work, improve the journal and help to advance the field of oral health research substantially. In recognition of their dedication, the journal thanks the following individuals who reviewed manuscripts in 2017.

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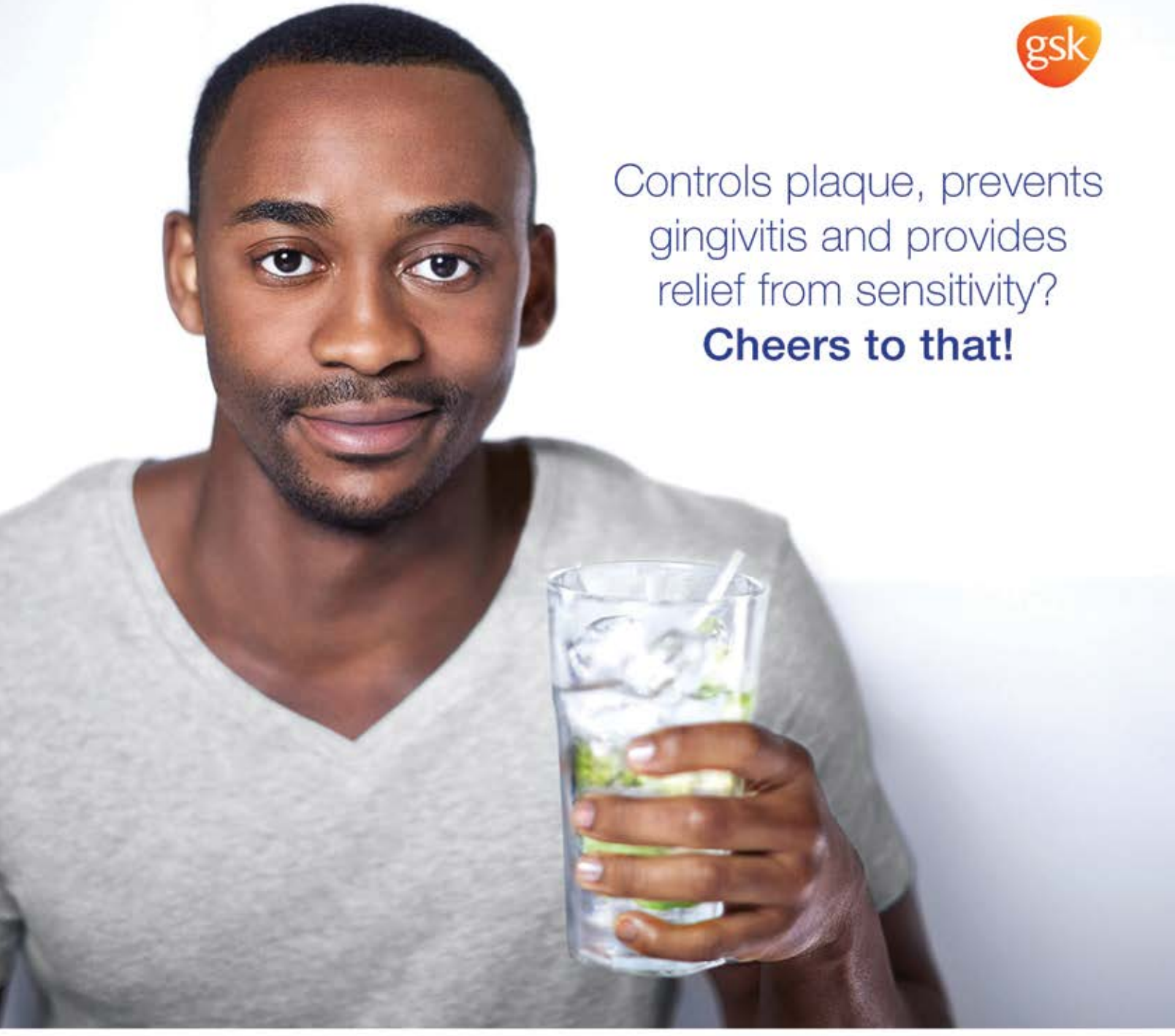

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Implementation of an enriched ultrasonic curriculum into a Canadian dental hygiene program

Dani Botbyl*, RDH; **Marilyn J Goulding**[§], MOS, RDH

WHY THIS ARTICLE IS IMPORTANT TO DENTAL HYGIENISTS

- Canadian dental hygiene graduates are not competent in contemporary ultrasonic instrumentation at an entry-to-practice level.
- An enriched ultrasonic curriculum for dental hygiene programs can significantly improve ultrasonic skills and outcomes of graduates without affecting program length or cost.
- Dental hygiene graduates who are competent in contemporary ultrasonic instrumentation remove more calculus and biofilm deposits, and can debride to completion with this technology.

ABSTRACT

Objective: Thorough debridement is the basis of periodontal treatment and a profound segment of dental hygiene expertise. Studies indicate Canadian dental hygiene graduates use ultrasonics with an outdated (traditional) approach resulting in an "unconsciously incompetent" clinician. This study tests a revised ultrasonic curriculum aimed at producing a more "consciously competent" graduate. **Methods:** This convenience sample study measured ultrasonic process and outcomes for graduates of an accredited Canadian school before (n = 17) and after (n = 18) implementation of a novel ultrasonic curriculum with enriched ultrasonic theory, preclinic and clinic content. Graduates were evaluated "in process" using a validated indexed rubric on 4 foci: equipment preparation, infection control, positioning, and instrumentation technique. Post-scaling, teeth were removed from the identical typodonts, anonymized, and scored for "outcomes" using tested grid calculations for 3 types of standardized deposits: heavy/tenacious, light, and biofilm. Ethics approval was obtained from Niagara College, Ontario. **Results:** From a potential 510 points for in process skills, the baseline graduates achieved a mean score of 112.3 compared to 295.6 for the enhanced curriculum cohort. The baseline group left 10.5 grids of tenacious calculus, 23.3 grids of light calculus, and 60.18 grids of biofilm from a potential of 72 each when outcomes were measured. In contrast, the enhanced curriculum cohort left 4.1, 7.4, and 39.3 grids, respectively. A 2-tailed, unpaired t-test measured statistical significance. All *p* values show statistical significance between the mean scores at the 0.01 level. **Conclusions:** The enhanced curriculum produced graduates with process improved by 263.1% ($p < 0.0001$). Debridement outcomes were enhanced similarly. This study suggests that an enriched ultrasonic curriculum can be inserted into an existing dental hygiene program with vastly improved results.

RÉSUMÉ

Objectif : Le débridement minutieux constitue la base du traitement parodontal et est une expertise fondamentale propre à l'hygiène dentaire. Les études démontrent que les diplômés canadiens en hygiène dentaire ont une approche désuète (traditionnelle) en matière d'ultrasoniques, ce qui en fait des cliniciens « inconsciemment incompétents ». La présente étude examine un programme d'études révisé en matière d'ultrasoniques, qui vise à produire un diplômé plus « consciemment compétent ». **Méthodes :** La présente étude, basée sur un échantillon de commodité, a évalué le processus et les résultats en matière d'ultrasoniques au titre des diplômés d'un établissement canadien agréé, avant (n = 17) et après (n = 18) la mise en œuvre d'un programme d'études inédit sur les ultrasoniques, qui comprend une théorie enrichie en matière d'ultrasoniques, ainsi qu'un contenu préclinique et clinique. Les diplômés ont été évalués au moyen d'une rubrique indexée et validée, axée sur les 4 processus suivants : la préparation de l'équipement, la lutte contre les infections, le positionnement, et la technique d'instrumentation. À la suite du débridement, les dents ont été retirées de mannequins identiques et dépersonnalisés, et notées en vue d'obtenir des résultats à l'aide de calculs de cases d'une grille validée, de 3 types de dépôts standards : les dépôts épais ou tenaces, les dépôts légers, et le biofilm. Le Collège Niagara en Ontario a fourni l'approbation déontologique. **Résultats :** Sur un potentiel de 510 points en compétences sur les processus, les diplômés de base ont obtenu la note moyenne de 112,3 par rapport à la note moyenne de 295,6 obtenue par la cohorte du programme d'étude optimisé. Lorsque le débridement a été mesuré, le groupe de base a laissé 10,5 cases de tartre tenace, 23,3 cases de tartre léger, et 60,18 cases de biofilm sur un potentiel de 72 cases de la grille pour chaque catégorie de dépôts. Par contraste, la cohorte du programme d'études optimisé a laissé respectivement 4,1, 7,4 et 39,3 cases de la grille. Un test t bilatéral non apparié a mesuré une différence statistiquement significative. Toutes les valeurs *p* démontrent une différence significative entre les notes moyennes au niveau de 0,01. **Conclusions :** Le programme d'études optimisé a produit des diplômés ayant une amélioration des processus de 263,1 % ($p < 0,0001$). Les résultats du débridement étaient améliorés de façon similaire. Cette étude suggère qu'un programme d'étude optimisé en matière d'ultrasoniques peut être ajouté à un programme d'hygiène dentaire existant en procurant des résultats grandement améliorés.

Key words: curriculum, dental hygiene, dental hygiene education, dental scaling, periodontal debridement, ultrasonic instrumentation

CDHA Research Agenda category: Capacity building of the profession

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INTRODUCTION

Dental hygiene education was established as a formal 2-year diploma program in Canada at the University of Toronto in 1951. Although the educational options for type of institution, program length, and course content have diversified over the years, the entry-to-practice requirement for graduates has long been a 2-year diploma.

In January 2010, the Canadian Dental Hygienists Association, in collaboration with the Federation of Dental Hygiene Regulatory Authorities (FDHRA), the Commission on Dental Accreditation of Canada (CDAC), the National Dental Hygiene Certification Board (NDHCB), and dental hygiene educators, released *Entry-to-Practice Competencies and Standards for Canadian Dental Hygienists*.[1] This document serves as a template for the evidence-based knowledge, self-reflection, and skills dental hygienists require to practise competently and responsibly. All accredited programs are required to use "competence at entry-to-practice" as a benchmark for successful graduates (Figure 1).[2]

Currently, there are 2 accepted methods of tooth debridement included in dental hygiene curricula: hand and power instrumentation. Handheld instruments for tooth "cleaning" were introduced in the early 1900s by Dr. A Fones in a concept known as "odontocure," which involved sending a female assistant, armed with an orange wooden stick, pumice, and a flannel rag, into the neighborhoods of Bridgeport, Connecticut, to clean residents' teeth. Fones eventually trained his cousin and chairside assistant, Irene Newman, in this program, evolving the work to include removal of calcified deposits with bladed instruments, and they opened the first dental hygiene school in North America in 1913.[3]

In the 1950s, Dentsply Corporation developed the "Cavitron," the first ultrasonic instrument aimed at effective supragingival gross calculus removal.[4,5] Initially, ultrasonic scaling was intended to be used as a preliminary debridement instrument followed by root planing with a bladed instrument to strip the tooth of a supposed toxic layer and leave a glass-like surface.

A more conservative approach to treating root surfaces eventually emerged, one aimed at preserving the root structure.[6,7] With the evolution of technology and the development of longer, thinner curved tips for improved access to complex root structure and deep pockets, research began to suggest that these specialized ultrasonic instruments had better, more consistent access to periodontal pockets.[8] Further studies confirmed that the use of these modified tips resulted in preservation; therefore, less damage of the root surface, along with reduced need for surgical intervention to gain access to pocket depths and furcations.[9-11] The growing body of ultrasonic research combined with technological advances have led dental practitioners into an era where ultrasonic instrumentation is now an essential component of all facets of periodontal debridement.[12-20]

Although the evidence base for this improved technology continues to expand and supports the use of ultrasonic instruments for the removal of lighter hard deposits and the removal or disruption of biofilm, 3 recent studies[21-23] show that graduating dental hygiene students still tend to use the ultrasonic approach as historically intended (traditional use; for initial debridement only) (Table 1).[21] These studies also report an incorrect use of equipment and tips, with an admitted lack of confidence in, and knowledge of, the more contemporary evidence-based approach (addressing biofilm and light deposits or scaling to completion).[22-24]

A follow-up study of Canadian dental hygiene school faculty reports a disparity in teaching hours assigned to ultrasonics in theory, preclinical practice, and clinical application, with the majority of surveyed schools reporting only 0 to 8 hours each of theory and preclinic throughout the program. A mere 16% of programs stated that they used a formal rubric for student evaluation of competence with the technology.[22]

This study tests a new evidence-based curriculum encompassing contemporary periodontal debridement strategies. An enriched methodology to teach ultrasonics,

Figure 1. Continuum of competence

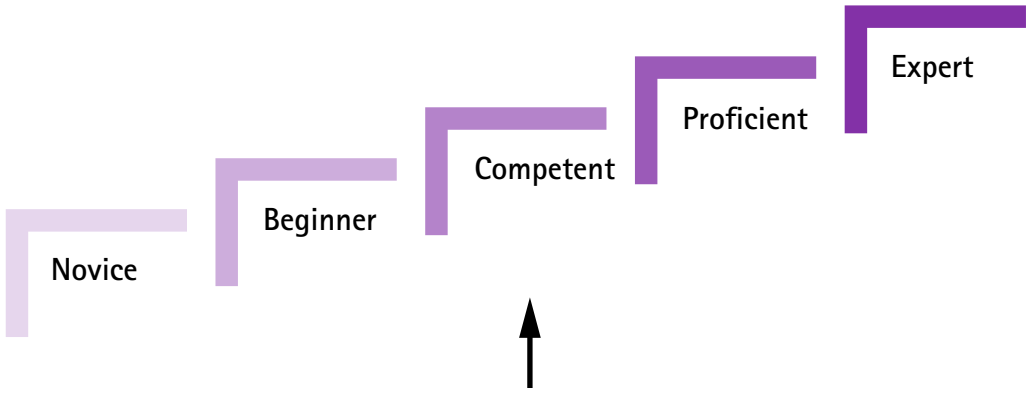


Table 1. Comparison of Traditional Ultrasonic Debridement Approach and Contemporary Ultrasonic Debridement Approach

Traditional	Contemporary
Thick diameter inserts	Thin or ultra-thin diameter inserts; straight and curved designs
Subgingival access limited	Subgingival access is superior
Moderate to heavy calculus removal	Light calculus removal with focus on biofilm/plaque removal
Instrument contacts calculus	Instrument contacts calculus and/or cementum/dentin
Medium to high power settings typical	Low power setting typical; medium power may be an option
Basic level of knowledge/skill and short "time on task" to achieve competence	Higher level of knowledge/skill and a longer "time on task" to achieve competence
Complete debridement requires use of hand instruments	Complete debridement possible with ultrasonics
Client/patient comfort challenging	Client/patient comfort most usual

Source: Asadoorian J, Botbyl D, Goulding M. Dental hygienists' perception of preparation and use for ultrasonic instrumentation. *Int J Dent Hyg.* 2015;13(1):30–41.

based in part on Karplus and Thier's learning cycle, incorporates a novel teaching approach, the Concurrent Debridement Model (CDM), and a realignment in scheduling. Together, these elements enrich all aspects of the educational experience in theory, preclinical and clinical venues, with the goal of producing a more legitimately (or consciously) competent graduate.

METHODS

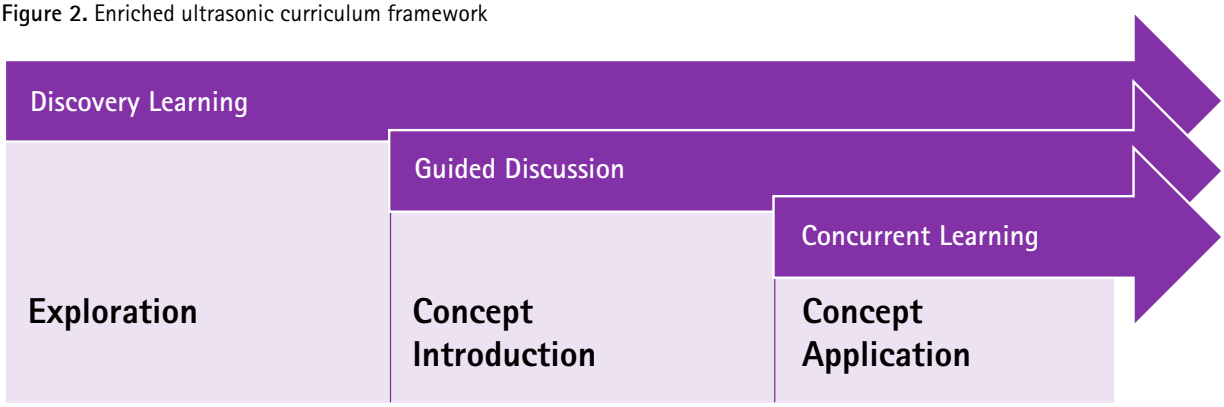
This study, a quantitative quasi-experimental research design, employs a convenience sample from an established, accredited private dental hygiene school in Toronto, Ontario. Pretest and post-test evaluations were performed by 2 calibrated subject-expert clinicians utilizing pretested and validated indexed rubrics for both process and outcomes. Recent graduates (n = 17, baseline group) from the institution's standard programming were assessed within 6 months of course completion (graduation) and compared to the next year's graduating cohort (n = 18, test group) from the same institute, following the implementation of an enriched ultrasonic curriculum and a revised approach to both preclinical and clinical teaching. Both groups were educated in the same facility by the same faculty, and all other educational parameters remained unchanged apart from the enriched ultrasonic teachings. The program consisted of three 24-week semesters. The enriched didactic and preclinical sessions were delivered by the 2 principal investigators while clinical sessions were staffed by faculty. Regular training and calibration sessions were held with all participating faculty.

The study received ethics approval from the Ethics Review Committee at Niagara College, Welland, Ontario, according to the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* (TCPS 2), certificate #CEC-NC2013-05. All participants signed an approved informed consent, and all instruction forms and data collection forms were submitted to and approved by the committee. The principal investigators followed expected confidentiality protocols, and all forms were randomly coded and anonymous. Each participant was awarded a $50.00 gift certificate to compensate for time given to the 2-hour evaluation session at the study's completion.

Framework for enriched ultrasonic curriculum

The enriched ultrasonic curriculum framework (Figure 2) was designed by the investigators in response to the analysis of the data collected as part of the Canadian Dental Hygiene Graduate Survey and also the Canadian

Figure 2. Enriched ultrasonic curriculum framework

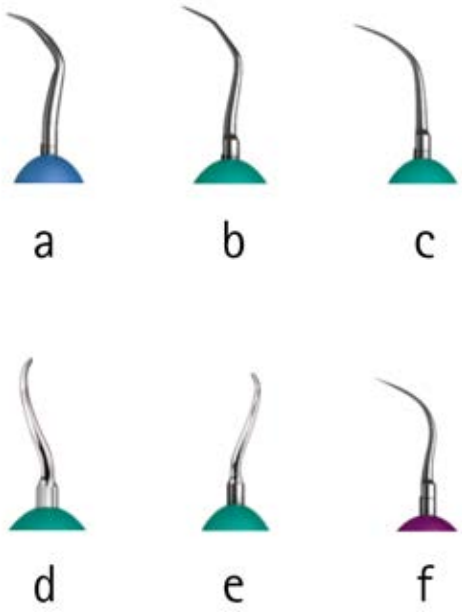


Dental Hygiene School Program Directors' Survey.[21,22] Methods chosen addressed identified gaps in the existing curricula of these programs and perceived opportunities to enrich student learning. This study's framework consists of 3 core elements from Karplus and Thier's learning cycle: exploration, concept introduction, and concept application[25], coupled with selected proven teaching strategies, including discovery learning.[26] This specific learning cycle approach has been shown to help students comprehend scientific ideas, improve scientific reasoning, and increase engagement in class.[27-29]

Exploration phase

The bulk of the exploration phase was implemented as part of preclinic and was designed to foster deep, rich learning of a topic especially relevant, conceptually difficult, and counterintuitive to manual debridement. An introductory classroom session preceded the preclinic discovery learning tasks to give the test group sufficient information to enable a reasonable attempt at completing the activities. Here, the students implemented a discovery learning method of inquiry-based activities using magnetostrictive ultrasonic units and inserts (Cavitron, Dentsply Sirona, York, PA) (Figure 3) and customized

Figure 3. Ultrasonic instruments included in the students' kits



(a) Standard diameter, straight, triple bend, square cross section
(b) Slim diameter, straight, triple bend, square cross section
(c) Slim diameter, straight, single bend, round cross section
(d) Slim diameter, curved left, round cross section
(e) Slim diameter, curved right, round cross section
(f) Ultra-slim diameter, straight, single bend, round cross section

teaching tools. Students experimented with equipment, drew comparisons, and wrestled with questions such as: "What do I hear when I turn up the power knob?" "What do I feel when I place a tip on a hard surface?" "What do I see when I push with an insert?" The intention was to encourage active engagement; promote responsibility, independence, and motivation; foster creativity and problem-solving skills; and tailor the learning experience to allow students to be present in the moment.[30,31] The investigators aimed this session at preparing the learners for the guided discussion format of the next phase of the learning cycle: concept introduction.

Concept introduction phase

Based on the learners' acquisition of knowledge from the preclinical sessions, a guided discussion format ensued in all subsequent classroom sessions. Research shows that learners who relate introduced concepts to actual experiences can be more successful.[32] The initial discovery learning method gave the learners experiences to draw from and thus provided the foundation necessary to participate actively in discussions in this phase of the instruction.[33-35]

Concept application phase

Concept application was executed in both preclinic and clinic. Most notable was the integration of a Concurrent Debridement Model (CDM) into clinic to ensure equal development of knowledge, skill, and critical thinking with either manual or ultrasonic instrumentation, each taught as a separate and complete system. The integration of CDM prevented any undue reliance on one method of instrumentation, thereby freeing the student to think critically within either system.

As clinical sessions commenced, students were equally prepared to deliver either manual or ultrasonic instrumentation to primarily light clients (shallow pockets and simple root anatomy). Because the needs of these types of clients could be addressed with either system, the students were assigned half-mouth instrumentation units; one half was "debrided to completion" with ultrasonic instruments while the other half was "debrided to completion" with hand instruments. There was no interinstrumentation between the 2 systems.

The test group eventually moved on from the CDM. More difficult clients were assigned and, based on the changing needs of the clients (an increase in severity of periodontal status/deeper pockets, and complex root anatomy), the test group needed to implement greater ultrasonic usage to achieve safe, effective, efficient debridement.

Measurement tools (data collection indices)

Each participant was evaluated for both process and outcome by 1 of the 2 principal investigators once graduation from the program had been determined. In order to reduce bias, the 2 principal investigators held 2

calibration sessions prior to evaluating each graduating class to ensure interrater reliability. They also reduced subjectivity by following a complex and specific set of rubrics which are outlined below.

Process evaluation

The "in process" evaluation was a 2-hour session in which each participant was assigned, on a typodont, a total of 16 teeth to be completed in a timed 1-hour debridement segment (Figure 4). Each student was observed during this 1-hour exercise by 1 of the calibrated investigators and acquired points according to a comprehensive rubric.

The in process rubric was defined by section, with potential points assigned to each category: equipment preparation (15 points), infection control (15 points), clinician positioning (120 points), and instrument technique (360 points). Each category was further divided into subcategories. Equipment preparation and infection control had 3 subcategories each (3 x 5 potential points for a total of 15 points per category). Clinician positioning and instrument technique were tooth specific (for each of the 6 indexed teeth) and further broken down into either a buccal or a lingual approach (Figure 5).

The participants were also scored on whether they chose to use only the traditional ultrasonic approach (a single instrument for initial debridement) or continued on to utilize the contemporary approach with more complex insert designs to take them through to full biofilm removal. The clinician positioning category was further broken down into 2 items evaluated for 6 teeth each; 6 x 5 potential points for both buccal and lingual equaling a total of (2x6x10) 120 points. Instrument technique comprised 6 items evaluated for 6 teeth each; 6 x 5 potential points for both buccal and lingual for a total of (6x6x10) 360

Figure 4. Student assignment outlined in rectangles on the odontogram with index teeth "buried" within the exercise (Teeth 16, 12, 24, 36, 32, 44)

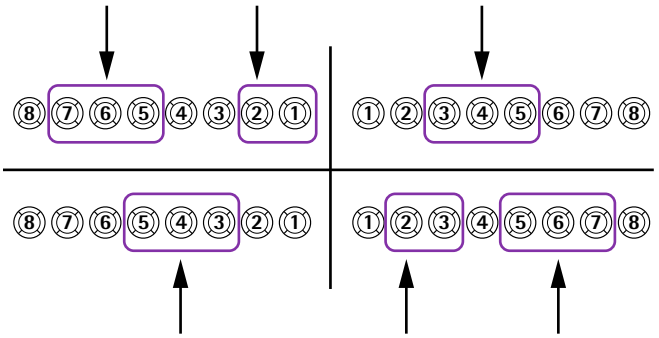
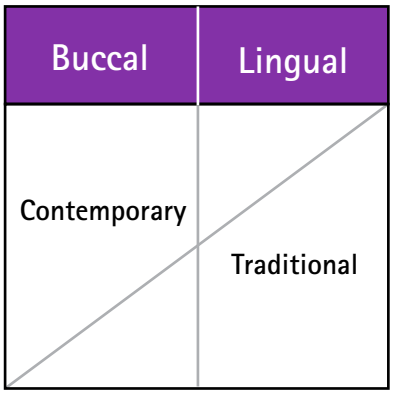


Figure 5. In process evaluation rubric



0 points = clinician does not meet expectations/inappropriate action
3 points = clinician meets minimal expectations/lack of ease
5 points = clinician exceeds expectations/shows expertise and ease of use

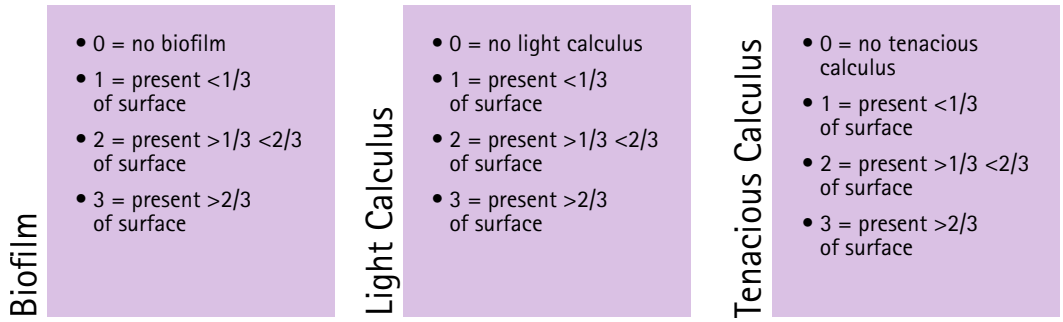
A score for each indexed tooth on each of 2 sides (buccal & lingual) was averaged and assigned to each of the 2 types of instrument categories (traditional approach vs. contemporary approach). Therefore, each tooth "square" could have a total of 10 points—a potential score of 60 points for each skill (see below).

Clinical positioning skills (120 points)	1. Clinician is positioned ergonomically and has direct sight line for each area of use (without compromising evacuation or aerosol control) (60 points) 2. Clinician uses light maximally for each area
Instrument technique skills (360 points)	1. Uses a gentle, balanced grasp and establishes an appropriate fulcrum for each area (60 points) 2. Demonstrates appropriate adaptation & angulation to tooth (60 points) 3. Keeps the tip in motion using a light overlapping and multidirectional, sweeping brush-like stroke or tap/tap stroke (60 points) 4. Sets power levels appropriately; considers insert and deposit type (60 points) 5. Examines surface periodically with non-powered instrument tip (or explorer) for adherent deposits or to establish debridement strategy (60 points) 6. Utilizes an appropriate combination & sequence of tips which work systematically to complete the task (60 points)

Note: This is not intended for faculty/school use; for research purposes only.

Figure 6. Outcomes evaluation rubric

Biofilm: Tooth #16	Buccal	Lingual	Mesial	Distal
Surface averages	Broad surfaces		Interproximal surfaces	
Light Calculus: #16	Buccal	Lingual	Mesial	Distal
Surface averages	Broad surfaces		Interproximal surfaces	
Tenacious Calculus: #16	Buccal	Lingual	Mesial	Distal
Surface averages	Broad surfaces		Interproximal surfaces	



Note: This is not intended for faculty/school use; for research purposes only.

points. The in process evaluation totaled a possible 510 points (Table 2).

Outcomes evaluation

The "outcomes" evaluation was performed on only selected indexed teeth (16, 12, 24, 32, 36, 44) of the 16 teeth assigned (Figure 4); these teeth represent all 4 quadrants as well as anterior and posterior positions and have been traditionally used in studies where the necessity to record biofilm and mineralized deposit exists.[36,37] To reduce the Hawthorne effect the participants were informed of the full assignment but remained unaware that only the predetermined indexed teeth would be evaluated.

The typodonts were standardized, each tooth being prepared by a single investigator to ensure consistency, using 3 different types of deposit applied to a maximum depth of 6 mm. A consistent thin layer of biofilm circumvented each root and was applied using an opaque, white correction fluid. Hard deposit was simulated by combining an adhesive with silica; adhesives with 2 types of bond strength were used to ensure varying degrees of tenacity. Prior to the evaluation, the simulated deposit was pilot tested with a small convenience sample to ensure suitability, and necessary modifications were made. Following instrumentation the indexed teeth (16, 12, 24, 36, 32, 44) were extracted from the typodonts for a "deposit remaining"' score. Each tooth was evaluated by

Table 2. Total process evaluation scores

Ultrasonic skills (observed over 1 hour)	Maximum category score
Equipment preparation	15 points
Infection control practices	15 points
Ergonomic clinical positioning	120 points
Ultrasonic instrument technique	360 points
Potential total score	**510 points**

both principal investigators in a grid format, according to the index (Figure 6). Each of 4 surfaces (buccal/lingual, mesial/distal) was examined for the 3 types of possible remaining deposit (biofilm, light calculus, tenacious calculus). Since the deposits were observationally different from each other, remaining deposits were easily identified by visual inspection under magnification. Outcomes evaluations were validated by the statistician.

RESULTS

The data set for this research consisted of the scores of 35 participants, divided by default (graduating year) into 2 groups. The baseline group and test group had 17 and 18 participants, respectively.

The process evaluation (Table 2) consisted of a potential 510 points dispersed over 4 categories with a total of 14 subcategories. The overall means of each group were compared (with standard error noted). In addition, the percentage of possible points achieved by the baseline and test groups in each of the 4 categories was compared (Figure 7).

The overall means for process evaluation were 112.3 points for the baseline group and 295.5 points for the test group (Figure 8) out of the potential 510 points, indicating an improvement of 263.1% for the test cohort. An area breakdown for percentage of total points possible shows equipment preparation at 15.9% vs 88.0%, infection control at 51.1% vs 95.3%, clinician positioning at 30.4% vs 60.9%, and instrument technique at 17.0% vs 51.8% for the baseline and test cohorts, respectively.

The outcomes evaluation provided an overall tally out of a potential 72 fragments (percentage within grids) of remaining deposit, derived from each of the scores in 3 different categories: biofilm, light calculus, and tenacious calculus. These were then further categorized into 2 subgroups (broad and interproximal surfaces). The broad and interproximal scores were calculated by taking the average of the buccal and lingual scores (broad) and mesial and distal scores (interproximal), while the scores for the biofilm, light calculus, and tenacious calculus deposits were calculated by adding all 4 scores for the buccal, lingual, mesial, and distal for each deposit type. These scores were tallied from the 6 indexed teeth extracted from each of the participants' typodonts. With 35 graduates receiving 12 initial scores for 6 different teeth, there were a total of 2520 individual data points.

The overall remaining deposit fragments were 60.2 vs 39.3 fragments (biofilm), 23.3 vs 7.4 fragments (light calculus), and 10.5 vs 4.1 fragments (tenacious calculus) for the baseline and test cohorts, respectively (Figure 9). An area-specific breakdown for amounts of total remaining fragments averaged over the 6 indexed teeth (out of 18 potential fragments) was as follows: tenacious broad surfaces 1.9 vs 0.6, tenacious interproximal 3.4 vs 1.4, light calculus broad surfaces 3.6 vs 0.6, light calculus interproximal 8.0 vs 3.1, biofilm broad surfaces 13.4 vs 6.4,

Figure 7. Process evaluation graph (by category)

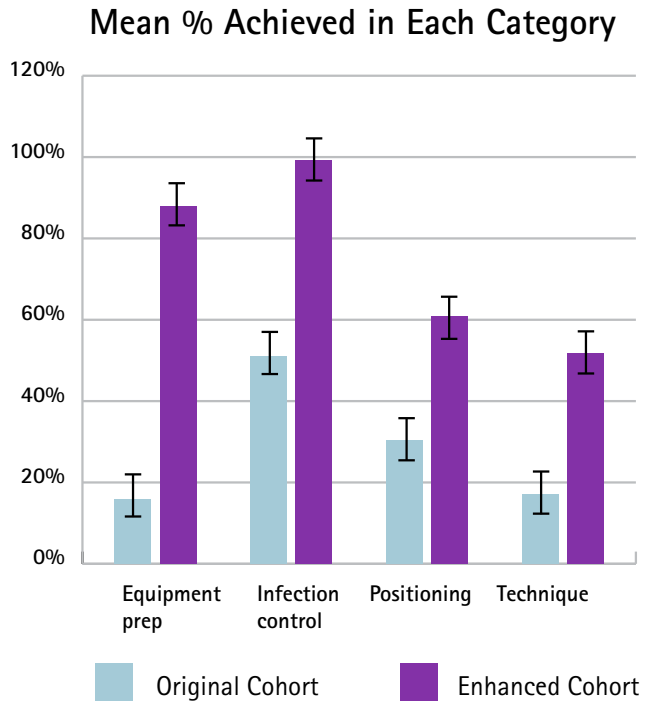


Figure 8. Process evaluation graph (overall)

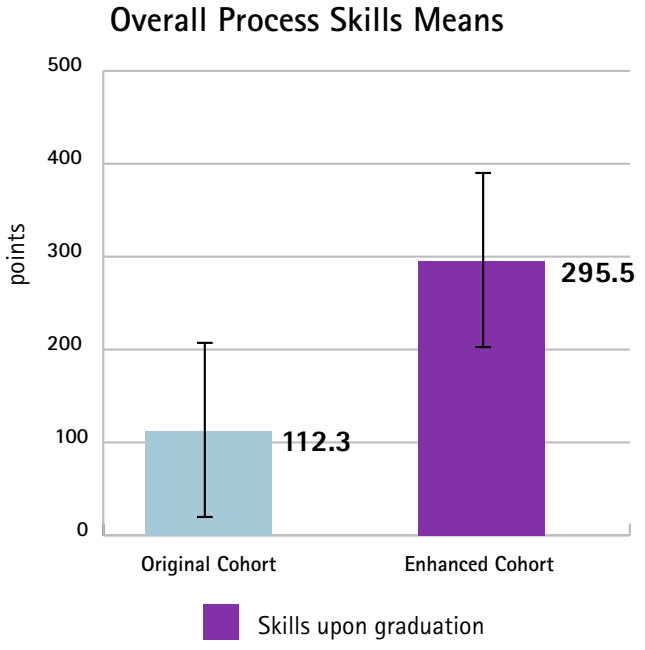
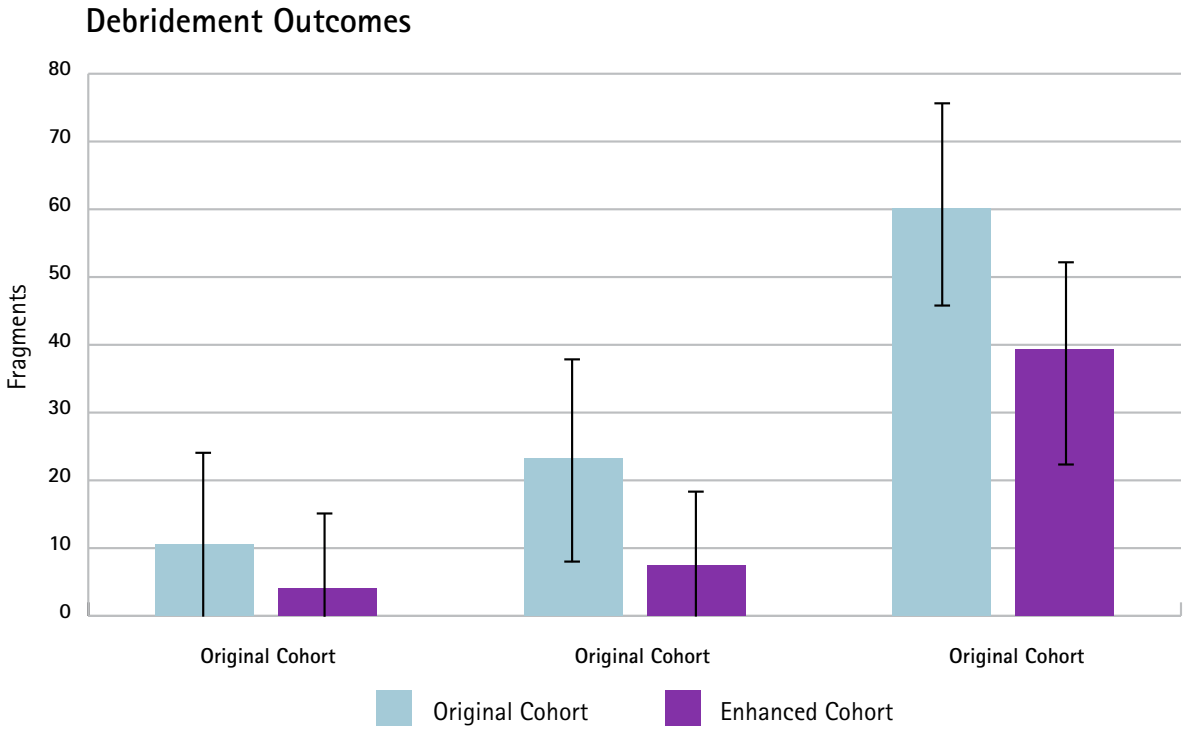


Figure 9. Outcomes evaluation graph (overall)



and biofilm interproximal 16.6 vs 13.3 for the baseline and test cohorts, respectively (Figure 10). The lower score is more desirable in this category given that it reflects fragments (or percentages within grids) of remaining deposit.

A 2-tailed, unpaired t-test was used to determine statistical significance between groups. The p values for all scores show statistical significance for the difference between the mean scores of the two groups at the 0.01 level. The highest single p value was 0.0005 while all remaining p values were 0.0001 or lower, indicating that the study's results were statistically highly significant.

In addition to the 2-tailed t-test, confidence intervals were also calculated to verify the reliability of the differences between the two groups' scores. The intervals were calculated at a 99% confidence level for both the baseline group and test group across all scores. The confidence intervals for the 2 groups did not overlap for any scores. The fact that there were no overlapping confidence intervals illustrates that even if, due to randomness, the test group was comprised entirely of individuals who were above average performers and the baseline group was made up solely of below average performers, the test group scored higher than the baseline group due to the intervention of the enriched curriculum (99% CI) (Figure 11).

Study limitations

Due to the nature of the protocol and the fact that it was implemented at a single accredited school, it was not possible to design the study with randomization. This accredited program was, however, reflective of Canadian dental hygiene schools, and the students were representative of the Canadian dental hygiene population.[21,22]

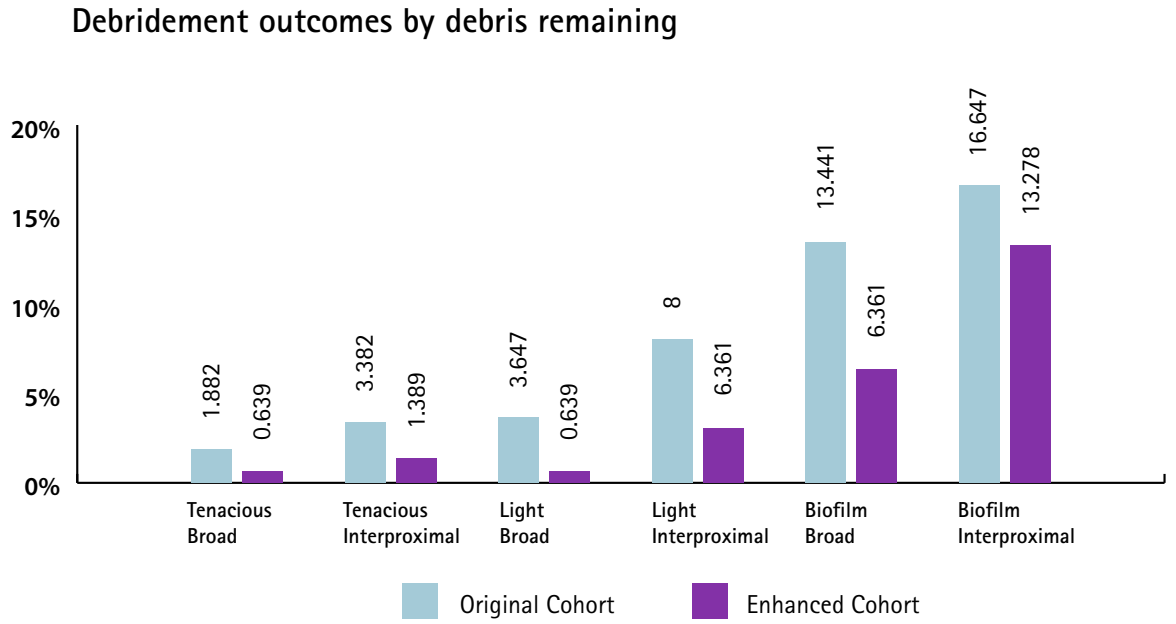
Additionally, the principal investigators were not blinded, given that it was known the baseline cohort received the original, established curriculum while the test group received the enriched curriculum. It was deemed critical to use the same evaluators given their experience (17 years and 23 years, respectively) in observation and analysis of ultrasonic technique in a study so focused on identification of detailed differences. In order to reduce the potential for bias, extensive calibration sessions were undertaken and a precise and multifaceted index for each measurement was developed and validated.

Upon reflection, it was noted that, although the test group participants were significantly improved in both their ultrasonic technique and outcome, it cannot be determined from this study design which of the enhancements to the curriculum produced the improvement. This study was not focused on the ranking of individual curricular elements, but rather on testing a holistic approach, drawing on the evidence base in current education techniques and addressing the gaps identified in the 2 previous survey studies.[21,22]

DISCUSSION

This study implemented and evaluated a new evidence-based curriculum for periodontal debridement based on an improved approach to ultrasonic teaching in the theory, preclinical and clinical venues with the goal of producing a more legitimately (consciously) competent graduate. The

Figure 10. Outcomes evaluation graph (by surfaces)



findings demonstrate the profound impact of an enriched ultrasonic curriculum on competence among dental hygiene graduates.

Despite the evolution of ultrasonic technology, Canadian programs have not adapted their approach, nor assigned the necessary time to develop this intricate skill.[22] Even the compelling evidence from current scholarly publications[21-23] has not yet prompted the redesign of the ultrasonic curriculum; programs persist in a strategy most heavily weighted on teaching hand instrumentation in preclinic.

In the clinical setting the imbalance is perpetuated by teaching debridement to completion either with hand scaling exclusively or with a combination of the two systems, despite a lack of evidence to support such a blended approach.[38] No consideration is given to using ultrasonics alone. In addition, faculty report assigning treatment sections according to hard deposit with no consideration given to the technology's microstreaming and cavitational effects on biofilm or treatment of inflammation.[22,23] Some programs even limit (with questionable rationale) the type of "ultrasonic clients" students are allowed to treat.[22]

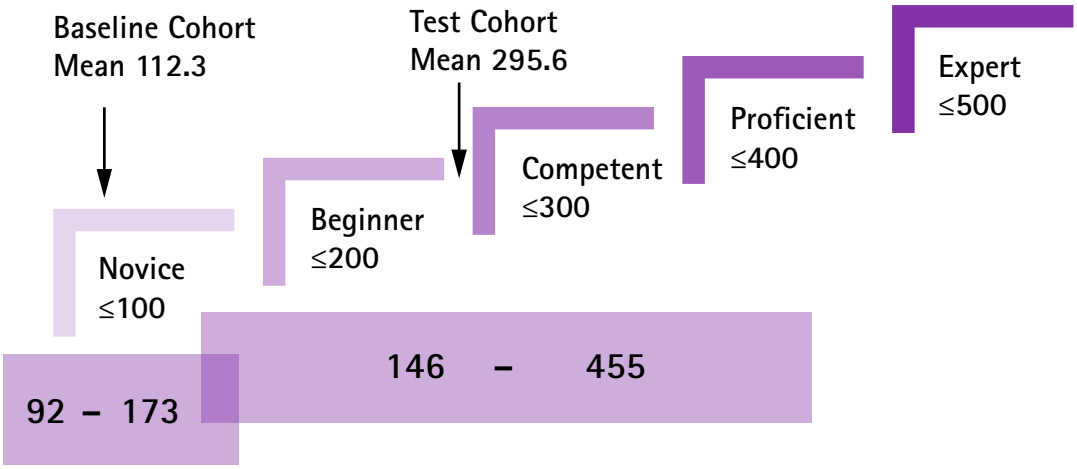
This outdated, traditional approach misguides students, forcing them to resolve ultrasonic problems with manual solutions. The suppression of critical thinking sabotages a clinician's chances of elevating his or her skill set, allowing little opportunity to reach proficiency. The Concurrent Debridement Model developed by the authors to facilitate critical thinking is, to our knowledge, the first to provide insights into a "scaling to completion" learning strategy which addresses proficiency in both treatment modalities. This study demonstrates that ultrasonic competency can be achieved in significantly fewer hours than current programs allot for manual instrumentation without extending the length of the program or adding remediation time. It prompts the question: "If we are bound by our *Entry-To-Practice Competencies and Standards for Canadian Dental Hygienists* which state: 'Each dental hygienist maintains and continually improves her/his competence in response to changes in health care, scientific information, technology, and professional expectations,'[1] why have we not adjusted our curricula to reflect the current evidence?"

This research draws on the following studies:

1. The recent Canadian Dental Hygiene Graduate Survey, which revealed that a majority of clinicians uses ultrasonic technology as their primary instrument with high levels of confidence, despite the fact that the data revealed they used it inappropriately and/or incorrectly.
2. The Canadian Dental Hygiene School Program Directors' Survey, which reported that, although Canadian dental hygiene programs are properly equipped with both traditional and contemporary ultrasonic equipment, they do not utilize these tools in alignment with the published evidence.
3. The clinical study, which shows that we are graduating dental hygienists who have not achieved entry-to-practice ultrasonic competence, specifically contemporary methods aimed at biofilm disruption and resolution of inflammation.

In 2003, the US Institute of Medicine engaged in a focused discussion (Clinical Research Roundtable) and published its consensus, entitled "Central challenges facing

Figure 11. Results of baseline cohort vs test cohort overlaid on the continuum of competence



the national clinical research enterprise."[39] The authors concluded that the failure to translate new knowledge into clinical practice and decision making in health care is a major barrier preventing human benefit from advances in biomedical sciences.[39,40] Given the compelling research demonstrating the advantages of ultrasonic debridement beyond initial calculus removal and as an effective treatment to disrupt and remove biofilm, coupled with the fact that we have an epidemic of oral inflammation and new research pointing to systemic links, it is worth asking: "What will it take to change?"

CONCLUSIONS

The implementation of an enriched ultrasonic curriculum in dental hygiene programs can result in a statistically significant improvement in the ultrasonic skills and outcomes of new graduates. This result can be achieved without compromising existing content or affecting program length or expenditures.

The results of this study could serve to promote necessary dialogue among dental hygiene educators on the need for a more balanced and evidence-based focus on curriculum planning for teaching debridement. These findings could also provide the basis for further discussion within accrediting and regulatory bodies on the equal competency levels of our graduates with both instrumentation systems to ensure safe, effective, and efficient practice.

Future studies need to examine earlier introduction of ultrasonics within dental hygiene programs. Additionally, verifying the impact of each of the elements of the enriched curriculum model could further inform educators as they strive to improve their programs.

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CONFLICT OF INTEREST

Dani Botbyl is an educational specialist employed by the granting agency. Marilyn Goulding began this project while a professor at Niagara College in the dental programs and, during the later stages of manuscript preparation, accepted the position of manager of clinical research with the granting agency.

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The effects of power toothbrushing on C-reactive protein levels in nursing home residents: A randomized controlled trial

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WHY THIS ARTICLE IS IMPORTANT TO DENTAL HYGIENISTS

- Studies show that nursing home residents have poor oral health as well as numerous systemic diseases, all of which lead to elevated levels of C-reactive protein (CRP).
- Reducing oral inflammation through twice daily use of a power toothbrush may lower CRP levels and improve the overall health of this population.
- Although no improvements in systemic inflammation were found, provision of oral care with a power toothbrush is an option for caregivers.

ABSTRACT

Objectives: The aim of this analysis was to investigate whether twice-daily use of a rotating–oscillating power toothbrush (Oral-B Professional Care 1000™) in nursing home (NH) residents over a 6-week period, compared to usual care, would reduce systemic inflammation as measured by C-reactive protein levels. **Methods:** A repeated measures single-blind randomized controlled trial was conducted with residents from 1 nursing home in Winnipeg, Canada, who were randomized to receive either twice-daily toothbrushing with a rotating–oscillating power toothbrush (PB) or usual care (UC) by caregivers. Consent was obtained from residents or their proxies. Participants had some natural teeth; periodontal inflammation; non-aggressive behaviour; no communicable diseases; were non-smokers; and non-comatose. This article reports on a secondary outcome of this trial that measured the systemic inflammation of participants at baseline and 6 weeks, using a high sensitivity C-reactive protein (hsCRP) assay. Changes in hsCRP were not normally distributed, thus data were analysed using non-parametric methods. Within group changes were measured with the Wilcoxon Signed-Rank Test and between group comparisons of ranked differences employed the Kruskal–Wallis Test. **Results:** Of 54 participants, 3 died before study completion leaving n = 51. No significant differences in CRP values were found between study groups ($X^{2(1)} = 0.191$, $p = 0.662$) with a mean rank score of 27.88 for the PB group and 26.02 for the UC group. **Conclusions:** Twice-daily power toothbrushing of NH residents' teeth did not significantly reduce levels of systemic inflammation as measured by hsCRP.

RÉSUMÉ

Objectif : La présente analyse a été effectuée pour déterminer si l'utilisation d'une brosse à dents électrique rotative et oscillante (Oral-B Professional Care 1000[MD]) par les résidants des centres hospitaliers de soins de longue durée (CHSLD) au cours d'une période de 6 semaines réduirait l'inflammation systémique telle que mesurée par les niveaux de protéines C réactives, par rapport aux soins habituels. **Méthodes :** Un essai à mesures répétées, à simple insu, aléatoires et contrôlées a été effectué auprès de 54 résidants d'un CHSLD de Winnipeg, Canada, qui ont été choisis au hasard pour recevoir soit un brossage de dents 2 fois par jour en utilisant une brosse à dents électrique (BÉ) rotative et oscillante ou des soins habituels (SH) par des soignants. Les résidants ou leurs mandataires ont donné leur consentement. Les participants avaient quelques dents naturelles; de l'inflammation parodontale; un comportement non agressif; n'avaient pas de maladies transmissibles; étaient non-fumeurs; et étaient non-comateux. Le présent article signale les résultats secondaires de cet essai qui mesure l'inflammation systémique des participants au départ et à 6 semaines, au moyen d'une épreuve biologique de protéine C réactive très sensible (hsCRP). Les changements dans les hsCRP n'étaient pas normalement distribués, donc les données ont été analysées au moyen de méthodes non paramétriques. Les changements au sein des groupes ont été évalués à l'aide du test Wilcoxon pour les observations appariées et les comparaisons des différences de rangs entre les groupes ont été évaluées à l'aide du test Kruskal–Wallis. **Résultats :** Parmi les 54 participants, 3 personnes sont décédées avant la fin de l'étude, laissant n = 51. Aucune différence significative dans les valeurs des hsCRP n'a été trouvée entre les groupes d'études ($X^{2(1)} = 0,191$; $p = 0,662$), et la note de classement moyenne était de 27,88 pour le groupe BÉ et de 26,02 pour le groupe SH. **Conclusions :** Le brossage de dents 2 fois par jour des résidants de CHSLD au moyen d'une brosse à dents électrique n'a pas réduit de façon significative les niveaux d'inflammation systémique tels que mesurés par les hsCRP.

Key words: C-reactive protein, nursing homes, power toothbrushing, randomized controlled trial, systemic inflammation

CDHA Research Agenda category: risk assessment and management

Trial registered at www.clinicaltrials.gov/ (Registration # NCT01639183)

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INTRODUCTION

It is well recognized that the number of seniors is increasing worldwide. The World Health Organization predicts that, between 2015 and 2050, the proportion of the world population over 60 years will nearly double, rising from 12% to 22%.[1] Similarly, the proportion of Canadians 65 years and older is projected to rise from 14% to 25% by 2036.[2] In addition to these population projections, nursing home (NH) residents' degree of illness has increased notably in recent years,[3] and researchers have suggested the demand for NH use will increase considerably in future years.[3,4]

In 2012, Matthews and colleagues reported that 66% of Canadian NH residents had periodontal disease.[5] Similar findings were reported by Compton and Kline in a student assessment of the oral status of residents of chronic care facilities in 2015.[6] Although caregiver staff are responsible for daily oral care, several studies[7-9] including a recent systematic review[10], have reported the oral health of NH residents is in many instances deplorable, not only in Canada but worldwide. These studies have demonstrated that NH staff are reluctant to provide this important activity of daily living to their residents, with factors such as lack of provider time; resident resistance; fear of being bitten; and outright aversion to the provision of this care cited as reasons.[7-10]

While maintaining good oral health into older adulthood has many important health and quality of life benefits, growing evidence also suggests a link between oral and certain systemic diseases, such as cardiovascular disease, stroke, respiratory disease, diabetes, obesity, metabolic syndrome, and more recently Alzheimer disease, arthritis, and end-stage renal disease.[11-13] While no causal linkages have been affirmed, of significance is that, in all of these chronic diseases, including periodontal disease, systemic inflammatory biomarkers, such as C-reactive protein (CRP), a non-specific inflammatory biomarker of systemic inflammation, are elevated.[11-18] CRP is produced by macrophages, endothelial cells, and smooth muscle, and is considered to be an important cardiovascular marker of inflammation. A speculated role of CRP may be in foam cell formation during atherogenesis and, as such, it is considered an important cardiovascular risk predictor.[16,17]

This literature has been derived almost exclusively from within the general population.[11-17] No studies on NH residents exist other than those that examine associations between oral health and aspiration pneumonia.[18,19] Numerous community-based oral health studies have shown reductions in overall CRP values following a variety of oral interventions.[20-25] Additionally, several researchers have reported improved oral health to be associated strongly with improved cardiac function among community-dwelling people,[22-27] and also with a reduction of aspiration pneumonia in NHs.[18,19] To date, however, there is no evidence of the extent to which reductions in oral inflammation due to improved oral care are associated with reductions in systemic inflammation among NH residents.

The reportedly poor state of oral health among NH residents, the reluctance of NH staff to provide adequate daily oral care, and the increasingly frail state of these residents call for an intervention that would improve this state of affairs. Several educational interventions have been attempted but with insufficient evidence of their effects as reported in a recent systematic review that included 9 randomized controlled trials and over 3000 NH residents.[28] In a study conducted by Wolden et al.[29] NH caregivers preferred delivering oral care using a power toothbrush, to alleviate their fears of being bitten. The current randomized controlled trial tested the use of a rotating–oscillating power toothbrush as the prime intervention with usual care being the comparison group. The purpose of the secondary analysis reported in this article was to test the extent to which twice-daily oral care using a rotating–oscillating power toothbrush versus usual care for 6 weeks reduced CRP levels as a marker of systemic inflammation.

METHODS

Design

This research used a 2-factor repeated measures single-blinded randomized controlled study design and followed an "intention to treat" protocol (ITT). Ethics approval to conduct this trial was obtained from the University of Manitoba Research Ethics Board for Research on Human Subjects (Bannatyne Campus; Reference # H2012:227) and also from the Deer Lodge Centre (DLC) Research Review Committee where the research took place.

Population

DLC is a government-owned NH with a total of 431 beds; 235 of these beds are located in the NH portion of DLC, comprising 6 units housing between 27 and 36 residents each. One of these units (47 beds) contains 36 regular NH beds plus a specialized "lock down" area with 11 beds. The remaining 196 beds at DLC are part of a chronic care long-term stay hospital. The director of the medical laboratory at DLC, which is operated by a separate organization, Diagnostic Services of Manitoba (DSM), provided the principal investigator (PI) with the laboratory services required for gathering the data for this secondary outcome measure.

Participant recruitment was conducted at the resident-level in 2 stages by the PI and aided by DLC nurse managers in charge of a nursing unit. These nurse managers provided the PI with a list of all residents in their respective units who had some natural teeth present and who, in their opinion, did not normally exhibit overly aggressive behaviour. These professionals also provided proxy contacts for residents unable to consent for themselves. From this initial list, the PI approached those residents or their proxies, who met the

broad inclusion criteria, to discuss the study and procure consent. Residents were recruited from 7 of the nursing units in DLC sequentially (6 NH units and 1 chronic care unit) to facilitate the training of caregiver staff and to monitor study progress. Baseline data collection was scheduled in the DLC dental clinic on a unit-by-unit basis once recruitment in the unit was complete.

At the second stage of delimitation, all consenting residents who met the broad inclusion criteria (some natural teeth, no communicable diseases, non-smokers, non-ventilated, non-comatose) were examined orally by the study research assistant—a registered dental hygienist—to ensure that each had some degree of inflammation surrounding their natural teeth as measured by the Modified Gingival Index (MGI)[30] and the Papillary Bleeding Index (PBI).[31] No participants were excluded during this latter stage of delimitation.

Demographic data were collected at study commencement for all participants, including classification of their cognitive status according to the Cognitive Performance Scale (CPS)[32] which appears in their medical chart, in addition to all comorbidities recorded in their medical charts.

Randomization

The PI randomly assigned consenting participants using a restricted randomization technique, where group numbers were placed in sequentially numbered sealed envelopes opened only at the commencement of the study by the PI, to either the power toothbrush (PB: n = 29) or usual care (UC: n = 25) group. The principal outcome of the study assessed the effects of power toothbrushing on oral inflammation (reported elsewhere)[33], while a secondary outcome measured the effects of this intervention on CRP levels, reported in this article. Although the primary study began with 57 participants, only 54 participants consented to having their blood drawn and were included in this analysis, which was conducted over a 6-week period for each resident, but lasted 9 months staggered over 7 nursing units at DLC.

Variables

Independent variables included a) twice-daily power toothbrushing (Oral-B Professional Care 1000™) and b) usual care, for a period of 6 weeks. The dependent variable for this secondary objective was systemic inflammation measured for each participant at baseline and again at the end of the 6-week study. Systemic inflammation was identified utilizing a high-sensitivity test (hsCRP) for the detection of C-reactive protein in the circulating blood. This high-sensitivity test detects much smaller levels of C-reactive protein than the standard test for CRP, at values ≥0.9 mg/L.[14,34,35] Mean CRP values between 2.5 and 5.0 mg/L of blood correspond to the Centers for Disease Control and Prevention's identification of cardiovascular risk.[34]

Clinical procedures

Caregivers in each DLC unit were informed of the study and taught to use the power toothbrush twice daily for individuals assigned to the PB group and instructed to perform usual care twice daily for those participants in the UC group. This usual care consisted primarily of manual toothbrushing but sometimes included only mouth rinsing, based on resident preference. Additionally, some of the residents were capable of performing their own oral care and preferred to do so. In this instance, staff were instructed to remind and observe the residents conducting their oral care.

Laboratory procedures

One vial of blood was drawn by a DLC registered laboratory technologist from each study participant at baseline and at the end of the 6-week study period; the technologist was blinded to the participants' study group. Once blood was drawn, it was centrifuged and aliquoted within an hour by the laboratory technologist and stored in an ice-packed cooler. On the same day of blood withdrawal, the PI transported the blood samples to the Intercity Medical Laboratory for hsCRP analysis. The Intercity Laboratory utilizes the Mayo Clinic technique for hsCRP analysis comprised of a Tina-quant CRP HS assay on a Roche/Hitachi 917 analyzer (Diamond Diagnostics – USA, Holliston, MA).[35] Results were faxed to the PI within 1 week of analysis.

Statistics

Sample size was calculated using an alpha of 0.05 and a power of 0.8 based on the primary study outcome of oral inflammation (reported elsewhere)[33] and not the secondary outcome reported in this article. Based on these calculations, the minimum sample size was set at 28 residents in each of the intervention and usual care groups. A target sample size was set at 60 residents (30 per group) allowing for a 10% death rate during the course of the study. Although 57 participants began the study, only 54 residents consented to having their blood drawn for the secondary outcome (CRP) analysis.

Change values in hsCRP levels deviated significantly from a normal distribution. As there is no non-parametric equivalent to repeated measures testing, data were analysed in 2 steps. Within-person differences in CRP levels were analysed using the Wilcoxon Signed-Rank Test.[36] This test is typically used as an alternative to the paired student t-test for matched pairs or the t-test for dependent samples, when the population cannot be assumed to be normally distributed.[36] The Kruskal–Wallis non-parametric test was then used to determine if the overall amount of change varied significantly between study groups.[37] This rank-based test may be used on independent variables that are either continuous or ordinal.[37] All tests of statistical significance were set at $p < 0.05$.

RESULTS

A total of 54 individuals or their proxies provided written consent to participate in the systemic outcome phase of this study. These 54 participants were randomly assigned at the beginning of the primary study to 1 of the 2 intervention groups: 29 in the PB group and 25 in the UC group. Two UC participants and one PB participant passed away after baseline data were collected but prior to study closure. None withdrew as a consequence of the study, thus the ITT protocol was not applied to these individuals. Data from the remaining 51 participants (PB = 28; UC = 23) who completed the 6-week period of intervention were analysed.

This study was conducted in a former veteran's facility where several beds are reserved for veterans. Sixty-seven percent (67%) of the study sample was male, with no statistical difference between study groups ($p < 0.335$) (Table 1). The mean age of study participants was 85.5 years, also with no significant difference between study groups ($p < 0.825$). The majority of participants had some form of cognitive impairment as measured using the Cognitive Performance Scale (CPS)[32] (Table 1). Twenty-two percent (22%) of all participants were either cognitively intact or borderline cognitively intact (CPS score of 0 to 1); forty-one percent (41%) were mild to moderately impaired (CPS score of 2 to 3); while 37% of participants were moderate-severe to very severely cognitively impaired (CPS score of 4 to 6). No significant differences in CPS levels were found between the study groups ($p < 0.599$).

All study participants had at least 1 physical chronic disease, and the majority (81%) had 3 or more chronic diseases (Table 1). While there was no significant difference in the number of comorbid participants between study groups ($p < 0.795$), significantly more individuals had

Table 1. Comparisons of mean age, gender, cognitive performance scores, and comorbidities across study groups at baseline

	Both groups (n = 54)	Usual care (n = 25)	Powerbrush (n = 29)	*P* value
Mean age (SD)	85.53 (8.54)	85.24 (9.44)	85.76 (7.68)	0.825
Sex				0.335
Male (%)	36 (67)	15 (60)	21 (72)	–
Female (%)	18 (33)	10 (40)	8 (28)	–
CPS scores (%)				0.599
0 to 1 (Intact-borderline)	12 (22.2)	7 (28.0)	5 (17.2)	–
2 to 3 (Mild to moderate impairment)	22 (40.7)	10 (40.0)	12 (41.4)	–
4 to 6 (Severe to very severe impairment)	20 (37.1)	8 (32.0)	12 (41.4)	–
Comorbidity				
A) Overall (%)				0.795
0 disease	0 (0)	0 (0)	0 (0)	–
1 to 2 diseases	10 (19)	5 (20)	5 (17)	–
>3 diseases	44 (81)	20 (80)	24 (83)	–
B) Specific diseases (%)				
Dementia/Alzheimer	39 (72)	17 (68)	22 (76)	0.529
Stroke	14 (26)	9 (36)	5 (17)	0.121
CVD	39 (72)	20 (80)	19 (66)	0.244
Arthritis	10 (19)	1 (4)	9 (31)	0.010
Diabetes	11 (20)	2 (8)	9 (31)	0.037
Cancer	10 (19)	9 (36)	1 (3)	0.002
Other	30 (56)	13 (52)	17 (59)	0.625

Table 2. Baseline comparisons in hsCRP measures across study groups

Outcome	Both Groups Median (Interquartile range)	Usual Care Median (Interquartile range)	Powerbrush Median (Interquartile range)	*P* value
High sensitivity C-reactive protein (hsCRP)*	4.0 (2.7 to 10.0)	5.2 (2.7 to 10.4)	3.5 (2.08 to 8.5)	0.407

*Scores below 1.0 mg/L indicate no risk for cardiovascular events. Anything above a 3.0 is associated with a higher risk of cardiovascular disease.

arthritis in the PB group (31%) compared to the UC group (4%) ($p < 0.01$). Similarly, significantly more individuals in the PB group had diabetes (31%) as compared to participants in the UC group (8%) ($p < 0.03$). Conversely, a larger proportion of residents in the UC group had cancer (36%) compared to one resident (3%) in the PB group ($p < 0.002$). No other statistically significant differences in resident characteristics were noted between the study groups.

No significant differences were found between study groups in systemic measures of inflammation using hsCRP ($p = 0.463$). The median score of hsCRP at baseline for both study groups combined was 4.0 (IQ, 2.7 to 10), and ranged from 3.5 (IQ, 2.08 to 8.5) for PB residents versus 5.2 (IQ 2.70 to10.4) for UC members (Table 2).

Resident changes in hsCRP during the 6-week study period are shown in Table 3. For both study groups combined, the median change (week 6 minus baseline) in hsCRP was 0.2 (IQR of –2.10 to 4.28), representing a slight but not statistically significant increase in this marker of systemic inflammation. UC group residents experienced an average decrease in hsCRP scores during the study period (median change value of –0.100; IQR of –5.00 to 5.60), while residents in the PB study group experienced a slight increase in hsCRP during this same time (median change value of 0.375; IQR of –1.78 to 2.47).

Comparisons between study groups of the changes in hsCRP are shown in Table 4. As with the descriptive findings, hsCRP values changed non-significantly over time for both study groups individually (PB: $p = 0.564$; UC: $p = 0.839$) and combined, ($p = 0.719$) and the rank order of these differences did not vary significantly by study group ($X^{2(1)} = 0.191$, $p = 0.662$) with a mean rank score of 27.88 for the PB group and 26.02 for the UC group.

Table 3. Changes (week 6 minus baseline) in high-sensitivity C-reactive protein (hsCRP) scores, overall and for both study groups

6-Week CRP–Baseline CRP	Median (Interquartile range)
Both groups (n = 51)	0.200 (–2.10 to 4.28)
Usual care (n = 23)	–0.100 (–5.00 to 5.60)
Powerbrush (n = 28)	0.375 (–1.78 to 2.47)

DISCUSSION

This study was conducted in a large NH in Winnipeg, Canada; residents were randomly allocated to receive twice-daily oral care using a power toothbrush or standard (usual) care for a 6-week period. The purpose of the present analysis was to determine if power toothbrush use (versus usual care) resulted in a statistically significant reduction in levels of C-reactive protein (as a measurement of systemic inflammation) across study groups.

The results of this research failed to reject the null hypothesis of this question that the level of CRP, as a marker of systemic inflammation, would be improved with the intervention of the power toothbrush as compared to usual care. Given the many factors influencing systemic inflammation in NH residents (e.g., numerous chronic diseases, proximity to death)[13,16,34,38,39], it is not surprising that CRP data were highly skewed at both baseline and follow-up. With these caveats, no significant improvement in CRP was found from baseline to week 6 of this study, overall or in either study group. One potential explanation for this result may be the poor levels of caregiver adherence to oral care (reported elsewhere).[39] This explanation, however, is not likely, given the documented improvements in oral health in this study (reported elsewhere).[33] This result is in contrast to numerous studies, albeit not conducted in NHs, which have shown clear associations between improvements in oral health and reductions in CRP.[40-43]

Oral health is only one of many factors thought to influence systemic levels of inflammation. Cardiovascular disease, arthritis, cancer, dementia/Alzheimer disease, and diabetes all are inflammatory in nature and therefore influence systemic CRP levels.[27,38,44-46] Since periodontal disease is only one source of inflammation, and given the high prevalence of comorbid chronic diseases among residents, the lowering of this single source of inflammation is likely insufficient to over-ride the effects of all other contributing factors. In this study population, the majority (81%) had 3 or more comorbidities such as diabetes, arthritis, cardiovascular disease, and dementia, all of which are inflammatory in nature.

One of the limitations of this study was the vast amount of variance in CRP levels at baseline with values ranging from 0.37 mg/L to 84.6 mg/L. No exclusion criteria were applied to CRP values as this was not the primary study question. Categorizing participants according to baseline CRP scores may have resulted in a different outcome.

Table 4. Assessment of changes in hsCRP over time, within people and across study groups

	Mean rank	*P* value	
Within-person change			
Both groups (n = 51)	32.48	0.719*	
Powerbrush (n = 28)	18.33	0.564*	
Usual care (n = 23)	14.32	0.839*	
Between-group differences			
Powerbrush (n = 28)	27.88	*P* value	$X^{2(1)}$
Usual care (n = 23)	26.02	0.662*	0.191*

*All computations are based on negative ranks

However, it would have also required a much larger sample size to accommodate randomization into 2 groups.

Numerous studies including 3 systematic reviews have confirmed that individuals with periodontitis have higher serum CRP concentrations as compared to those without periodontitis.[14,15,19-21] Similarly, a case–control study by Pejcic et al.[22] reaffirmed these findings, not only reporting significantly higher levels of CRP in those with periodontitis, but also demonstrating a dose–response effect by separating subjects with periodontitis into moderate and severe periodontitis groups.

It would seem logical that removing this source of oral inflammation would help to lower overall levels of systemic inflammation. Interestingly, several studies[23-25] have documented such positive reductions in overall CRP following periodontal interventions including several systematic reviews and meta-analyses[19-21], while other similar studies have not demonstrated the same results[47-49]. Reasons for these inconsistencies at this time are unknown, however the possibility of alternate disease pathways may be one explanation. Another possible explanation may be the overall burden of disease as suggested by the current study outcome. However, the results of a recent systematic review by Teeuw[21] and colleagues were in direct contrast to the current study findings; Teeuw and colleagues reported significant reductions in CRP levels in only those with other comorbidities. They speculated this result was due to higher levels of baseline CRP for those study participants compared to those without a comorbidity.[21]

Since the majority of these studies employed more invasive interventions such as scaling and root planing, perhaps the daily toothbrushing utilized in this current study was not sufficient enough to have an effect on lowering CRP levels. However, a large epidemiological study conducted in Scotland found reduced levels of CRP in those who brushed regularly compared with non-brushers.[50] The difference was that the study population in the de Oliveira[50] study was the general public rather than NH residents.

The potential for oral care strategies to reduce CRP levels in the body and to improve endothelial dysfunction and carotid intima media lumen size may have major health benefits for NH residents. CRP has also been identified as an important diagnostic and prognostic tool in NH-associated pneumonia.[51] Arinzon and colleagues found CRP to be positively correlated with the rate of death in those with pneumonia ($r = 0.493$, $p < 0.001$) and suggested that CRP values be determined for all NH patients suspected of having pneumonia.[51]

For frail older adults, such as NH residents, who have numerous chronic diseases that elevate their systemic inflammatory levels, more invasive oral interventions may be required to reduce their systemic inflammatory levels. A combination of frequent periodontal debridement treatments along with daily tooth brushing may subsequently reduce systemic inflammation, hence helping to improve their overall health. Further studies, therefore, are required to investigate such combinations of procedures conducted with NH residents to lower their CRP levels.

CONCLUSION

Oral hygiene interventions using either twice-daily brushing with a power toothbrush or standard care both failed to lower CRP values in NH residents over a 6-week period. The authors conclude that daily toothbrushing efforts are not sufficient enough to lower the high levels of CRP in NH residents given the presence of 3 or more chronic comorbidities found in over 80% of study participants. More invasive oral hygiene interventions may be required to have an impact on lowering systemic inflammation in this unique population group.

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CONFLICT OF INTEREST

The authors have declared no conflicts of interest.

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Granuloma gravidarum associated with pregnancy: A case report

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ABSTRACT

Granuloma gravidarum, commonly known as "pyogenic granuloma," is a reactive inflammatory hyperplasia that occurs in response to various stimuli such as low-grade local irritation or trauma, hormonal factors or certain kinds of drugs. Occasionally it develops during pregnancy because of the hyper-responsiveness of the oral tissues to increased levels of pregnancy hormones. This case study describes a persistent pregnancy tumour postpartum and discusses its management using electrocautery. Simple oral hygiene measures are highly effective in preventing both the initial occurrence and persistence of such lesions postpartum. Pregnant clients should be educated about the risk for developing pyogenic granulomas and counselled on the importance of maintaining good oral hygiene.

WHY THIS ARTICLE IS IMPORTANT TO DENTAL HYGIENISTS

- Poor oral hygiene may lead to the development of reactive lesions, such as granuloma gravidarum, during pregnancy. These lesions usually develop in the first trimester and regress postpartum.
- If the lesions persist, they may compromise maternal health.
- Educating clients about the importance of maintaining good oral hygiene during pregnancy can help to prevent the occurance of such lesions and the need for surgical excision postpartum.

RÉSUMÉ

Le botriomycome, communément appelé le « granulome pyogénique » est une hyperplasie inflammatoire réactive qui se présente en réponse à divers stimuli tels que l'irritation ou le traumatisme mineur local, les facteurs hormonaux ou certaines sortes de médicaments. Occasionnellement, il se développe pendant la grossesse en raison de l'hyperréactivité des tissus buccaux en réponse à la hausse du niveau des hormones de grossesse. La présente étude de cas décrit une tumeur de grossesse qui persiste après l'accouchement et se penche sur sa gestion au moyen de l'électrocautérisation. De simples mesures d'hygiène buccale sont grandement efficaces pour la prévention à la fois de l'occurrence initiale et de la persistance de telles lésions postpartum. Les clientes enceintes devraient être renseignées sur les risques de développer des granulomes pyogéniques et devraient recevoir des conseils sur l'importance de maintenir une hygiène buccale optimale.

Key words: electrocautery, granuloma gravidarum, oral hygiene maintenance during pregnancy, pregnancy tumour, puerperal period, pyogenic granuloma

CDHA Research Agenda category: risk assessment and management

INTRODUCTION

Oral soft tissue enlargements often present a diagnostic challenge since a diverse group of pathologic processes can produce such lesions and thus complicate their management. Such enlargements may be deviations from normal anatomy, developmental anomalies, cysts, inflammation or neoplasms. Among these lesions is a group of highly reactive hyperplasias, which develop in response to a chronic, recurrent tissue injury that initiates an unruly reparative tissue response.[1,2] Granuloma gravidarum, commonly known as "pyogenic granuloma," is one of the most common oral soft tissue enlargements. It is a benign, fast-growing, focal reactive growth, fibrovascular in nature, with extensive endothelial proliferation. The lesion was originally described in 1897 by Poncet and Dor, who named this lesion "botryomycosis hominis." The term "pyogenic granuloma" was proposed by Hartzell in 1904.[2] This name, however, is a misnomer since the lesion is neither associated with pus nor does it represent a true granuloma.

Gingival pyogenic granuloma develop in up to 5% of pregnancies. Hence the terms "pregnancy tumour" and "granuloma gravidarum" are often used interchangeably to describe this lesion.[3,4] Periodontal pathogens, local irritants, and circulating hormones in the pregnant woman contribute to the origin of this lesion. The principal oral

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site affected by pregnancy tumours is the gingiva. Other sites in the oral cavity include the lower lip, tongue, buccal mucosa, upper lip, and the palate. The true prevalence of pregnancy tumours is not well established since not all affected women seek professional care for these lesions.[5] The overall reported prevalence is 0.2% to 9.6%. Pregnancy tumours generally appear in the 2nd or 3rd month of pregnancy and show a tendency to gradually increase in size. The lesion typically regresses following childbirth.[5]

This short communication presents a case report of a pregnancy tumour that persisted postpartum and was managed by surgical excision using electrocautery together with vestibuloplasty to increase the depth of the vestibule in the same region.

CASE REPORT

A 22-year-old female client reported to the Department of Periodontics at KLE VK Institute of Dental Sciences, Belagavi, Karnataka, India, with a chief complaint of a swelling in her gums in the area of her lower front teeth. She reported that the lesion appeared approximately 8 months earlier during the 3rd month of her pregnancy. The lesion was of negligible size when the client first noticed it, but it gradually increased in size. This growth was accompanied by an increase in tooth mobility. Eventually, the condition began to cause discomfort during mastication due to the large size of the lesion and was also esthetically unpleasing.

The client's medical history revealed that she underwent a normal delivery 3 months prior to presenting to this institution. The client reported visiting a local dentist in the 3rd month of her pregnancy when she perceived that the lesion was increasing in size. Supragingival ultrasonic scaling was performed at that time, and oral hygiene instructions were given. However, the client was advised against any surgical intervention and was asked to report postpartum.

The extraoral examination showed no facial asymmetry. The intraoral clinical examination revealed a roughly oval, exophytic, sessile lesion, attached to the labial surface of the gingiva between the mandibular left central and lateral incisors (Figure 1A). The lesion measured approximately 13 mm x 9 mm x 6 mm (Figures 2A, 2B, 2C). The lesion also extended onto the lingual side as a small mass measuring 2mm x 2mm (Figure 1B). The surface of the lesion was lobulated and reddish-pink in colour. On palpation the growth was soft to firm in consistency and non-tender. The lesion was quiescent and showed no signs of spontaneous bleeding. It involved the interdental papilla, marginal and attached gingiva and, when retracted from the teeth, its attachment to the interdental papilla was visible (Figure 1C).

The mandibular central and lateral incisors had Grade I mobility. The oral hygiene status of the client was poor, with a score of 4.49 on the Simplified Oral Hygiene Index.[6] Laboratory investigations, including hemoglobin, bleeding, and clotting times, were ordered and reported to be within normal limits. Radiographic examination revealed approximately 20% to 30% horizontal bone loss

Figure 1A. Lesion attached to labial surface of the gingiva in relation to mandibular left central and lateral incisors

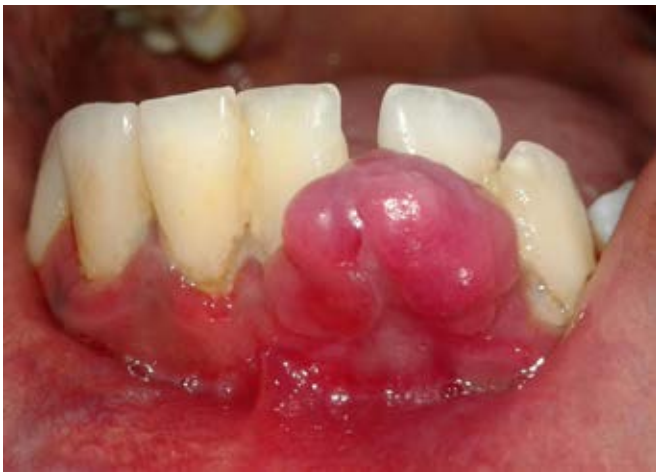


Figure 1B. Extension of the lesion on the lingual side

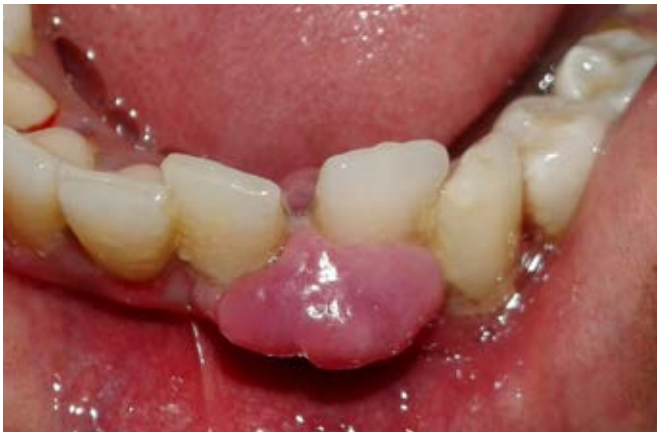


Figure 1C. Attachment of the lesion primarily to the interdental papilla

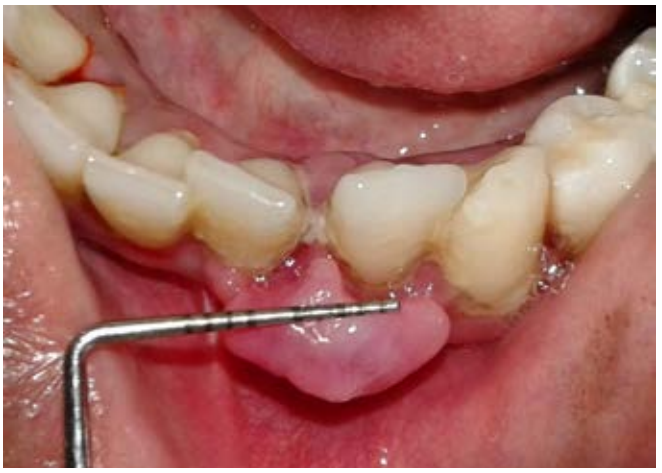
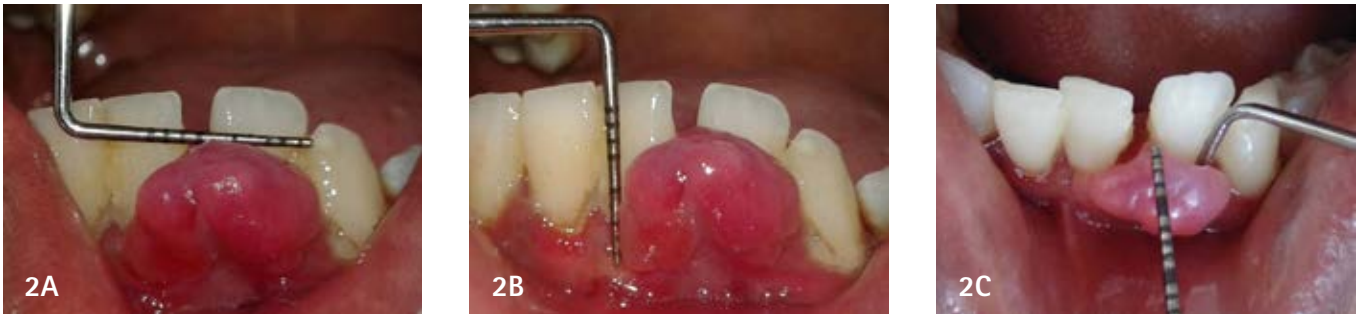


Figure 2. Images showing size of the lesion

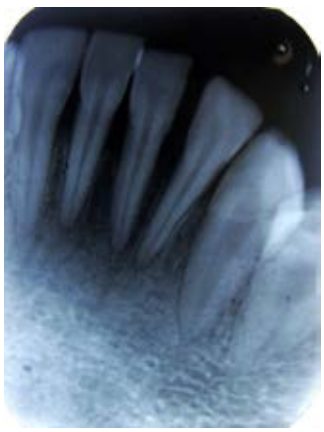


in the mandibular anterior region (Figure 3). Thus, based on the client's medical history and clinical examination, a differential diagnosis of pregnancy tumour (granuloma gravidarum), peripheral giant cell granuloma, and peripheral ossifying fibroma was made.

At the initial visit, the local irritating factors (plaque and calculus) were eliminated by thorough ultrasonic scaling followed by root planing performed with Gracey Curettes after application of a local anesthetic. The client was instructed on maintaining her oral hygiene, and a treatment plan was presented to her which included surgical excision of the lesion. The procedure was scheduled for 1 week following her phase-I therapy as the client complained of a lot of discomfort during mastication and refused to follow the standard 6-week re-evaluation protocol.

At the subsequent appointment, one week later, the lesion had a pale pink surface, most likely resulting from the reduction in inflammation due to the phase-I therapy (Figure 4A). Hence, a decision was made to proceed with the excision of the lesion using an electrocautery unit in order to minimize the anticipated intraoperative bleeding, which is a common occurrence with such lesions. After an injection of local anesthesia, the lesion was excised using a unipolar electrocautery device mounted with a needle-like active electrode, up to 2 mm beyond the involved margins (Figure 4B). The lesion bled minimally during the excision. A ball electrode was later used to achieve complete hemostasis.

Figure 3. Intraoral periapical radiograph showing horizontal bone loss in the mandibular anterior region



After the lesion was excised, an inadequate depth of the vestibule was noted in the same region, thus a decision to perform a frenotomy along with vestibular deepening was made. The mandibular labial frenum was held using a hemostat, and a number 15 blade was used to excise the tissue along the upper and lower borders of the hemostat until the hemostat was free and the wedge-shaped tissue was removed. The edges of the frenotomy incision were extended laterally by making an incision in the depth of the vestibule (Figure 4C). A periodontal dressing was placed to protect the raw area corresponding to the excised lesion and to prevent reattachment at the site where the vestibuloplasty was performed. The client was recalled after 1 week for dressing removal and evaluation of the surgical site. The excised tissue (Figure 4D) was sent to the Department of Oral Pathology for histological examination.

One week later, at the follow-up visit, the surgical site had healed uneventfully although some amount of redness was noticed at the interdental papilla between the mandibular left central and lateral incisors (Figure 5). This redness had subsided at a subsequent follow-up visit without any further intervention. When the vestibular depth measurements recorded before and after the procedure were compared, a gain of 3 mm of vestibular height was noted (Figures 6A, 6B). The case was followed for 1 year and no signs of recurrence or discomfort were reported.

The histopathologic examination revealed stratified squamous parakeratinized epithelium. The underlying connective tissue was delicate and loose with plum- to spindle-shaped fibroblasts and focal aggregates of chronic inflammatory infiltrate comsisting of lymphocytes and plasma cells. Numerous endothelial lined vascular spaces and budding endothelial cells were identified. Several endothelial lined blood vessels were engorged with RBCs and few extravasated RBCs were also noted. These findings were consistent with the diagnosis of pyogenic granuloma (Figures 7A, 7B, 7C).

Figure 4A. Slightly reduced size and pale pink surface of the lesion 1 week after phase I therapy

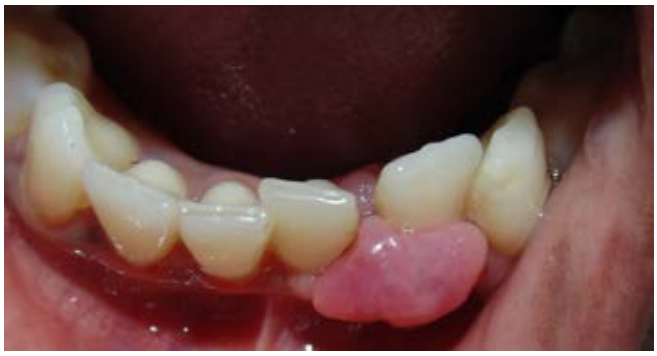


Figure 4B. Electrocautery device used for excision of the lesion

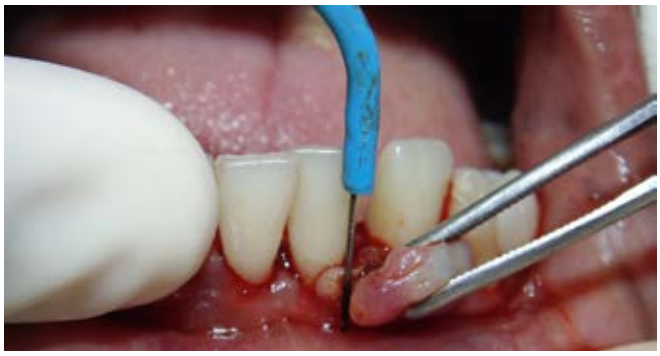


Figure 4C. Vestibular deepening

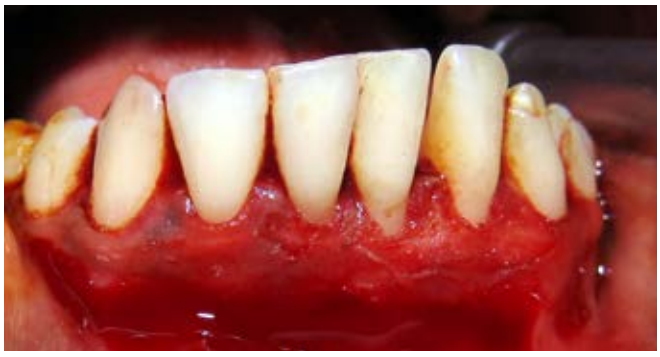
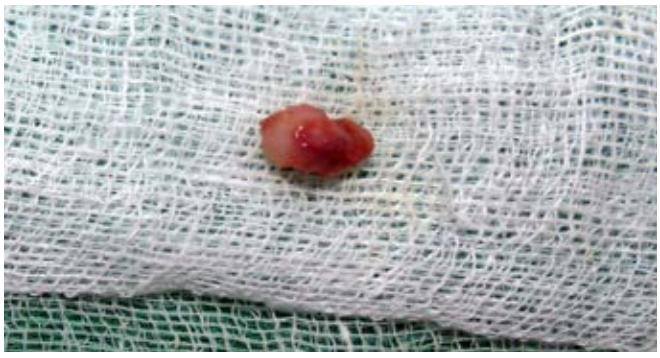


Figure 4D. Excised lesion sent for histopathological examination



DISCUSSION

Granuloma gravidarum has been referred to by a variety of other names, such as "granuloma pediculatum benignum," "benign vascular tumour," "pregnancy tumour," "vascular epuli," and "Crocker and Hartzell's disease." Angelopoulos proposed the term "hemangiomatous granuloma," which accurately expresses the histopathologic picture, i.e., the hemangioma-like and inflammatory nature of oral pyogenic granuloma.[7]

Gingival inflammation in the initial months of pregnancy is induced by the persistence of plaque that serves as a base for the development of granuloma gravidarum.[5] Later, in the subsequent months, it is controlled by the cumulating hormonal stimuli. Broad investigations have been carried out to study the molecular mechanisms contributing to the development of granuloma gravidarum during pregnancy as a result of the increased leves of female sex hormones, namely progesterone and estrogen.[2] Progesterone functions as an immunosuppressant in the gingival tissues of pregnant women, preventing a rapid, acute inflammatory reaction against plaque, but allowing an increased chronic tissue reaction. This clinically results in an exaggerated appearance of inflammation.[4,5]

Estrogen enhances granulation tissue formation, which accelerates wound healing by stimulating the following factors[4,5,8,9]:

- basic fibroblast growth factor (bFGF) and transforming growth factor beta-1 (TGF-Bl) production in fibroblasts
- granulocyte-macrophage colony-stimulating factor (GM-CSF) production in keratinocytes
- vascular endothelial growth factor (VEGF) and nerve growth factor (NGF) production in macrophages

The changes in the function and structure of the blood and lymph microvasculature of mucosa is brought about by the profound endocrine turmoil during pregnancy. However, it should be noted that the pregnancy tumour typically regresses following childbirth but the mechanism for such regression remains unclear. This finding may be

Figure 5. Postoperative image (1 week following surgery)

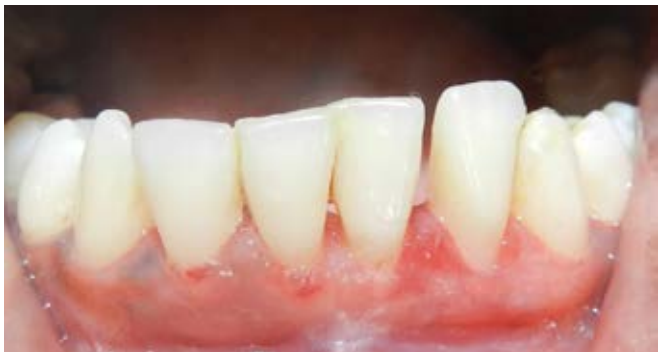


Figure 6A. Vestibular depth measurements at the time of the procedure

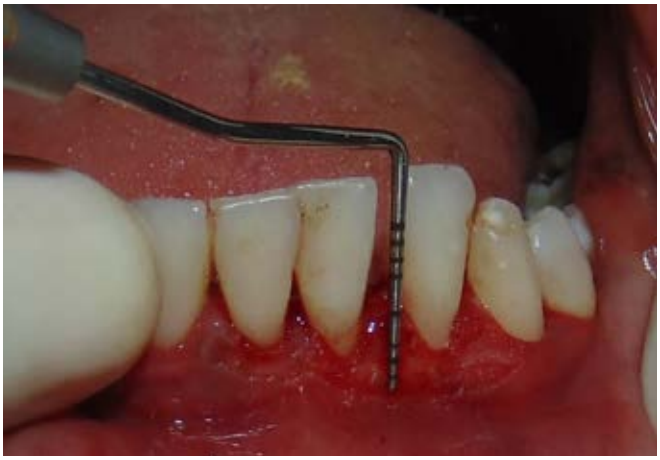
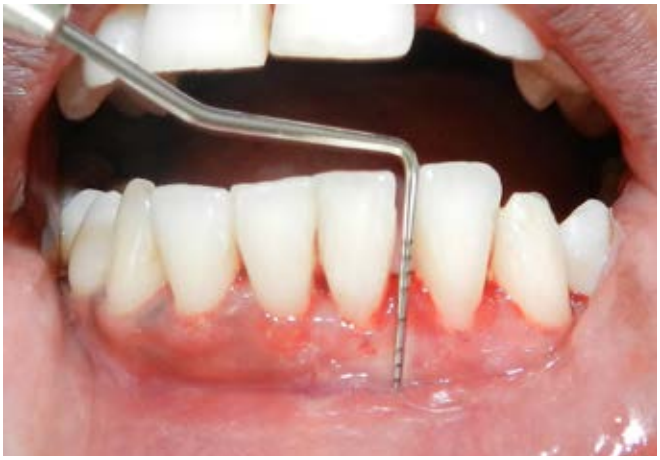


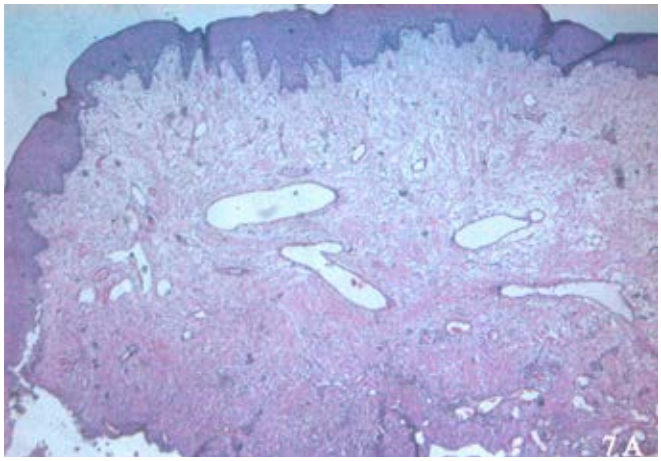
Figure 6B. Vestibular depth measurements 1 week after surgery



explained partially by the fact that, in the absence of VEGF, angiopoietin-2 (Ang-2) causes blood vessels to regress. The amount of VEGF has been found to be high in granulomas associated with pregnancy and almost undetectable after childbirth.[4,9,10]

In the present case, the client's poor oral hygiene habits and persistent band of supra and subgingival calculus and plaque most likely acted as a chronic stimulus causing the lesion to persist postpartum. This result could potentially have been avoided by proper maintanence of oral hygiene during pregnancy. Management of granuloma gravidarum depends on the severity of symptoms. If the lesion is small, painless, and free of bleeding, eradication of the etiology, clinical observation, and follow up are advised. Because pyogenic granuloma is a benign lesion, surgical excision is the treatment of choice for larger lesions that are painful or tend to interfere with mastication. Surgical intervention is generally avoided during pregnancy since these lesions usually regress postpartum.[7,9]

Figure 7A. Histopathologic section at 4x magnification

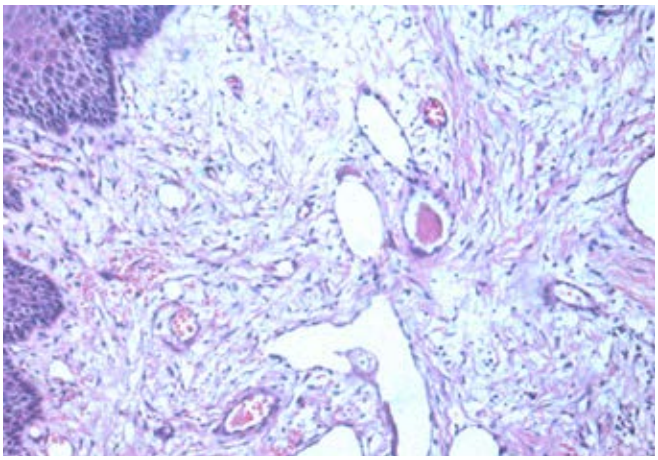


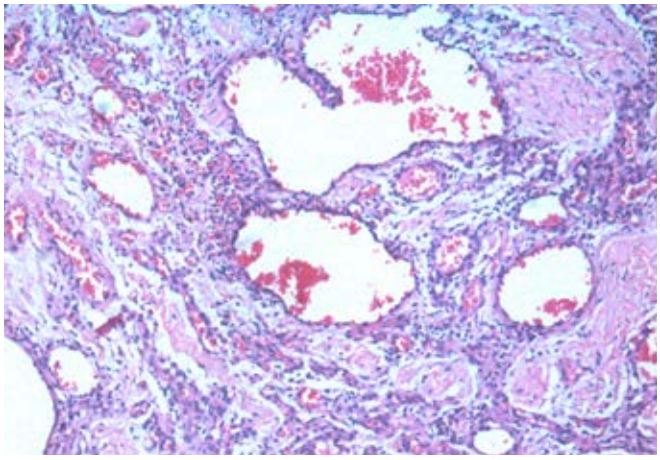
During management in the puerperal period, teeth should be thoroughly scaled to remove any source of continuing irritation. The excision should extend down to the periosteum and include excision of up to 2 mm of the adjacent tissue collar in order to avoid recurrence. The majority of cases typically show a tendency to bleed excessively during excision with a scalpel.[11,12] Thus, an electrocautery device was used to excise the lesion in the current case which avoided any such complications. Other novel treatment options include the flashlamp pulsed dye laser[13], cryosurgery[14], and sodium tetradecyl sulfate sclerotherapy[15]. Intralesional injection of absolute ethanol and corticosteroids has been used particularly for highly recurrent lesions.[16] Recurrence has been reported in up to 16% of these types of lesions, which might be due to incomplete excision or failure to remove the etiologic factors.[17]

CONCLUSION

The diagnosis of granuloma gravidarum is complex, and it is important to differentiate this type of lesion from inflammatory tumours and true neoplasms. Careful management also helps in preventing the recurrence of these benign lesions. Often, oral health may be neglected during pregnancy, leading to the development of such reactive lesions. Thus, during pregnancy, oral hygiene maintenance should be reinforced and made a priority, since the increased levels of progesterone and estrogen in the presence of dental plaque can promote the development of these lesions in the oral cavity. From this case report, it can be concluded that pregnancy tumours can be adequately treated with the correct diagnosis and proper treatment planning.

Figure 7B, 7C. Histopathologic section at 10x magnification





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Proceedings of the Global Dental Hygiene Conference, Ottawa 2017

Introduction

Jane L Forrest*, EdD, RDH; Ann Eshenaur Spolarich§, PhD, RDH

The National Center for Dental Hygiene Research & Practice (NCDHRP) blended its 4th Global Dental Hygiene Research Conference with the Canadian Dental Hygienists Association (CDHA) biennial conference to produce *Translating Knowledge to Action*, which took place in Ottawa, Canada, October 19–21, 2017. This 3-day conference provided an opportunity for dental hygiene practitioners, educators, and researchers to convene and explore commonalities in their interests, learn from each other about new and ongoing research programs, and foster future collaborations. It is our hope that discussion and interest generated at the conference provided the networking support and intellectual stimulation needed to systematically and purposefully move our knowledge base, educational programs, and clinical practice standards forward.


Jane L Forrest


Ann Eshenaur Spolarich

Together with CDHA, we offered scientific sessions featuring 60 original posters and 29 oral free papers on a wide range of topics for the many communities of dental hygienists represented.

Conference workshops were designed based on the key areas identified in the new research agendas of the Canadian and American dental hygienists' associations: risk assessment & management, capacity building of the profession, access to care & unmet needs, alternative practice in the US and Canada, and seniors' oral health. Colleagues shared findings from their original research about problems encountered every day in practice so that we can all improve the quality and type of education provided to the next generation of dental hygienists and the care we provide to the public.

This conference required extensive planning, and we must acknowledge the contributions and support that we received along the way. First, we thank CDHA for hosting us in Ottawa, their beautiful Canadian capital city, for managing the conference logistics, and most importantly, for their unwavering, ongoing partnership with us. Their commitment to advancing the profession and to supporting research is deeply appreciated and admired. Second, we extend our thanks to the members of the NCDHRP Advisory Board, CDHA's Research Advisory Committee, and other invited leaders for serving as abstract reviewers, and to our board member, Ashley Grill, for managing the process. Third, we thank the many volunteers who facilitated the workshops, moderated the scientific sessions, staffed the registration tables, and helped to make the conference run so efficiently and seamlessly. Fourth, we thank the attendees who came to Ottawa from around the world to participate. Attendees represented 16 countries from 4 continents, including 11 Canadian provinces and territories, and 27 states from the US.

Most importantly, we extend our deepest and most heartfelt gratitude to our corporate sponsors for their support of the scientific sessions and the NCDHRP: The Procter & Gamble Company, Colgate-Palmolive/Colgate Oral Pharmaceuticals, Philips, Dentsply Sirona, and Sunstar Americas, Inc. The scientific sessions would not have been possible without their partnership and educational grant support. We also thank the International Association for Dental Research for its support and sponsorship of the conference research

*Director, National Center for Dental Hygiene Research and Practice
§Associate Director, National Center for Dental Hygiene Research and Practice

awards. Award recipients for best abstracts were Elizabeth Couch, MS, RDH, and Deanna Mackay, BDSc(DH), RDH.

We continue to strive to promote the research efforts of dental hygienists in the best way possible and feel privileged that so many of our colleagues return to our conferences to share their work. Collaboration is critical to successfully address our respective national research agendas and to improve the health of the populations we serve. For those of you who were unable to join us in Ottawa, we hope that these proceedings will encourage you to keep learning and perhaps stimulate you to conduct and disseminate your own research.

Cutting the ribbon to open the poster presentations
From left to right: Ann Eshenaur Spolarich (NCDHRP), Gerry Cool (CDHA President), Jane L Forrest (NCDHRP)

ACKNOWLEDGEMENTS

The Canadian Dental Hygienists Association and the National Center for Dental Hygiene Research & Practice thank all of the sponsors who made this global conference possible:

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ORAL PRESENTATION ABSTRACTS

EDUCATION

DENTAL HYGIENE EDUCATION EXCEEDS THE DEGREE GRANTED: A PILOT STUDY

*Trisha O'Hehir, MS, RDH. O'Hehir University, USA

Problem statement: Since 1945, the entry-to-practice requirement for dental hygiene has remained at a 2-year level. Dental hygiene lags far behind other health professions in acknowledging the education required and provided to meet today's advanced scope of practice and the clinical responsibilities required within the dental hygiene process of care. **Purpose:** The majority of dental hygienists complete more than 2 years of college for an associate degree. The purpose of this study was to determine if a 2-year associate degree appropriately represents the current level of dental hygiene education. **Methods:** This is a retrospective, analytical pilot study comparing 3 current community college dental hygiene programs to the 1945 standards for 2-year dental hygiene programs. Additionally, the curricula of these community college dental hygiene programs and 1 university program were compared for contact credit hours required, credits earned, credits granted, and degrees conferred. **Results:** Descriptive statistics revealed that community college graduates today complete 112 earned credits compared to 61 credits in 1945, a difference of 51 credits. Today's university dental hygiene program requires 13 contact credit hours more than the community college programs, 7 more earned credits, and grants 16 more credits for the BS degree than are granted for an AAS degree. These differences do not exceed one semester of additional course work for associate degree graduates to achieve a BS degree. This pilot study is limited by the small sample size of dental hygiene programs included for analysis. Further studies need to include a broader array of dental hygiene programs. **Conclusion:** Dental hygiene education has expanded significantly since 1945, without the requisite degree being granted.

AN EXAMINATION OF STUDENT SATISFACTION AND PERCEIVED COMMUNITY IN UTILIZING A TEXT MESSAGING MOBILE APPLICATION

*Rachel C Kearney, BSDH, MS, Amy L Molnar, BSDH, MDH. Division of Dental Hygiene, The Ohio State University College of Dentistry, USA

Problem statement: Increasingly more online courses are offered in higher education. A commonly identified problem with online courses is that students lack a feeling of connectedness and sense of community when taking online courses. **Purpose:** The purpose of this study was to examine the use of a text messaging application in online dental hygiene courses. The study utilized data analytics, student preferences, and Community of Inquiry (COI) measures to explore the utilization of a text messaging application in online dental hygiene courses. **Methods:** Institutional review board approval was obtained. A text messaging application was implemented into a BS course and a MDH course. Students in 3 online dental hygiene courses were given instructions and access to a text messaging application. At the end of the semester, the students filled out a satisfaction and COI survey. Data analytics were also collected from the messaging application software. **Results:** A total of 31students completed the study. Most students were 20 to 25 years of age, female, and in an entry-level baccalaureate program. Thirty percent of students reported using the application very frequently and 30% reported using it occasionally. Seventy-one percent of students agreed or strongly agreed that receiving notifications on their phone was a good way to communicate course information. Students also noted that their course instructor answered messages faster on the application than via email. The COI survey revealed moderate to high levels of teaching (3.0±1.0), social (3.0±0.68), and cognitive (3.0±0.73) presence. Graduate students reported significantly higher COI than entry-level students ($p \leq 0.001$). **Conclusions:** Most students reported a messaging application to be useful, efficient, and helpful in facilitating information about their online course. Students who have no face-to-face classes reported higher COI than those students who attended courses face to face.

DOES STRESS IN A DENTAL HYGIENE AND DENTAL THERAPY UNDERGRADUATE PROGRAM CONTRIBUTE TO A SENSE OF WELL-BEING IN THE STUDENTS?

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Problem statement: A recent study used the Scale of Positive Well Being, the Adult Hope Scale, and the Values Questionnaire in conjunction with the widely used Dental Environment Stress questionnaire to explore stress and well-being in a combined program of dental hygiene and dental therapy students (DHDTS). The findings of this research showed that students reported high scores of psychological well-being at the same time as high sources of stress, and provided baseline data for this qualitative follow-on study. **Purpose:** To use a qualitative approach to further explore the stress and well-being of DHDTS during their undergraduate training. **Methods:** Ethical approval was obtained from the University of Portsmouth Science Faculty Ethics Committee. A purposeful selection of 8 DHDTS from the University of Portsmouth Dental Academy (11% of total student population) were recruited to participate in semistructured recorded interviews of approximately 45 minutes duration. A piloted interview schedule designed to explore perceived motivation, goals (in particular, goal failure), and stress in DHDTS was used. Thematic analysis of all data was undertaken by the first author, using Braun and Clarke's (2006) 6 phases of thematic analysis. Twenty-five percent of the data were analysed independently by the 2 second authors experienced in qualitative methodology. **Results:** Three main themes of "fulfillment," "the learning environment," and "perception of stress" were identified. Within these themes, 12 subthemes were identified. Analysis suggested that a strong sense of passion to become a clinician mitigated most, but not all, of the stressful experiences of the DHDTS undergraduate learning environment. **Conclusions:** Fulfillment from the learning environment meant that DHDTS perceived sources of stress (positive and negative) during their undergraduate programme were strongly linked to a sense of meaningfulness.

STUDENT WELL-BEING IN THE DENTAL HYGIENE PROGRAM

*Ava K Chow, MSc, PhD, RDH, Barbara J Gitzel, BEd, MFA, RDH. School of Dentistry, University of Alberta, Canada

Problem statement: Student well-being can have significant impact not only on their overall health, but also on their learning experience and the quality of patient care they deliver. While stress is an inevitable part of the university experience, previous work has shown that students in the health care professions have higher levels of stress than their non-health care counterparts. **Purpose:** This work examines whether dental hygiene (DH) students have a different wellness experience than other postsecondary students. **Methods:** The Research Ethics Board at the University of Alberta approved this work. DH students admitted in 2015 and 2016 (N = 80) were invited to complete the National College Health Assessment (NCHA), a survey that examines the health and wellness of university students, in February 2016. The results were compared with the spring 2016 NCHA Canadian Reference Group which consisted of 43,780 responses from students attending 41 postsecondary institutions in Canada. **Results:** A total of 48 DH students (60%) responded to the NCHA. DH students were more likely to report that anxiety (41.7% vs 32.5%), sleep difficulties (35.4% vs 28.4%), and stress (68.8% vs 42.4%) were affecting their academic performance when compared with the Canadian Reference Group. Similarly, DH students were more likely to report feelings of hopelessness (68.8% vs 59.6%), being overwhelmed (97.9% vs 89.5%), exhaustion (97.9% vs 88.2%), and loneliness (70.8% vs 66.6%) in the last 12 months. **Conclusions:** DH students report a higher incidence of mental health stressors than the Canadian postsecondary student population and they believe these challenges impact their academic performance. Baseline measures of DH student health and wellbeing will allow educators to design curricula and health initiatives aimed at promoting self-care and well-being.

EXPLORING THE INTEGRATION OF THE DENTAL HYGIENE DIAGNOSIS IN ENTRY-LEVEL DENTAL HYGIENE CURRICULA

*JoAnn Gurenlian, PhD, RDH, Kandis Garland, MS, RDH, Tammy Sanderson, MSDH, RDH, Darlene Swigart, BS, RDH. Idaho State University, USA

Problem statement: Many health care professions rely on a preliminary diagnosis, which is later confirmed or refuted by a definitive diagnosis. In dental hygiene, a dental hygiene diagnosis (DHDx) is formulated based on the assessment phase of care. There is currently no research available to show how the concept of the DHDx is utilized in dental hygiene education programs. **Purpose:** The purpose of this study was to investigate how dental hygiene educational programs incorporate DHDx into current dental hygiene curriculum. **Methods:** An exploratory, descriptive study was designed to assess the extent to which DHDx is integrated into entry level dental hygiene curriculum. A 30-item self-generated survey was designed and content validity established using a subset of dental hygiene faculty and researchers as well as participant team members from the American Dental Hygienists' Association. Human Subjects Committee approval was received from Idaho State University. Data were collected using the online survey tool Qualtrics®; 2 mailings were sent. All surveys included a consent form and confidentiality was maintained. Descriptive statistics were utilized to analyse data. **Results:** Of the 334 surveys sent, 198 responses were received for a response rate of 59%. Of the responding programs, 98% reported that the dental hygiene process of care and concepts specifically relating to the DHDx were taught in the program. In addition, 79% of programs confirmed they "always" require students to write a DHDx statement for the patients. Of the respondents, 80% recognized that formulating a DHDx would result in improved patient outcomes, and 76% indicated that a DHDx increases the dental hygienist's accountability in patient care. Over 50 individuals provided comments indicating the need for standardization and faculty calibration for DHDx terminology, and that conflict exists surrounding this topic. **Conclusion:** It appears that DHDx is an integral component of entry-level dental hygiene education.

WHO ARE WE? EXPLORING PERCEPTIONS OF IDENTITY AND CAPACITY BUILDING OF ONTARIO DENTAL HYGIENE EDUCATORS DURING NATIONAL CURRICULUM REFORM

*Laura Perri, BSc, MEd, RDH. Brock University, Ontario, Canada

Problem statement: *The Entry-to-Practice Competencies and Standards for Canadian Dental Hygienists* (National Competencies) document was published in January 2010 by the dental hygiene governing bodies and were provided nationally to dental hygiene schools for implementation in the curriculum. However, the current hierarchal structure of dental hygiene education gives dental hygiene educators little opportunity to voice their experiences during a reform that requires them to build new personal capacity to implement the national competencies. **Purpose:** The purpose of this interpretive, qualitative study was to explore Ontario dental hygiene educators' perceptions of how they could build personal capacity during the national competencies curriculum reform. **Methods:** This qualitative study used a purposive sample of 5 dental hygiene educators of diverse training and teaching organizations who participated in in-person interviews, 1 participant via telephone interview, and 1 participant through Skype interview. A semistructured interview guide framed open-ended data collection. Recorded narratives were transcribed and analysed, coded, and interpreted using within-case and cross-case thematic analysis. Findings were validated through member checking and triangulation of data. This study received approval from the Brock University Research Ethics Board. **Results:** Themes drawn from the data demonstrated that perceptions of collegial identity for all members of the dental hygiene profession are required for building personal capacity. Participants observed that discussions and conversations as educators and as a profession need to occur. They also indicated that standardizing dental hygiene education at the degree level on a national basis and collaboration and communication among educators could establish consistent dental hygienists' identity. **Conclusions:** Despite the literature describing the national competencies as establishing professional identity, participants described the need for further discussions among educators to build a solid foundation. As the data demonstrate, the building of personal capacity will require the establishment of a more open and collaborative system. Funding for this project was provided by Canadian Institutes of Health Research and Canadian Foundation for Dental Hygiene Research and Education.

UNMET NEEDS

EXAMINING HOW CARE PARTNERS SUPPORT DAILY ORAL HYGIENE OF COMMUNITY-DWELLING ADULTS LIVING WITH DEMENTIA

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Problem statement: Community-dwelling individuals living with dementia (ILDs) progressively struggle to perform self-care activities such as daily oral hygiene, and increasingly require support. Care partners' (CPs) experiences and strategies for supporting oral hygiene are unknown. **Purpose:** To examine CPs experiences and practices of supporting daily oral hygiene activities of ILDs. **Methods:** Qualitative exploratory design using focus groups. Twenty CPs, either ILD spouses or a child, were recruited through the Alzheimer's Society. In 5 semistructured focus groups, participants explored their experiences, practices, and strategies in supporting oral hygiene activities of ILDs. Saturation was reached when no new data emerged. Data analysis consisted of content analysis, including open coding, categorization, and abstraction. How individuals expressed their practices, and the synergistic effect between participants that allowed participants to realize new insights about their current practices were also analysed. **Results:** While dementia severity is assessed clinically, there was little correspondence with ILDs' reported level of independence. Oral hygiene practices reflected a continuum of independence ranging from wholly or partially independent to wholly compensatory. CPs contextualized oral hygiene as one dimension of preserving the autonomy of ILDs. Strategies to support oral hygiene included relying on embodied habits, providing supportive aids, verbal reminders, and physical intervention. Difficulties occurred when the ILDs resisted support or could not alter engrained habits. CPs understood that strategies had to change over time, although some realized, during the focus group sessions, their practices were insufficient to meet the current needs of ILDs. Ethics approval was obtained from the University of Alberta Research Ethics Board (Pro00060323). **Conclusion:** CPs struggled to identify key transition points, indicating the need for a different level of assistance as oral hygiene was assumed to be an embodied and persistent habit. Accurately determining an ILD's actual abilities as well as strategies to gain the ILD's cooperation is needed.

ORAL HEALTH RECOMMENDATIONS AND REFERRALS IN LONG-TERM CARE: WHAT HAPPENS NEXT?

Sharon Compton, PhD, RDH, *Arlynn Brodie, BPE, MHS, RDH. University of Alberta, School of Dentistry, Canada

Problem statement: Poor oral health in long-term care (LTC) has been well documented, yet how oral health recommendations are being managed by facility staff and how referrals to dental professionals are processed is less well understood. **Purpose:** The purpose of this study was to examine how oral health recommendations made by a registered dental hygienist (RDH) for seniors are managed by facility staff and how referrals to dental professionals are processed. **Methods:** Ethics approval was obtained from the University of Alberta Research Ethics Board (#Pro00060584). First, a retrospective chart review was conducted to obtain data from oral assessments completed by dental hygiene students with supervision of a registered dental hygienist at 4 LTC sites. Second, semistructured interviews were conducted with a convenience sample of 4 health care providers, 1 from each site, and each was selected based on his or her role as a "champion" of oral care at their facility. Three registered nurses and one dietician were interviewed. Interview questions explored how recommendations and referrals for oral care were managed by staff. Interview data were analysed using content analysis. **Results:** Data were collected from 317 charts. Recommendations for oral care were made for 241 residents (76%); 165 residents (52%) were given recommendations such as needs assistance or cueing to perform daily toothbrushing; 125 external referrals were made, 56 to dental hygienists, 58 to dentists, 10 to denturists, and 1 to other. Interview data revealed families are predominantly responsible for organizing dental appointments for the resident. Finances, level of cognition, resistive behaviours, family member support, staff turnover, and time, are reported by staff to be barriers to ensuring seniors in facilities visit a dental professional when indicated. **Conclusions:** Multiple factors affect implementing recommendations and pursuing dental referrals for residents of LTC; therefore, a multipronged approach is necessary to overcome barriers, ensuring seniors receive recommended oral care.

FACTORS FACILITATING DENTAL PRACTITIONERS IN THE PROVISION OF INFANT AND TODDLER DENTAL HOMES IN ALBERTA: AN INTERPRETIVE DESCRIPTION

*Jacqueline R VanMalsen, BSc(DH), RDH, Sharon M Compton, PhD, RDH, Maryam Amin, PhD, DMD. University of Alberta, Canada

Problem statement: The Canadian dental and Canadian dental hygienists' associations recommend a child's first dental visit should occur no later than age 1; however, there has been limited uptake within the dental community. Understanding facilitating factors utilized by dental practitioners who have successfully integrated infant and toddler oral health into their practice is integral to developing strategies to improve uptake of early pediatric dental homes. **Purpose:** The purpose of this study was to explore factors used by oral health practitioners that facilitate provision of a dental home for infants and toddlers in Alberta. **Methods:** This study employed a qualitative, interpretive, descriptive methodology and an ecological theoretical framework. Semistructured individual interviews were conducted with oral health practitioners who routinely provide a dental home for infants and toddlers. Data collection and analysis were concurrent, using purposive sampling and a constant comparative method. Ethics approval was obtained through the University of Alberta (#Pro00061569). **Results:** Eight dentists and five dental hygienists with diverse practice experience and from varied locations (urban, rural) and practice settings (group, solo) were interviewed. Thematic analysis revealed 4categories that facilitate practitioners in the provision of infant and toddler oral health care: the practitioner, practice, profession, and population. These categories are interrelated and include factors both endogenous and exogenous to the dental practitioner. Common endogenous factors include the individual practitioner's comfort with young children and having clinical exposure within dental education; common exogenous factors include parental awareness and adequate insurance coverage for preventive procedures. **Conclusions:** Strategies to improve uptake of a dental home by age 1 include enhanced practitioner education and public awareness, as well as increased remuneration for preventive early pediatric oral health care. Provision of infant and toddler dental homes is affected by many variables. Consequently, strategies to improve uptake must employ a multipronged approach.

THE INTEGRATION OF AN ORAL CARE PROTOCOL ON EXTUBATED PATIENTS IN THE INTENSIVE CARE UNIT

*Michele Carr, MA, RDH[1], Rachel Kearney, MS, RDH[1], Esther Chipps, RN, PhD[2]. [1]The Ohio State University, College of Dentistry, [2]The Ohio State University, College of Nursing, USA

Problem statement: Evidence shows that oral care protocols in mechanically ventilated patients are associated with a reduction in ventilator-associated pneumonia. This evidence has resulted in adoption of oral care protocols in intensive care units (ICUs) as standard practice yet surveys show the majority of nurses use foam swabs while a minority use regular toothbrushes to clean the oral cavity. Limited research has focused on patients' oral health and satisfaction when oral care protocols are implemented. **Purpose:** The purpose of this study was to determine the impact of a standardized oral care protocol on oral health and satisfaction in postmechanically ventilated patients. **Methods:** In this IRB-approved clinical trial, 74 subjects were randomized to a control (toothbrushing, swab rinses) or intervention (battery-operated tooth brushing, tongue scraping, flossing, mouthrinse, lip care) group, administered by nurses, twice daily. The protocol was designed by nursing and dental hygiene faculty. Outcome measures utilized the revised THROAT (R-THROAT: oral cavity assessment) which evaluated lips, gums, teeth, tongue, saliva, smell, and mouth comfort. Categories were assessed on a scale from 1 to 3 (3 = poorest oral health). The overall score was the sum of the 7 categories. Assessments were completed by dental hygienists on days 1 and 4 of each protocol. **Results:** As measured by the R-THROAT, the intervention group demonstrated significant oral health improvement over the control group (R-THROAT = 1.97 intervention vs 0.87 control, p = 0.04). Subjects in the intervention group were more satisfied with their protocol than the control group. **Conclusions:** This study suggests policies and practices related to oral care of postmechanically intubated patients merit further attention. Practices should incorporate innovative protocols to improve oral health. Consideration should be given to collaborating with dental personnel to teach clinical nurses oral care delivery or utilizing dental personnel in hospital facilities to help improve the oral health of patients in ICUs.

EVALUATION OF NURSES' KNOWLEDGE, ATTITUDES, AND PERCEPTIONS AFTER PARTICIPATING IN AN ORAL HEALTH INTERPROFESSIONAL EDUCATION PROGRAM

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Problem statement: Epidemiological studies have revealed that older adults who live in residential care facilities (RCFs) have the worst oral health status of all older adults. The scientific literature confirms that one of the main reasons for this problem is that Bachelor of Science in Nursing (BScN) students have inadequate oral health care education (OHCE). On average, student nurses receive 1hour of instruction, and it does not align with best practice guidelines. The existing BScN curriculum has not kept up with the increasing complexity of health care delivery that requires health care providers from unrelated professions to collaborate and deliver coordinated patient-centred care. Developing OHCE for BScN and dental hygiene students is recommended to ensure nurses have the oral health knowledge necessary to ameliorate the health status of their patients. **Purpose:** The purpose of this study was to evaluate the BScN students' knowledge, attitudes, and perceptions of an oral health interprofessional education (IPE) program. **Methods:** The study college and Central Michigan University's research ethics boards approved the study. A quantitative descriptive post-test design was used to survey a convenience sample of 47 year-one students at one community college. The validated paper-based measurement tool used in the study contained 10 multiple choice and 20 Likert-type questions. Data were collected after students participated in an IPE session. The tool measured the students' oral health knowledge and their attitudes and perceptions towards oral health care delivery and IPE. **Results:** The students' overall scores on all survey items were generally higher than was reported in the literature review for students who did not participate in IPE. **Conclusions:** The study's findings support an IPE program for BScN and dental hygiene students as a strategy to improve nurses' oral health knowledge, attitudes, and collaborative skills that may help improve the oral health status of older adults living in RCFs.

ERGONOMICS/TOBACCO/ ORAL CANCER

THE EFFECT OF MAGNIFICATION LOUPES ON POSTURE DURING EXPLORING BY DENTAL HYGIENISTS

*Emily Anne Ludwig, MSDH, RDH[1], Gayle B McCombs, MS, RDH[1], Susan L Tolle, BSDH, MS[1], Daniel M Russell, PhD[2]. [1]Old Dominion University, Gene W Hirschfeld School of Dental Hygiene, [2]Old Dominion University School of Physical Therapy and Athletic Training, USA

Problem statement: Upper extremity musculoskeletal disorders (MSDs) are common in the dental professional, and researchers have been challenged with determining preventive strategies to reduce MSDs in dental hygienists. The use of dental magnification loupes has been suggested to minimize risk factors associated with MSDs. **Purpose:** The purpose of this study was to determine the effects of dental magnification loupes on posture during instrumentation. **Methods:** This IRB-approved study comprised a convenience sample of 27 right-handed dental hygienists, with no history of injuries or disabilities of the head, neck or trunk regions. Baseline posture calibrations were taken. Triaxial accelerometers were placed on 4 locations of the head and trunk (occipital region of head; cervical vertebrae C5; thoracic vertebrae T5; lumbar vertebrae L1) to measure acceleration and the orientation of the body to gravity. Mean accelerations of the 3 axes were used to compute average forward/backward (AP) and side-to-side (ML) tilt of each accelerometer. Chair-mounted typodonts with artificial calculus were used to represent a simulated oral environment. Participants were randomly assigned to wear loupes during the first or second half of the experiment and instructed to explore all areas of the mouth using an ODU 11/12 instrument. At the end of the study, an end user opinion survey was completed. **Results:** No statistically significant differences in posture were revealed between participants wearing loupes and not wearing loupes. However, 74% of participants strongly agreed that magnification loupes made exploring easier, and 67% strongly agreed that magnification loupes improved their posture. **Conclusion:** While the majority of participants perceived that magnification loupes enhanced their posture and made exploring easier, the data provided little evidence to suggest that wearing loupes leads to improvement in body orientation. Future research should examine if loupes adjusted with an adequate declination angle can reduce neck and trunk flexion.

OUT OF THE LOUPE: THE PREVALENCE OF COAXIAL MISALIGNMENT OF SURGICAL LOUPES AMONG BC DENTAL PROFESSIONALS

*Maggie Wen, MSc, RDH, Zul Kanji, MSc, RDH, Denise Laronde, PhD, RDH, Batoul Shariati, DDS, MPH, PhD, Lance Rucker, DDS. Faculty of Dentistry, University of British Columbia, Canada

Problem statement: Surgical loupes have been increasingly popular among dental professionals for their visual and postural benefits. In British Columbia (BC), over 60% of dental professionals practice with surgical loupes and many dental and dental hygiene educational institutions have made surgical loupes mandatory for students. However, dental professionals will only receive the full benefits of surgical loupes if the loupes are fitted to the individual needs of each clinician. Previous research has identified 3 critical criteria for surgical loupes selection and adjustment: working distance, declination angle of the oculars, and coaxial alignment. While the first 2criteria have been thoroughly researched, there remains limited understanding of coaxial alignment of surgical loupes. **Purpose:** Surgical loupes misalignment creates a profound visual disturbance which may have serious impact on the quality of care delivered by dentists and dental hygienists. This study is one of the first to examine the prevalence of coaxial misalignment of surgical loupes among BC dental professionals. **Methods:** A simple quantitative coaxial alignment measurement tool was developed and validated through 2pilot studies. The tool was then used to measure coaxial alignment of surgical loupes for 97 practising dental professionals in British Columbia and for 23 University of BC dentistry students who currently practise with surgical loupes. Data were analysed using Fisher's exact test. **Results:** The prevalence of coaxial misalignment was 82.5% among the participants. There was no difference in prevalence between dentists and dental hygienists (p = 0.792), nor between students and professionals (p = 0.937). **Conclusions:** This study developed a quantitative tool to measure coaxial alignment of surgical loupes and revealed that a high prevalence of coaxial misalignment is present among BC dental professionals. The results of this study will help dental professionals select surgical loupes best fitted for their practice and will guide surgical loupes manufacturers to develop more evidence-based products.

IDENTIFYING RISK OF UPPER EXTREMITY INJURIES IN DENTAL HYGIENE PROFESSIONALS

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Problem statement: Given the extensive time using scaling instruments and sustaining postures, dental hygienists are prone to developing upper extremity musculoskeletal injuries. **Purpose:** To identify risk factors and establish a predictive model of musculoskeletal injury development in dental hygienists to promote preventive techniques. **Methods:** This IRB-approved, longitudinal, multicohort study has a targeted recruitment of 120 dental hygiene (DH) students (exposed to high-intensity hand activities) and 60 occupational therapy (OT) students (non-exposed control group). Repeated data collection occurs every semester across the 2-year training, including morphology of anatomical structures using sonographic imaging; neurophysiologic function using nerve conduction testing; symptoms/function and exposure to extracurricular hand/wrist activities using questionnaires; and exposure to hand strain and postural assessment during dental scaling using video analyses. **Results:** Currently enrolled DH (n = 53) and OT (n = 55) students are similar in age (DH, 24.4 yrs, SD = 3.5 yrs; OT, 24.8 yrs, SD = 2.6 yrs.) and are primarily right handed (92.5%, 87.3%) females (88.7%, 89.1%). The groups have equivalent grip/pinch strengths, report similar extracurricular activities, and essentially no pain or limitations. A video data collection protocol using 3 cameras positioned in orthogonal views has been established, and a coding process for descriptive characteristics has been validated. Preliminary analyses indicate that students spend an average of 1 hour 45 minutes (SD = 28.4 min.) actively scaling during a patient visit. Good to excellent inter-rater reliability of exposure measures (Revised Strain Index and Rapid Upper Limb Assessment) has been established (i.e., ICCs >0.80). **Conclusions:** Students in both programs have essentially no pain/limitations, nor indicators of pathology; baseline equivalency ensures that injury development can be modeled according to any disparate changes across time between groups. When combined with risks identified through video observations, these data will illuminate targets for enhanced DH education and inform development of DH self-assessment tools to prevent injuries.

DENTAL PROVIDER PREFERENCES FOR TOBACCO CLINICAL DECISION SUPPORT

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Problem statement: Tobacco dependency interventions are inconsistently delivered by dental providers. There is a great need to integrate a systematic approach into practice. The introduction of electronic dental records (EDR) offers an opportunity to incorporate best practices using clinical decision support (CDS) to improve care. **Purpose:** The purpose of this study was to understand provider preferences for tobacco CDS and explore the feasibility of embedding such a system. **Methods:** This mixed-methods study was approved by expedited review at HealthPartners Institute and provided qualitative data in support of an effort to seek funding for a randomized clinical trial (RCT) to test a tobacco CDS. First, the providers were surveyed to identify clinics that systemically address tobacco use, utilize EDRs, and identify providers interested in participating in structured interviews. The structured interviews identified what providers are doing to document and assist their patients in cessation. Based on interview findings, a mock-up system was developed. Iterative face-to-face interviews were conducted to obtain feedback from practitioners leading to the final design. **Results:** Among 630 surveys sent, 89 were returned (43 dentists, 28 dental hygienists, and 5 unknown). The survey responses identified 76 offices using an EDR to record clinical care. In 70 (95%) offices, smoking status is recorded in the health history. Structured interviews (n = 11) and face-to-face interviews (n = 11) determined that practitioners are interested in a tobacco CDS. **Conclusions:** Tobacco cessation is generally conducted by dental hygienists with support from the dentist. Both have a strong desire for a consistent approach. They see their role as providing resources and referral. The tool must be easy to use, with limited data entry, track patients who are resistant to discussion, and fit into workflow. Many respondents supported the use of web-based patient resources. Information gained from this study will be used to further develop a tobacco CDS intervention to be studied in dental practices.

COMPARABLE NICOTINE DEPENDENCE LEVELS BETWEEN ADOLESCENT SMOKELESS-ONLY AND DUAL-TOBACCO USERS

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Problem statement: Tobacco use is associated with adverse oral and systemic health effects. Despite declining cigarette use among adolescents, dual and polyuse of multiple tobacco products is increasing. **Purpose:** This study aimed to assess nicotine dependence according to patterns of current tobacco use. **Methods:** 594 adolescent males, a population at high risk of smokeless tobacco (ST) use, at 36 rural California schools (2014–2016) completed in-person surveys. Participants reported their current frequency and lifetime history of using 6 tobacco products (cigarettes, ST, snus, e-cigarettes, cigars, and waterpipes). Participant clusters were defined based on frequency of tobacco use across products. The Hooked on Nicotine Checklist (HONC), a validated scale of adolescent nicotine dependence, was administered to all past-month users of any tobacco product. Approval was obtained from the UCSF Institutional Review Board. **Results:** Seven classes were identified: never-users (43%), those who never tried tobacco; triers (20%), those who tried tobacco, but never used frequently; experimenters/former users (10%), those who used tobacco, but not currently (past-month); infrequent current users (16%), those who used tobacco <10 times in the past month; and 3 classes of frequent current users (combined, 11%): those who reported use of at least one tobacco product ≥10 times in the past-month: ST-only users (n = 38), ST/combustible dual-users (n = 15), and non-ST users (n = 17). HONC scores were low for infrequent current users (mean = 0.8) but were higher overall (mean = 2.8) and comparable between classes of frequent current tobacco users: ST-only users (mean = 3.3), tobacco dual-users (mean = 2.8) and non-ST users (mean = 1.8) (p = 0.19). **Conclusions:** Nicotine dependence was detectable but low for infrequent tobacco users; among frequent current users, dependence was higher and comparable by tobacco product used. Dental professionals should include all tobacco products in patient assessment and counselling, while tobacco control policy makers should consider dual and polyuse as a potential addiction risk for youth. Funding for this project was provided by grant number 1P50CA180890 from the National Cancer Institute and Food and Drug Administration Center for Tobacco Products and NIH National Center for Advancing Translational Sciences award number KL2TR000143.

TECHNOLOGY/ DENTAL HYGIENE PRACTICE

MOLECULAR MARKERS, ORAL CANCER, AND SOUTH ASIANS IN BRITISH COLUMBIA

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Problem statement: The global rate of oral cancer is increasing at an alarming rate. A significant source of this burden is South Asia (SA), where the incidence of oral cancer is over 130,000 new diagnoses per year. While several cases have been linked to unique sociocultural habits, many are of unknown etiology. South Asians represent a growing proportion of British Columbia's (BC) population. Accordingly, a corresponding increase in the number of cancer cases is anticipated. Genetic marker profiling is a validated risk predictor for oral cancer. Loss of heterozygosity (LOH) in key chromosomal loci identified for certain populations remains inconclusive in SAs. Understanding the risk profile of this population is essential to the identification and management of oral premalignant lesions (OPL). **Purpose:** The purpose of this study is to examine the LOH profile of SA oral dysplasias in BC. **Methods:** This study includes a retrospective cohort of 24 SA patients enrolled in the Oral Cancer Prediction Longitudinal Study, with primary OPLs. Lesion biopsies taken prior to 2010 are excluded. DNA extracted from tissue samples are analyzed for LOH at 3p, 4q, 8p, 9p, 11q, 13q, and 17p using polymerase chain reaction and microsatellite assay. DNA extracted from the connective tissue of the same sample acts as control. IRB approval was obtained from the UBC-BCCA research ethics board. **Results:** The mean age is 52.2 years; 71% are men; 25% are smokers. The most common site is the ventrolateral tongue at 66.7%, with 45.8%, 33.3%, and 16.7% presenting as mild, moderate, and severe dysplasia, respectively. Preliminary results show frequent LOH at 9p and 3p; 4q is infrequently lost. **Conclusions:** There may be some variation in the genetic risk profile of SA OPLs in BC. Education, screening, and treatment targeted to this ethnic subgroup will be crucial in the management of OPLs. Funding for this project was provided by UBC Dentistry Research Award, BC Cancer Foundation.

COACTION BENEFITS OF INTRAORAL CAMERA USE AND SMS FOR DENTAL HYGIENE BEHAVIOURS AND GINGIVAL HEALTH AMONG ADULT PATIENTS WITH GINGIVITIS: A RANDOMIZED CONTROLLED TRIAL

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Problem statement: Patients have difficulty adhering to recommendations for biofilm removal, which is important for preventing gingivitis. Images and text messages are promising tools to increase patient motivation and self-regulatory efforts for dental hygiene behaviour, but efficacy needs to be tested. **Purpose:** This study investigates the effects of using an intraoral camera (IOC) during supportive periodontal therapy (SPT), oral hygiene short messages (SMS) between appointments, or both on clinical, behavioural, and psychological parameters of patients with gingivitis. **Methods:** Adult patients (N = 203) receiving SPT were randomly assigned into 4 conditions: IOC, SMS, IOC+SMS, and Usual Treatment. Bleeding on marginal probing (BOMP), brushing and flossing behaviours (primary outcomes), and social cognitive determinants of behaviour change (outcome expectancies, action and volitional self-efficacy, intention, and planning) were evaluated at baseline, 4 months, and 8 months later. Mixed-effect modelling was employed to verify if change occurred in study outcomes. The ethics committees of the institutions involved approved the clinical trial (Ethic Committee Doc.No.6/14). **Results:** Compared to the control group, all treatment conditions improved flossing (B_{IOC} = –0.446, p = 0.001, B_{SMS} = –0.436, p = 0.006, $B_{IOC+SMS}$ = –0.611, $p < 0.001$), and revealed a significant decrease in BOMP (B_{IOC} = 0.269, $p < 0.001$, B_{SMS} = 0.249, $p < 0.001$, $B_{IOC+SMS}$ = 0.493, $p < 0.001$) from baseline to 4 months with no differences between 4 and 8 months. When compared to the control group, individuals in the IOC+SMS condition had more positive outcome expectancies, higher levels of action self-efficacy and intention from baseline to 4 months with no differences between 4 and 8 months. Volitional self-efficacy was reinforced in all treatments. **Conclusions:** Mixed-model results indicate significant interaction effects for primary and secondary outcomes (flossing, dental hygiene, BOMP, and psychological determinants). The coaction benefit in using IOC in consultation while receiving SMS between appointments improves clinical, behavioural, and psychological parameters of periodontal health 4 months after treatment, maintained in 8 months' follow-up.

MULTIMEDIA TECHNOLOGIES USED IN PRECLINICAL DENTAL HYGIENE

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Purpose/Goals: Principles of Dental Hygiene I Clinic is an introductory course aimed at integrating foundational scientific knowledge and clinical skills used in delivering comprehensive dental hygiene patient care. A technology-enhanced redesign of the course using multimedia lessons was undertaken to increase student preparedness for application of dental hygiene skills and collaboration during class sessions and to improve student-learning outcomes. **Significance:** A technology-enhanced redesign of the course was developed to prevent double-teaching; increase practice time; standardize step-by-step instruction to diverse learners; offer comprehensive demonstration videos with ability to pause, skip, and repeat viewing; provide close-up views that cannot be seen in group demonstrations; and offer enhanced 2D and 3D graphic animations of anatomical structures and instrumentation in subgingival tissues. **Approach/Key issue:** This technology-enhanced redesign of the course supports blended learning and a flipped classroom environment with the use of multimedia lessons. Students of the Principles of Dental Hygiene I Clinic course review required readings, watch videos, and complete knowledge check questions and online quizzes prior to class. Dental hygiene techniques are practised on typodonts in the simulation lab, and with partners in a clinical setting. **Evaluation:** As a result of the multimedia lessons, the students have shown to be better prepared for application and collaboration during class sessions, having had the opportunity to learn at their own pace in this media-rich environment. Students and faculty were surveyed anonymously. Ninety-seven percent of students stated improvement in their learning and performance of skills compared to topics in the course without the multimedia lessons. One hundred percent of faculty perceived students who viewed the multimedia lessons as better prepared. There was an improvement in student learning outcomes, with an 8% increase in course average scores and a 45% reduction in student failures.

COMBINED DENTAL HYGIENE AND DENTAL THERAPY (ORAL HEALTH THERAPY) EDUCATION AND SCOPE OF PRACTICE IN AUSTRALIA

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Problem statement: Since 1996 in Australia and New Zealand, the education of dental hygienists and dental therapists has almost exclusively undergone a change to a combined outcome degree graduating oral health therapists. In parallel, regulatory frameworks have emerged allowing a wider range of practice settings, scopes. and business models. **Purpose:** The objective of this presentation is to examine the education, regulation, and practice of oral health therapists in Australia to inform planning and leadership in profession, education, and policy internationally. **Methods:** This presentation will draw on Australian accreditation standards, curriculum frameworks, regulation, and practice activity research to explore the educational preparation, scope of practice, and application to both private and public sector practice. Research to inform this paper includes studies examining dental therapists' practice in private sector employment; the ability of dental hygienists to diagnose and treatment plan oral health care for people in residential aged care settings; the ability of dental therapists to provide restorative care to adults, and a recent national oral health practitioner practice activity study*. **Results:** Dental therapy practice has been readily accepted in the private sector, dental hygienists are recognized as capable of diagnosing and treatment planning their own care even for high-needs people, dental therapists are able to deliver restorative care to at least the same standard as a dentist, and oral health therapists' practice activity (although varied in different practice settings) reflects their utilization as both therapists and hygienists. Regulation in Australia has also changed over time to reflect this evidence, and oral health therapists are now well accepted members of the dental team. **Conclusions:** The results of these studies offer insights into the utilization and practice of combined dental hygienist/therapists (oral health therapists), and an examination of recent regulatory developments will flag the directions of change in oral health workforce demands in Australia.

**The author has been an investigator on all four of these studies.*

DIETARY ANALYSIS AND NUTRITIONAL COUNSELLING FOR CARIES PREVENTION IN DENTAL PRACTICE: A PILOT STUDY

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Problem statement: Increased consumption of free sugars is recognized as a risk factor for many chronic health problems; more specifically, studies have demonstrated significant associations between sugary drink intake and caries experience. Dental practitioners agree that dietary counselling is essential for caries prevention; however, they provide advice infrequently due to a lack of confidence and competence. **Purpose:** The purpose of this project was to improve dental practitioners' practices through an online training module exploring the use of a brief counselling method and a diet assessment of caries risk form. **Methods:** This project was conducted as a prospective cohort study, using convenience sampling. Phase 1: dental practitioners (dentists, dental hygienists, and dental therapists, n = 41) completed a survey on current practices and confidence in providing dietary advice, followed by an online training module that was pilot tested among dental academics. Participants completed a 6-month follow-up survey exploring changes in confidence and perceived barriers as a result of their online training. Phase 2: ten dental hygienists were then involved in the patient phase of the study, including recruiting patients, eliciting a diet assessment of caries risk, and using brief counselling techniques. Patients were followed up at 6 months for a risk assessment review. **Results:** A statistically significant improvement in confidence when providing nutritional advice was observed among participating dental hygienists. A paired sample t-test was performed using the data from the patients who completed baseline and follow-up risk assessments. Patients (n = 64) showed a significant reduction in high-risk behaviour pertaining to quantity and timing of sugar intake, and significant trends in improvement of behaviours relating to frequency, exposure time, and drinking style ($p < 0.05$). **Conclusions:** It appears that a simple online learning module can improve dental hygienists' confidence in dietary advice provision and have a positive impact on patient behavioural change within a relatively short timeframe.

THE ROLE OF LORICRIN IN AGGRESSIVE PERIODONTAL DISEASE

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Problem statement: AgP comprises a group of rapidly progressive forms of periodontitis generally characterized by an early age of clinical manifestation and a distinct tendency to aggregate in families. Research has suggested multiple etiologies for AgP, but no common mechanism. **Purpose:** The overall goal of this study is to determine if downregulation of loricrin leads to impairment of epithelial barrier function and increased levels of inflammation and bone destruction in the periodontium in response to the causative bacteria of AgP. Revealing the underlying mechanism in AgP will dramatically change early diagnosis of this complex disease and ensure that susceptible patients are treated promptly to reduce long-term morbidity and quality of life issues. Mechanistic insight will also enable the development of new intervention strategies. **Methods:** Gingival samples from periodontal healthy patients and AgP patients undergoing routine periodontal surgeries in which the tissue is normally discarded are being collected. The western blot and qPCR for protein detection and gene quantification, respectively, will be used. These methods will allow us to determine if these AgP patients experience a downregulation in loricrin. This study was approved by the research ethics board of the University of Alberta (Pro00062112). **Results:** Twelve of forty samples have been collected. Using western blot analysis, a protocol that detects loricrin in human skin and mouse oral tissue samples has been successfully established. Next, a qPCR protocol will be developed to determine if there are changes in gene expression. **Conclusions:** Overall, this proposal addresses a devastating childhood illness by testing a novel hypothesis using innovative study designs. Conceptually, it challenges the current focus of research in AgP and may lead to new research and therapeutic directions. This project is funded by the University of Alberta Hospital Foundation, the University of Alberta Dental Hygiene Fund, and the Fund for Dentistry.

COMMUNITY HEALTH

INCREASING INDIGENOUS CULTURAL CONTENT IN DENTAL HYGIENE CURRICULA: A PILOT PROJECT

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Problem statement: Studies have shown Indigenous populations feel unsafe when accessing mainstream health care services due to fear of being racialized and stigmatized. To help improve access to timely health care, Canadian medical and nursing bodies have integrated Indigenous cultural competency and safety training into their curricula. However, dental and dental hygiene education focus little on this content. **Purpose:** The purpose of the study was to bridge the historic context of Indigenous peoples, understanding their contemporary oral issues and inequities and integrating them into dental hygiene curricula, and to evaluate and measure students' knowledge, attitudes, and feedback. **Methods:** A talking circle was conducted with 8 men and 10 women from a Vancouver Indigenous community group to explore their perspectives of and experiences receiving oral care. Information gained from the talking circle and literature was used to develop 9 hours of curricula for 49 dental hygiene students. Indigenous guest speakers strengthen the cultural content of the curricula. At each session, students' levels of knowledge were evaluated with pre and post-assessments and measured with t-tests (IBM SPSS Version 22.0). The University Behavioural Ethics Board approved the project. **Results:** Students' level of knowledge increased significantly around Indigenous health and oral health, residential school system and intergenerational trauma, and concepts of cultural competency and safe oral care ($p < 0.001$). Connecting cultural content with personal stories shared by Indigenous community members reinforced students' learning. Students suggested that a future opportunity to work directly with communities would be most beneficial to their overall learning of Indigenous content. **Conclusions:** Incorporating Indigenous history and health context into dental hygiene curricula is a plausible approach to help address the knowledge gap in understanding oral health challenges and inequities among Indigenous populations. Dental experiences of Indigenous peoples who have received care by dental hygienists trained in cultural safety require further exploration.

THE USE OF INTERPRETERS WITH IMMIGRANT PATIENTS IN A DENTAL HYGIENE CLINIC

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Problem statement: Dalhousie University Faculty of Dentistry provides dental hygiene care to new immigrants who are clients of the Immigrant Services Association of Nova Scotia (ISANS). Research indicates health outcomes are enhanced when individuals receive care in their own language. ISANS provides a limited number of professionally trained interpreters, therefore recruitment of volunteer dental and health professions students and faculty was necessary to interpret medical histories and explain treatment options. This approach led to concerns regarding the effectiveness of using untrained interpreters with various health care backgrounds in a dental setting. **Purpose:** Evaluate the perceived benefits of using trained versus untrained interpreters with diverse health care backgrounds in an immigrant dental hygiene clinic by exploring the experiences of the care providers, supervising faculty, and interpreters. **Methods:** An original survey containing 13 items was distributed to dental hygiene students (n = 26), faculty (n = 9), and interpreters (n = 35) involved in the ISANS clinic. Closed-ended questions were summarized using descriptive statistics. Open-ended questions were examined for common themes. This project was approved by the Dalhousie University Research Ethics Board. **Results:** All faculty and 95% of students reported interpreters with backgrounds in health care were helpful in the ISANS clinic, with 84.6% and 71.4%, respectively, preferring to collaborate with the untrained volunteer interpreters, specifically since many were dental students. Both untrained volunteer and trained ISANS interpreter groups felt they aided in the treatment of patients in a culturally competent manner and their assistance was an overall benefit to both the student and ISANS patient. Faculty (85.7%) and students (66.7%) reported they would not feel comfortable treating an ISANS patient without an interpreter. **Conclusions:** This study revealed that interpreters with various health care backgrounds are useful in an immigrant dental hygiene clinic. The untrained interpreters were preferred over professional ISANS interpreters.

PRICE COUNTY ANALYSIS OF DENTAL ACCESS IMPACTING QUALITY OF LIFE IN NORTHERN WISCONSIN

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Problem statement: An examination of epidemiologic data from the partnership between the Robert Wood Johnson Foundation (RWJF) and the University of Wisconsin-Population Health Institute (UWPHI) consistently ranked the studied service county in the lower quartile of the state for both quality of care (QoC) and quality of life (QoL) measures. Researchers determined QoL might be more accurately measured using a satisfaction survey. Families were asked about their perceptions of care received and if their QoL was impacted. **Purpose:** The purpose of this follow-up study was to identify how families served through county-based health programs felt about the QoC received, and how QoL was impacted. **Methods:** A cross-sectional research design was used. An electronic survey was sent to a convenience sample of families with children receiving care (n = 108). The survey consisted of 25 closed-ended questions using a 4-point Likert scale. Satisfaction survey questions had previously established content validity and reliability. Informed consent was obtained after IRB approval (UWSP-expedited 3242014) before survey administration. Responses were anonymized and kept confidential. Descriptive statistics were used to report the data. **Results:** A response rate of 27.2% (n = 30) was obtained. Overall satisfaction with the public health facility received ratings of either excellent (43.33%) or good (56.67%). Of the 30 participants, 29 reported families' dental needs were addressed with either an excellent (63.33%) or good (36.67%) overall quality rating. Overall, family members reported complete satisfaction with the care received, and the QoL was positively influenced (100%). **Conclusions:** Data documented families in county-based programs were satisfied with the QoC received and reported that QoL was improved in comparison to state and national epidemiologic data.

CHALLENGES AND OPPORTUNITIES IN COMMUNICATING ABOUT COMMUNITY WATER FLUORIDATION: PERCEPTIONS OF DENTAL HYGIENISTS IN ALBERTA, CANADA

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Problem statement: The current impasse in the community water fluoridation (CWF) controversy is problematic for public health. Beyond the issue of best evidence, CWF encompasses other factors—ethics, values, authority, power, and credibility. **Purpose:** Our objective was to understand key stakeholder views about challenges and opportunities in communications about CWF and broader public health concepts such as equity and health. **Methods:** This study received research ethics board approval. Dental hygienists from a linked quantitative study, who consented to future contact from the research team, were invited to participate in follow-up focus groups. The discussion guide aimed to encourage participants to share and understand diverse views about health, health equity, population-level policies in general, and CWF. Thematic analysis was guided by literature on the public engagement of science and the expert–lay divide, as well as theory of power relations between health professionals and the public. Implications for communication at the client and public health level were drawn. **Results:** Analysis of data from 4 focus groups revealed several challenges for dental hygienists when communicating about CWF with members of the public. These challenges centred around 3 themes: evidence confusion (e.g., breadth of and multiple disciplines involved in fluoridation literature), authority and expertise (e.g., perceived mismatch between public health and private practice about fluoridation, patient knowledge), and messaging issues (e.g., caries risk factors beyond fluoridation). Dental hygienists viewed health communication as a process that involves building trust over time and recognized client knowledge as important. **Conclusions:** This study underscores that dental hygienists are aware of and value 2-way health communication techniques in practice. They also have a strong understanding of the impact of trust in the health relationship. Nevertheless, communication challenges around CWF persist, and solutions to those challenges will need to consider the breadth of multidisciplinary evidence, topical versus systemic fluoride, and explaining population- versus individual-level interventions. Funding for this project was provided by an Eyes High Postdoctoral Scholarship from the University of Calgary and an Applied Public Health Chair (CIHR–Institute of Population & Public Health, Institute of Musculoskeletal Health & Arthritis) grant.

RELATIONSHIP BETWEEN SOCIOECONOMIC STATUS AND SELF-REPORTED PERIODONTAL SYMPTOMS USING THE COMMUNITY HEALTH SURVEYS OF 2011 AND 2013

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Problem statement: Periodontal disease is a chronic disease worldwide that is highly influenced by socioeconomic status. **Purpose:** The purpose of this study was to determine the relationship between socioeconomic status and self-reported periodontal symptoms. **Methods:** This study was conducted after receiving approval from the institutional review board at the Korea Centers for Disease Control and Prevention (IRB No: 2011-05CON-04-C, 2013-06EXP-01-3C). This cross-sectional study used data from 210,432 (weighted n = 36,294,413) and 220,396 (weighted n = 39,067,134) subjects of the 2011 and 2013 Community Health Surveys, respectively. All subjects were community residents aged ≥19 years who lived in the sampled households in each year. Prevalence rates of tooth mobility, gingival swelling, calculus, and gingival bleeding were determined. Independent variables were sex, age, and socioeconomic status (i.e., occupation, education level, and income). Differences in self-reported periodontal symptom rates according to socioeconomic status were determined using independent t-tests and one-way analysis of variance. **Results:** Approximately 30% of subjects reported at least 1 periodontal symptom; specifically, in 2013, 11.1%, 10.3%, 4.5%, and 4.4% reported gingival swelling, gingival bleeding, dental calculus, and tooth mobility, respectively. More women (31.4%) than men (29.1%) reported periodontal symptoms. Of the subjects aged ≥60 years, 34.2% reported periodontal symptoms, while only 23.4% of those in their twenties did so; thus, self-reported periodontal symptoms appeared to increase with age. Prevalence of self-reported periodontal symptoms differed by socioeconomic status ($p < 0.01$). **Conclusions:** Self-reported periodontal symptoms differed according to socioeconomic status: subjects with a low socioeconomic status reported more advanced periodontal symptoms (e.g., gingival swelling), whereas those with a higher status reported more incipient symptoms (e.g., gingival bleeding).

DEVELOPMENT OF THE CURRENT ISSUE IN KOREAN DENTAL HYGIENE RESEARCH AGENDA: FOCUSING ON SOCIAL DENTAL HYGIENE

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Problem statement: To expand the profession of dental hygiene, knowledge translation of research for integration into practice is crucial. Recently, Korea has established an academic classification category for dental hygiene. We identified the research agenda subcategory of "social dental hygiene" as an area needing development. Social dental hygiene considers the community, society, culture, circumstance, and environment surrounding the individual as factors for improving the oral health of the population. **Purpose:** The purpose of this study was to develop the subcategory "social dental hygiene" for the Korean Dental Hygiene Research Agenda. **Methods:** This study utilized a Delphi survey method. Surveys were sent to the chairpersons of the Korean Dental Hygienists' Association and its subsocieties via email (n = 8). All participants provided informed consent (IRB YWDS2015-03-002). Chairpersons' opinions were grouped into the following categories: basic science, clinical, social, and educational dental hygiene. The categories were then classified into "health promotion/disease prevention," "health services research," "professional education and development," and "occupation health and safety," according to the ADHA National Dental Hygiene Research Agenda (2007). The research agendas were compared with the articles published in 2 Korean journals (JKDH, JDHS) and one international journal (IJDH) from the first issue to December 2014. **Results:** Among 129 identified research priorities on the Korean agenda, social dental hygiene priorities numbered 44 (34.1%) items. Eleven priorities about oral health necessity or epidemiology have already been preliminarily studied to determine factors influencing oral health. Thirty-three priorities about oral health policy have not yet been studied. The newly developed priorities for social dental hygiene have not been studied. **Conclusion:** Previous dental hygiene studies in Korea were focused on discovery of new knowledge, including social factors that influence oral health. The new Korean Dental Hygiene Research Agenda aims to enhance knowledge translation to dental hygiene practice.

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POSTER ABSTRACTS

EDUCATION

CRITICAL THINKING IN DENTAL HYGIENE EDUCATION: EXAMINING STUDENT PERCEPTION

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Problem statement: Empowering learners to effect change implies that learners acquire lifelong learning skills; one such skill is critical thinking. Critical thinking is a high-level cognitive function desired in graduates of higher education, including professional education programs such as dental hygiene. Research on the general topic of dental hygiene education is limited; research specific to critical thinking in dental hygiene education is even more rare. **Purpose:** This research is designed to deepen understanding of dental hygiene students' perceptions and experiences of acquiring critical thinking skills in their professional education. **Methods:** A basic qualitative study was selected to start the discussion, and data were gathered during a focus group followed by individual interviews. Research ethics board approval was obtained. The purposeful sample comprised 7 recent graduates of the final 2-year cohort of a community college-based dental hygiene program in Ontario, Canada. Inductive data analysis using an interpretive perspective was conducted to identify categories, patterns, themes, and ultimately meaning to address the research questions. **Results:** Participants indicated their critical thinking began with acquiring base knowledge of theory related to dental hygiene followed by developing a thought process using case-based learning with small group work and discussion. Participants valued being offered a variety of activities to develop their critical thinking, such as problem-based learning, active learning, and cooperative learning. Participants also acknowledged the role of confidence, emotions, and time constraints, thinking outside the box, and reflection as facilitators. The clinical setting was noted as a real and challenging environment in which to apply critical thinking and to see it modeled. **Conclusions:** Many of the findings of this exploratory study align with research on developing critical thinking in adult education and professional education. This basic qualitative study provides beneficial preliminary information about how dental hygiene students learn critical thinking skills.

E-TEXTBOOKS IN DENTAL HYGIENE EDUCATION: UTILIZATION AND PERSPECTIVES OF STUDENTS AND FACULTY

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Problem statement: Transitioning from paper textbooks to interactive e-textbooks has been considered revolutionary in terms of enhancing student learning. Students termed the "net generation" have grown up with technology, and it is assumed they embrace technological options such as e-textbooks. However, this technology in higher learning has been met with hesitation. **Purpose:** This research study investigated student and faculty perspectives of mandatory e-textbooks in a dental hygiene program. **Methods:** Ethics approval was obtained from the university's Research Ethics Board (#Pro00072859). The student questionnaire utilized a 5-point Likert scale (strongly disagree [1] to strongly agree [5]) and examined convenience; compatibility with learning style; perceived enjoyment; and perceived usefulness. Student use frequency for each text was collected. Open-ended questions captured benefits and challenges. A focus group gathered perspectives from faculty (5 of 10) who required an e-textbook. Descriptive statistics were calculated for questionnaire data, and narrative analysis was used for open-ended questions and focus group transcripts. **Results:** Survey completion was 48% (50/105). Overall, students disagreed with the utility of this e-textbook platform, scoring all factors below neutral. Results of students' ratings of 4 categories showed convenience (M = 2.75, SD = 0.92); compatibility (M = 1.93, SD = 0.83); perceived effectiveness (M = 2.15, SD = 0.90); and perceived usefulness (M = 2.36, SD = 1.04). A high correlation between all factors suggests the utility factors were uniformly rated by students. On average, 71% of students did not use their textbook more than once a month. Benefits were few and challenges included technical glitches, eyestrain from screens, cost, and inability to choose books for purchase. Faculty's perspectives aligned closely with the students' responses, but they appreciated portability of texts and quality of clinical images. **Conclusions:** Students strongly dislike e-textbooks; they do not read e-textbooks, but study from condensed, summarized presentations. Faculty felt e-textbooks do not align with positive student learning experiences and mostly preferred traditional paper texts for their teaching.

EVALUATION OF STUDENT COMPETENCIES FOLLOWING IMPLEMENTATION OF AN ENRICHED ULTRASONIC CURRICULUM INTO A CANADIAN DENTAL HYGIENE PROGRAM

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Problem statement: Thorough debridement is the basis of periodontal treatment and a profound segment of dental hygiene expertise. Studies indicate that Canadian graduates use ultrasonics with an outdated (traditional) approach resulting in an "unconsciously incompetent" clinician. **Purpose:** This study tested a revised ultrasonic curriculum aimed at producing a more "consciously competent" graduate. **Methods:** This convenience sample study measured both ultrasonic process and outcomes for graduates from an accredited Canadian school (n = 17) vs the following year's graduating cohort (n = 18) after implementation of a novel ultrasonic curriculum. Methods comprised enrichment of ultrasonic theory, preclinic and clinic content, including problem-based learning, critical thinking, and faculty calibration. Graduates were evaluated "in process" via a validated, indexed rubric on 4 foci: equipment preparation, infection control, clinician positioning, and instrumentation technique by the investigators following calibration exercises. Post-scaling, the teeth were removed from the identical typodonts, anonymized, and scored for "outcomes" via tested grid calculations for 3 types of standardized deposits: heavy/tenacious, light, and biofilm. Ethics approval was obtained from Niagara College, Ontario. **Results:** From a potential 510 points for in process skills, the baseline graduates achieved a mean score of 112.3 vs 295.6 for the enhanced curriculum cohort. Outcomes debridement measured the baseline group leaving 10.5 grids of tenacious calculus, 23.3 grids of light calculus, and 60.18 grids of biofilm from a potential of 72 each. The enhanced curriculum cohort left 4.1, 7.4, and 39.3 grids, respectively. A 2-tailed, unpaired t-test measured statistical significance. All p values show statistical significance between the mean scores at the 0.01 level. **Conclusions:** The enhanced curriculum produced graduates with process improved by 263.1% ($p < 0.0001$). Debridement outcomes were enhanced similarly. This study suggests that an enriched ultrasonic curriculum can be inserted into an existing dental hygiene program with vastly improved results.

ULTRASONIC INSTRUMENTATION CURRICULA IN CANADIAN DENTAL HYGIENE PROGRAMS: A DESCRIPTION OF CURRICULAR ELEMENTS FROM PROGRAM DIRECTORS' PERSPECTIVE

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Problem statement: Contemporary ultrasonic instrumentation (UI) has improved due to biofilm and light deposit removal and enhanced subgingival access. However, it is unknown if dental hygiene curricula have kept pace with this progress. **Purpose:** The purpose of this study was to assess dental hygiene UI curricula from program directors' perspectives. **Methods:** Thirty-nine Canadian program directors were invited to participate in an electronic survey containing closed- and open-ended items about current UI curricula, with the latter qualitative items focused on educational objectives and clinical criteria for UI implementation. The study received ethics approval from the University of Manitoba; responses were kept confidential. The survey was pilot tested with a small convenience sample to establish clarity and validity. Quantitative analyses were primarily descriptive statistics including frequencies, proportions, and means. Narrative data underwent inductive qualitative thematic analysis. Sensitizing concepts identified from previous research were used for developing codes. Codes were analysed to identify themes. **Results:** The response rate was 47.5%. Timing of the introduction to UI was widely varied. UI theory, preclinical, and clinical training ranged from 2 hours to 20 hours, 0 hours to 12 hours, and >20 hours, respectively. A reliance on guest speakers (90%) and textbooks (95%) was observed. Student evaluation was reported mostly based on observation, with and without examination (21%, 36%) primarily without assessment rubrics (21%). While criteria for ultrasonic use were client based, some aspects of criteria were not theoretically established. Program objectives were predominantly theory as opposed to clinically focused. **Conclusions:** The study demonstrated several deficiencies in Canadian dental hygiene UI curricula. Shortcomings primarily surrounded a lack of instilling evidence-based, contemporary approaches for UI into all curricular elements. The authors recommend careful reviews, modifications, and future evaluations of ultrasonic curricula within Canadian dental hygiene programming.

DOCUMENTING INCIDENCE AND RECOMMENDATIONS FOR PATIENTS WITH DRY MOUTH IN UNDERGRADUATE STUDENT CLINICS

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Problem statement: Dry mouth is a complex condition impacting many older adults. Older adults frequently attend undergraduate dentistry and dental hygiene student clinics. **Purpose:** The purpose of this study was to document the incidence of dry mouth and assess the management protocols recommended by dental and dental hygiene students. The project also evaluated associations between age, medical history (i.e., systemic conditions), medication use, as well as frequency and type of treatment goals when salivary change was noted in the clinical assessment findings. **Methods:** This retrospective chart review collected data from electronic patient records. Study approval was obtained from the university's Research Ethics Board (protocol # Pro00065611). Records from 2014–2016 were selected if changes in saliva were noted. Data analysis was completed using SPSS. Frequencies were displayed as percentages and associations between variables were examined. **Results:** AxiUm database revealed 250 pertinent patient charts from 4934 patients seen. Results showed students do not frequently mention dry mouth in the treatment plan, with only 13% (n = 33) of patients receiving recommendations for managing dry mouth. Patients who received recommendations were over 70 years of age. Students rarely include dry mouth in the diagnosis (n = 29) and, when it was documented, patients had a comorbidity of autoimmune disorders (n = 18); taking antidepressants (n = 8) or other medications (n = 10). If dry mouth was noted in the treatment plan, students recommended nothing (n = 12), Biotène products (n = 11) or various other agents (n = 10). **Conclusions:** Findings indicate dental and dental hygiene students identify changes in salivary flow during clinical assessment. However, few students provide recommendations to support patients in managing dry mouth. Further research is required to examine reasons why advice for managing dry mouth is rarely provided to patients, as well as to consider the feasibility of implementing a diagnostic test into clinical protocols to better assess and define a person's dry mouth.

BLUEPRINTING DENTAL HYGIENE COMPETENCIES TO FACILITATE IMPROVED STUDENT FEEDBACK

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Problem statement: Clinical examinations in dental hygiene education assess a variety of student competencies regarding application of knowledge and skills in an authentic setting. However, this analysis of competence is rarely returned to students in the form of constructive feedback. Confidentiality and time constraints often limit feedback for these intensive examinations. **Purpose:** To develop an assessment blueprint for providing structured quality feedback following a dental hygiene clinical examination. **Methods:** One dental hygiene examination at the University of Alberta involves comprehensive client history taking, including identifying risk factors contraindicating or requiring modification to treatment. Using entry-to-practice dental hygiene competencies detailed by the Canadian Dental Hygienists Association, an assessment blueprint with test items mapped to competencies was developed. Competencies relevant to the examination were identified and grouped based on similarity into overarching domains. Test items were then mapped to domains, allowing students' scores by domain to be calculated (without revealing the confidential test items themselves to the students). Feedback was based on student performance per domain and included overall scores, domain descriptions, how to improve, cohort comparisons, and relevant competencies. **Results:** The blueprinting process identified 4 domains as essential to the history-taking examination: eliciting essential information, effective communication, client-centred care, and interpreting findings. This process also aided the test development, as an inadequate number of test items for assessing client-centred care was identified through the blueprinting. Feedback reports were successfully delivered through online mechanisms to all dental hygiene students following their history-taking examination, in December 2016. **Conclusions:** Blueprinting dental hygiene competencies and test items to examination domains provides a mechanism for structured, confidential, and efficient feedback following clinical examinations. Additionally, this process further validates the examination itself by revealing missing or irrelevant test items. This assessment blueprinting process can be used to provide feedback for any dental hygiene clinical examination. Funding for this project was provided by University of Alberta, School of Dentistry, Educational Research Scholarship Fund.

BEYOND ASSESSMENT: ENHANCING FEEDBACK, INTERACTION, AND PEER LEARNING WITH A STUDENT RESPONSE SYSTEM

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Problem statement: Formative assessment is essential to monitor student progress. Quizzes can be conducted using student response systems (SRS), otherwise known as "clickers." Advantages of SRS include increased student participation, interactivity, promotion of class discussion, instant availability of results, and immediate feedback. However, faculty may hesitate to incorporate SRS due to perceived difficulty in learning and using the system by their students. **Purpose:** This study (CUNY IRB approval #2015-0464) evaluated the students' perceptions about incorporating SRS and peer learning using clickers in the first-semester dental hygiene course, Oral Anatomy (DEN1112). **Methods:** The SRS (ELMO, New York, USA) was used for weekly quizzes in DEN1112. In fall 2015, students completed a 6-question, anonymous, paper-based survey about their experiences with clickers before and after the course and their views on SRS as an assessment tool for quizzes. In fall 2016, peer-learning activities were introduced in quizzes using clickers. After submitting their initial answer, students were allowed to discuss selected quiz questions in small groups and answer the question again with only their second answer recorded. In 2016, student surveys included 2 additional questions about these peer-learning activities. Results were analysed by descriptive statistics. **Results:** One hundred sixty students participated in the survey in 2015–2016. Although the majority (74.4%) of respondents were not familiar with clickers before DEN1112, at the completion of the course 58.8% of them felt "very comfortable" and 32.8% were "somewhat comfortable" using SRS. In 2016, 86.8% of respondents found peer-learning small-group activities using clickers "very helpful," and 31 students (40.8%) explained in the optional comments how those activities were beneficial to them. Most respondents (90.8%) estimated that they changed their initial answer 50% of the time or less following small-group discussions. **Conclusion:** The majority of students easily adapted to clickers and embraced the interactivity, discussion, and peer learning augmented by the SRS.

UBC DENTAL HYGIENE STUDENTS' SELF-RATED CONFIDENCE LEVEL RELATED TO THE CANADIAN NATIONAL COMPETENCIES FOR BACCALAUREATE DENTAL HYGIENE EDUCATION

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Problem statement: In 2015, the Canadian Dental Hygienists Association published the first *Canadian Competencies for Baccalaureate Dental Hygiene Programs*. To date, we have no scientific evidence to support that graduates from baccalaureate programs have gained these abilities. **Purpose:** To explore the confidence levels of senior dental hygiene baccalaureate students in their ability to demonstrate national baccalaureate competencies. **Methods:** This is a 3-year longitudinal study involving senior students enrolled in the University of British Columbia dental hygiene baccalaureate program. Following university ethics board approval, an online, anonymous survey was conducted with senior students to rate their confidence level based on a 5-point scale ranging from "not confident" to "confident" in the national competencies that include 13 domains with 110 associated subcompetencies. This abstract is directed to the frequency data of graduating students from the March 2017 survey as their data reflect confidence at graduation. **Results:** Seventeen of 22 fourth-year students responded to the survey for a 77% response rate. Ratings of "mostly confident" and "confident" scores were summed to explore the number of subcompetencies within each domain in which 75% to 100% of respondents indicated such confidence. The competency areas in which they expressed the highest confidence included collaboration (100%), clinical therapy (100%), oral health education (90%), disease prevention (86%), professionalism (82%), and integration of knowledge (80%). Areas in which they expressed the least confidence included policy use (20%) and advocacy (11%) where many respondents were "not confident," "somewhat confident" or "unsure." **Conclusion:** These data provide the faculty with important insights to support curriculum revisions to promote deeper experiences in such areas as policy use and advocacy. It also helps to contribute to a broader national discussion about the baccalaureate competencies to explore subcompetencies that may be beyond the scope of baccalaureate education.

A COMPARISON OF EVIDENCE-BASED PRACTICE BETWEEN DENTAL HYGIENE STUDENTS AND DENTAL HYGIENISTS

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Problem statement: Dental hygienists must be competent in evidence-based practice (EBP) to uphold the ADHA Standards for Clinical Dental Hygiene Practice. **Purpose:** The purpose was to compare EBP knowledge, attitudes, access, and confidence (KACE) between entry-level dental hygiene students and registered dental hygienists (RDHs). **Methods:** A convenience sample of entry-level dental hygiene students and RDHs was used. Participants enrolled in an EBP course completed the validated KACE survey the first week and last week of the course. IRB approval was obtained from Texas Woman's University. Repeated measures analysis of variance (ANOVA) was conducted to determine if there was a significant positive change in knowledge, attitudes, access, and confidence from pretest to post-test and if there was a significant interaction between group and time. **Results:** Thirty-eight dental hygiene students and 43 RDHs were in each group (N = 81). In all 4 dimensions of KACE (knowledge of EBP, attitudes towards EBP, accessing evidence, and confidence in critical appraisal), there was a significant increase between pre- and post-tests for students ($p < 0.001$). However, for RDHs, there was only a significant increase in 2 dimensions: knowledge of EBP from pretest (M = 2.67, SD = 1.39) to post-test (M = 5.38, SD = 1.88), $p = 0.044$ and attitudes towards EBP from pretest (M = 3.78, SD = 0.40) to post-test (M = 4.19, SD = 0.38), $p = 0.012$. **Conclusion:** Dental hygienists should engage in formal training in EBP upon entrance into a dental hygiene program and training should continue throughout the program.

COMPARISON OF DENTAL HYGIENISTS' AND DENTISTS' CONTINUING EDUCATION NEEDS FOR CAREER INTERRUPTED DENTAL HYGIENISTS IN SOUTH KOREA

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Problem statement: Continuing education (CE) maintains and enhances the job skills of health care professionals. Most dental hygienists are women, and in some cases their careers are interrupted because of marriage, childbirth, and child care. After a certain period, these career-interrupted dental hygienists and dentists will hope to be reinstated and provided CE. **Purpose:** The purpose of this study was to investigate the CE needs of career-interrupted dental hygienists and dentists. **Methods:** A total of 154 participants (83 dental hygienists and 71 dentists) completed an online questionnaire. All participants were members of their respective professional associations in Gyeonggi, Korea. The independent variable was occupation, and the dependent variables were reasons for career interruption and type of CE needed. Frequency analysis and descriptive statistics were used to determine participants' general characteristics, differences in reasons for career interruption, and CE needs. Responses were analysed using an independent t-test with the PASW statistics 22.0 program. **Results:** All dental hygienists were women (mean working experience: 4.4±18.5 years), while most dentists were men (95.7%; mean working experience: 18.5±6.0 years). Dental hygienists and dentists were both positive after returning to work. However, dental hygienists showed a higher need for CE for job training in "dental assistance" and "preventive care." Whereas, dentists showed a high need for CE related to "hospital management" and "administration." CE needs related to "special needs patient care" was low for both groups. **Conclusions:** Dental hygienists and dentists differed in their reported CE needs after career interruption. Funding for this project was provided by the Gyeonggi province branch of the Korea Dental Hygienists Association.

PERCEIVED STRESS AND WELL-BEING IN DENTAL HYGIENE AND DENTAL THERAPY STUDENTS STUDYING IN THE UNITED KINGDOM AND AUSTRALIA

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Problem statement: There is a gap in the literature with regards to our understanding of stress and well-being among dental hygiene and dental therapy students (DHDTS). A recent study used the Scale of Positive Well-Being, the Adult Hope Scale, and the Values Questionnaire in conjunction with the widely used Dental Environment Stress questionnaire to explore stress and well-being in a combined program of DHDTS in one UK school. The findings showed that students reported high scores of psychological well-being at the same time as high sources of stress, and provided baseline data for this comparative study. **Purpose:** To compare findings of sources of stress and well-being among DHDTS studying a combined program in the UK and in Australia, for clearer understanding of what role a country's institutional environment and curriculum has on students' perceptions. **Methods:** A questionnaire that included the Dental Environment Stress questionnaire (DES); Depression Anxiety Stress Scales (DASS-21); Scales of Psychological Well-Being (SPWB); Valuing Questionnaire (VQ); and the Adult Hope Scale (AHS) was distributed to all students in years 1, 2, and 3 DHDTS at the University of Portsmouth Dental Academy in the UK, and at La Trobe Rural Health School in Australia. Data were collected on students' perception of levels of stress and well-being. Statistical analyses were undertaken using SPSS™ software. Mann-Whitney U tests with Bonferroni corrections were used as multiple pairwise tests were performed on a single set of non-parametric data, to set significance at $p < 0.002$. **Results:** A response rate of 58% (n = 42, UK) and 55% (n = 46, Australia) was achieved. Clinical factors and academic work were perceived as stressful for DHDTS in both the UK and Australia. The Australian DHDTS perceived stress in the educational environment was significantly higher ($p < 0.002$) than the UK DHDTS. All students reported high levels of positive well-being, with no significant differences between the 2 groups. **Conclusions:** DHDTS in the UK and Australia identified sources of stress within their undergraduate education, but also perceived themselves as positively functioning individuals.

PRE-LIMINAL VARIATION OF EXPERIENCE OF DENTAL HYGIENE DIPLOMA STUDENTS EMBARKING ON THEIR DEGREE-COMPLETION PROGRAM

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Problem statement: Dental hygiene diploma graduates who immediately continue into degree-completion studies undergo a change from a clinically focused, hands-on learning environment to an experience focused on higher order concepts such as critical thinking, conceptual writing, research use, and health care advocacy. This shift in learning experience forces students into a "liminal space," suspended between old and new levels of education. Understanding this pre-liminal state will allow educators to better support students as they begin their degree studies. **Purpose:** The purpose of this research project is to examine perceptions of dental hygiene students on the pre-liminal phase experienced when moving from diploma to baccalaureate education. **Methods:** This qualitative study utilized phenomenography to capture and categorize variation in students' experience of this pre-liminal state. A purposeful sample of dental hygiene students enrolled in a degree-completion program volunteered to participate in semi-structured individual interviews. Interview questions explored why they decided to undertake degree-completion studies, what factors influenced their decision, what their expectations were, and how they believed their expectations as a student might change. Qualitative coding utilizing phenomenographic analysis was conducted to determine the various ways in which students experience pre-liminality. Ethics approval was obtained from the University of Alberta Research Ethics Board (#Pro00072407). **Results:** Students articulated a variety of reasons for immediately pursuing their degree, including the short-term impact of an additional year of study, as well as long-term implications on their careers. However, students were unclear on the expectations, experiences, and cognitive adjustments necessary during this transition. **Conclusions:** Students entering the degree-completion program do not seem aware of the possible cognitive adaptations that may be required to successfully navigate their new learning environment but can articulate a desire to earn a degree as part of their career goals. It is important to understand this pre-liminal state to implement strategies to support this transition for dental hygiene degree-completion students. Funding for this project was provided by the Summer Studentship in Health Professions Education (HPE) Grant Program – Office of Education, Faculty of Medicine and Dentistry, University of Alberta.

ASSESSMENT FOR NEED OF A MASTER OF SCIENCE IN DENTAL HYGIENE PROGRAM

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Problem statement: Since 1988, there has not been a Master of Science (MS) in Dental Hygiene (DH) program in New York State (NYS) to provide educational opportunities for professional growth and alternative employment settings for dental hygienists. **Purpose:** The purpose of the study was to assess the need to establish an MS in DH program in NYS, whose curriculum and design would meet the needs of DH graduates. **Methods:** A convenience sample of 5244 American Dental Hygienists Association members was used to complete a survey to assess the need, curriculum specialization, and educational design for an MS in DH degree curriculum. The survey contained 11 items with closed-ended responses. It was pilot tested by the DH Research Development Committee to establish content validity. The survey was administered online and all responses remained confidential. Descriptive statistics were used to analyse the data. No ethics approval was needed according to New York University's IRB Office. **Results:** There were 828 (16%) respondents, 571 (69%) of whom are currently employed as dental hygienists: 696 (84%) in clinical, 232 (28%) in education, and 17 (2%) in sales and marketing. Reported highest degree earned were bachelor's (43%), associate (35%), master's (19%), and doctorate (3%). Interest in an MS program was reported by 24%, while 26% were undecided. Of the areas of degree specialization, 73% selected educational leadership, 65% chose advanced DH practitioner (ADHP), 39% selected clinical research, and 25% chose sales/business management. The preferred delivery of the curriculum was online, selected by 47%, while 46% preferred a hybrid, and 7% a traditional classroom setting. **Conclusions:** Currently there is no MS degree program in NYS. Survey results indicated that 199 (24%) were interested in earning a master's degree. The majority of respondents supported the need for an online or hybrid program.

FACULTY PERCEPTIONS OF SUPPORTING STUDENTS' DELIVERY OF MOTIVATIONAL INTERVIEWING DURING PATIENT CARE

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Problem statement: In order to effectively support students' delivery of motivational interviewing (MI) during patient care, faculty should have appropriate training. **Purpose:** The purpose of this study was to assess the University of Michigan (U-M) Dental Hygiene (DH) faculty members' perception of the importance of and their confidence in supporting students' delivery of MI during patient care before and after participating in MI professional development activities. **Methods:** A convenience sample of 16 U-M DH program faculty members, who teach in clinic, participated in this study. They participated in MI training workshops focusing on increasing their understanding of MI, integrating this into their teaching, and supporting students' application during clinical care. There were 4 evaluation instruments: 3 utilized a Likert scale pretest, post-test format; 1 used a qualitative question design. The U-M Institutional Review Board (IRB) approved this study as exempt (HUM00065102). **Results:** Wilcoxon signed ranked test compared importance and confidence in facilitation of MI strategies from T1 (pre-test to post-test 1), T2 (pre-test to post-test 2), and T3 (post-test 1 to post-test 2) and found no statistical significance. In addition, faculty perceptions increased (T1, $p = 0.03$) related to students having enough time to incorporate MI during patient care. There was a decrease (T3, $p = 0.03$) regarding faculty perceptions of having a positive influence on students' application of MI strategies. Faculty perceptions of importance and confidence supporting students' delivery of MI strategies decreased slightly without statistical significance. Fifty-six percent of faculty participated in team grading and reported that the most helpful professional development activities were team grading (58%) and in-service (25%). **Conclusions:** Faculty members' perceptions of the importance of and their confidence in supporting students' delivery of MI decreased slightly over the academic year. Faculty found professional development activities helpful and recommended that more be offered. Research on the longitudinal impact of MI faculty professional development is recommended. Funding for this project was provided by Rackham Block Grant Funding.

ENGAGING DENTAL HYGIENE STUDENTS IN CLINICAL RESEARCH

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Problem statement: Research is a critical component of dental education. While it is accepted that most dental hygiene professional students initially enter practice, clinicians must have a basic understanding of research to support their clinical decision making. **Purpose:** The purpose of this project was to provide student dental hygienists with a hands-on opportunity to participate in a clinical research project to supplement their research course. **Methods:** Four dental hygiene programs identified a faculty member to serve as the principal investigator at each site. Students recruited 2 to 3 patient participants with moderate to poor oral hygiene, plaque accretions, and gingivitis for 2 visits. A plaque index, gingival index, percent bleeding on probing, and an oral soft tissue examination were collected. Students completed a subjective assessment questionnaire about each participant's oral health and performed a dental prophylaxis. Participants were provided 2 tubes of Colgate® Total® toothpaste and a soft manual toothbrush. Home care instructions were provided. Follow-up evaluations scheduled 6 to 8 weeks later included recording oral health indices and a participant questionnaire. Students completed a questionnaire regarding observations made during the study. Ethics committee/IRB approval was secured at each institution prior to commencement of the study. **Results:** Over 100 students engaged a total of 298 participants. Clinical results demonstrated statistically significant ($p < 0.05$) reductions in plaque index (from 1.44 to 0.55), gingival inflammation (from 1.28 to 0.39) and bleeding on probing (from 31.29% to 8.04%). Principal investigators reported a high level of engagement, interest, and satisfaction among the students who participated as examiners in the study. **Conclusions:** This study demonstrated the positive effect that including students as examining clinicians in a clinical study can have on their understanding and appreciation of research and bringing discoveries to practice. Funding for this project was provided by Colgate-Palmolive, Co., Inc.

INTERPROFESSIONAL EDUCATION AND PRACTICE

GRADUATE OUTCOMES OF DENTAL HYGIENE BACCALAUREATE EDUCATION

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Problem statement: There is a scarcity of studies on Canadian baccalaureate dental hygienists. As discussions about baccalaureate education for dental hygiene continue on a national level, examining outcomes of earning a dental hygiene degree is paramount. **Purpose:** To investigate the practice outcomes of the University of British Columbia's (UBC) Bachelor of Dental Science in Dental Hygiene (BDSc) graduates. **Methods:** UBC dental hygiene entry-to-practice (ETP) and degree-completion (DC) graduates (n = 116; 30% response rate) from 1994 to 2016 participated in an online survey. Survey questions explored motivating reasons for pursuing dental hygiene degree education, abilities gained during their degree, and practice outcomes after earning their degree. Chi-squared tests were used to compare ETP and DC graduates. Survey results were also compared to the Canadian Dental Hygienists Association (CDHA) national job market and employment survey. Ethics approval was received from UBC's Behavioural Research Ethics Board. **Results:** Primary reasons for pursuing a degree were personal satisfaction (82%), increased knowledge base (82%), increased employment opportunities (78%), status/recognition of a degree (76%), access to graduate education (68%), and improved critical thinking abilities (61%). For DC graduates, abilities strengthened included enhanced skills for appraising research (92%), enhanced critical thinking and problem solving skills (90%), enhanced skills for retrieving scientific information (89%), and increased value for lifelong learning (85%). Respondents reported that the BDSc degree enabled them to expand their career opportunities (75%). More than 30% of respondents have pursued graduate education, and 40% work in employment settings outside of clinical practice. In comparison to CDHA's job market and employment survey, a greater proportion of UBC BDSc graduates earn more than $80,000 annually (44% vs 16%, $p < 0.001$), receive more benefits (4.0 vs 3.5, $p < 0.001$), and collaborate more with non-dental health professionals (2.7 vs 0.8, $p < 0.001$). **Conclusion:** The results highlight the impact of UBC baccalaureate education on dental hygiene practice.

INTERPROFESSIONAL EDUCATION WITHIN DENTAL HYGIENE CURRICULUM

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Problem statement: Today's collaborative health care system calls for dental hygiene academia to adopt interprofessional education (IPE). The commencement of such transformative initiatives is the responsibility of administrators and faculty. However, their viewpoints can prevent the progression of these strategies. Failure to foster IPE can potentially jeopardize the relevance of the profession. **Purpose:** The purpose of this study was to assess the attitudes of dental hygiene administrators and faculty towards IPE, and to investigate how perspectives influence the implementation of this educational methodology. **Methods:** This quantitative cross-sectional study utilized a snowball and convenience sample of 91 dental hygiene administrators and faculty who completed a survey about viewpoints towards IPE and the use of interprofessional practices. The survey consisted of 34 items with closed-ended responses. Of these items, 28 were adapted with permission and were previously content validated. Survey data were collected through the use of an online software application. All responses remained anonymous and confidential. Descriptive and inferential statistics were used to analyse the data. IRB approval was obtained from Farmingdale State College. **Results:** Respondents demonstrated favourability towards interprofessional education (M > 3.00 for 26 of 28 items). Approximately half (47.78%) of them were in the infancy stages of integrating IPE into curricula, while only 5.56% had incorporated it as a major component. There was a significant association between attitudes and use of IPE (rs = 0.269), which highlighted student comprehension, course quality, and logistics ($p \leq 0.05$). **Conclusions:** Although administrators and faculty do hold IPE in high regard, most affiliated programs are not structured on interprofessional models. Perspectives have instilled a desire to develop and implement transformative plans focused on incorporating shared teaching and learning into dental hygiene education. Favourable attitudes are impacting the evolution of collaborative educational opportunities contributing to dental hygiene students becoming a part of modern medical practices.

A COLLABORATIVE AND INTERPROFESSIONAL COMMUNITY OUTREACH PROGRAM

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Purpose/Goals: The program goals were to provide oral screenings, patient education, and preventive oral health services to children through a collaborative, interprofessional community outreach program. The purpose was to target children in communities without access to oral health care, provide dental hygiene students the opportunity to participate in a valuable community outreach program while honing clinical skills in the dental hygiene care of children and adolescents. **Significance:** This program provided preventive services to underserved children while incorporating an educational component for patients and students with an interprofessional element to enhance the program through health care disciplines. **Approach:** Sophomore dental hygiene students provided oral health care, freshman dental hygiene students volunteered as assistants, dental residents provided urgent care while dental hygiene faculty and dentists from neighbouring dental societies supervised the clinic floor. Speech pathologists distributed information to attendees, nursing faculty and students provided blood pressure screenings, and medical laboratory technology faculty and students demonstrated proper handwashing techniques. Representatives from oral health and health care companies disseminated information. Appointments were scheduled, and children were accompanied by a parent or guardian on the day of the event. Sophomore dental hygiene students reviewed health histories, obtained consent forms, completed oral health screenings, patient education, oral prophylaxes, and fluoride varnish. Dental sealants, when deemed necessary, were provided. Dental hygiene faculty and supervising dentists reviewed student findings and signed the completed screening forms. **Evaluation:** Data analysis supported the intended goals in the need for community outreach programs. Post-event data indicated 187 screenings, 180 prophylaxes, and 150 fluoride varnishes were provided while 146 dental sealants were placed and 2 children received urgent care. All children and parents participated in the patient education program. Of the 187 children treated at the events, 66.13% presented with decay and 9.60% presented with recurrent decay. This collaborative, interprofessional program for community outreach supports reducing health disparities in preventive dental hygiene care.

TRAINING PHARMACISTS TO COUNSEL OLDER ADULTS ABOUT ORAL HEALTH

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Problem statement: Patients who lack a dental home consult pharmacists about oral health information and advice. **Purpose:** The purpose of this study was to evaluate the impact of an interprofessional training program on practising pharmacists' knowledge, confidence, and perceived preparedness to counsel older adults about oral health. **Methods:** A convenience sample (n = 63) of practising community-based pharmacists was recruited to attend a training program about oral health, and 44 chose to participate. Prior to the program, 41 (93%) completed 2 surveys: one assessing experiences and training related to oral health, the other a pretest to measure knowledge, ability, and level of preparedness with counseling older adults. Immediately after training, participants completed the matching post-test. Responses were anonymous to protect confidentiality. Data were analysed using SPSS 22 (IBM Corp. Armonk, NY). AT Still IRB approved the study (#2015-068). **Results:** The most frequent oral problem about which pharmacists' advice was sought was mouth ulcers (n = 10; 24%). Pharmacists perceive dry mouth as the most important oral health problem among older adults (n = 11; 27%). An exact McNemar's test determined that there was a statistically significant difference on 5 of the 12 knowledge measures ($p = 0.000$) after the training intervention. A Wilcoxon signed-rank test showed that participation in the training program produced a statistically significant change in pharmacists' confidence in ability to locate oral health information ($Z = -4.730$, $p = 0.000$) and available area dental resources ($Z = -4.350$, $p = 0.000$); and level of preparedness to counsel older adults about the importance of oral health to overall general systemic health ($Z = -4.638$, $p = 0.000$) and about interventions to address oral health needs ($Z = -5.066$, $p = 0.000$).

Conclusions: Participation in an interprofessional training program improved pharmacists' knowledge, confidence in their ability to locate resources, and level of preparedness to counsel older adults about oral health. Funding for this project was provided by the Dental Trade Alliance Foundation.

THE NATURE OF THE INTERPROFESSIONAL PRACTISING RELATIONSHIPS BETWEEN DENTISTS AND ORAL HEALTH PRACTITIONERS IN AUSTRALIA

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Problem statement: Australian oral health practitioners (oral health therapists [OHT], dental hygienists [DH], and dental therapists [DT]) work autonomously within their scope of practice in a structured professional relationship with a dentist. There is no requirement for standing orders or supervision of practice. How this relationship plays out in practice and the nature of vertical relationships within the dental team can affect cost and access to dental care. **Purpose:** To describe the interprofessional relationship between oral health practitioners and dentists. **Methods:** Following ethics approval from the University of Adelaide, a survey mailed to all members of the 2 professional associations representing DT, DH, and OHT collected practitioner and clinic characteristics. Practitioners described the frequency (7-point Likert scale) with which they prepared treatment plans, consulted a dentist prior to providing treatment, and how often treatments provided were inspected by a dentist. Associations between a range of characteristics and the frequency of these activities were assessed by comparing proportions (Chi-square, $p > 0.05$). **Results:** Overall response rate was 60.6% (n = 1083); 28% were registered as DT, 29% as OHT, and 43% as DH. Among the 3 practitioner groups, DT had the highest proportion (78.6%) reporting that they very often or always prepared patient treatment plans, and the lowest proportion (16.2%) very often or always consulted a dentist and inspection by a dentist (9.2%). By contrast, DH reported the lowest proportion (41.6%) very often or always prepared patient treatment plans, and the highest proportion (41.6%) very often or always consulted a dentist and inspection by a dentist (36.4%). Self-reported frequency of these activities significantly varied by a range of practitioner and clinic characteristics. **Conclusions:** The nature of interprofessional relationships varied by practitioner type and clinical setting. Education of oral health practitioners and dentists should include the development of effective working relationships. Further research should investigate the impact of professional relationships on costs of care, applied practice scope, and patient outcomes. Funding for this project was provided by the National Health and Medical Research Centre (NHMRC) Centres for Research Excellence (Grant no. 1031310).

CHILDREN'S ORAL HEALTH PRACTICES OF NURSES FOLLOWING AN EDUCATIONAL INTERVENTION: PILOT STUDY

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Problem statement: Performing preventive oral screenings can reduce the "silent epidemic" of early childhood caries. Although nurses working in pediatric settings can assist in preventive dental care, many report having insufficient skills to perform such tasks. **Purpose:** The purpose of this study was to improve nurses' pediatric oral health knowledge and practices through a theory-based educational intervention. **Methods:** This randomized control trial used a sample of 33 nurses. Using the random number generator software, 18 participants were assigned to the intervention group, and 15 to the control group. Data collection for the study occurred over a 4-week period. An adapted, validated 21-question survey designed through Qualtrics© software measured oral health practices at pre and post-test. The electronically delivered continuing education (CE) course focused on children's oral health. Participants in the intervention group received the CE course immediately following completion of the pretest survey whereas participants in the control group received the CE course content after completing the post-survey at 4 weeks. A trivia question related to children's oral health was delivered via email at 3 weeks to keep all participants engaged over the 4 weeks. Participants who completed all portions of the study received 1 free CE credit as an incentive for participating in study. The IRB at Old Dominion University approved this study. **Results:** There was no significant difference between control and experimental groups at pre- and post-test for performing OHAs on children, F (1, 30) = 1.70, p = 0.20. The following scores significantly increased from pre- to post-test within experimental and control groups: knowledge (F [1, 31] = 12.67, p = 0.001), confidence performing OHAs (F [1, 30] =10.17, p = 0.003), and confidence providing anticipatory guidance to parents (F [1, 30] = 10.78, p = 0.003). **Conclusions:** Due to small final sample size, a post hoc power analysis determined a minimum final sample of 61 is needed for future studies to observe differences between groups. However, improvements in knowledge, confidence performing OHAs, and providing anticipatory guidance to parents were observed within groups.

COLLABORATIVE INTERPROFESSIONAL EDUCATION MODELS

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Purpose: In 2015, a university dental hygiene program implemented an interprofessional education experience. The purpose was to give students a broader understanding of their scope of practice and collaboration with all relevant health care providers for the delivery of patient-centred interprofessional, collaborative care. **Significance:** This novel curricular educational experience prepares health profession students for deliberatively working together with the common goal of building a safer and better patient-centred and community- or population-oriented US health care system. **Approach:** Applying adult learning theory, students were put into groups, given one of several case scenarios, and asked to design an interprofessional collaborative care model. Students were asked to answer questions in a paper pertaining to: 1) prior interprofessional collaboration knowledge; 2) medical, dental, and psychological conditions of the patient in the case scenario; 3) team member roles and responsibilities; 4) rationale for their particular model; and 5) potential benefits and challenges. A rubric was provided for quantitative evaluation by a dental hygiene faculty member to grade student models and papers. Qualitative feedback was evaluated by content analysis of open-ended discussion in the papers. **Evaluation:** Sixty-four of 82 students stated that they did not know much about interprofessional collaboration (IPC) prior to this curricular experience. Grades for demonstrating application of IPC knowledge ranged from 90% to 100% with a mean of 97.3%. Additionally, each group uniquely and creatively depicted an interprofessional model using a poster board, a computer image or a hand-crafted 3D model. Some narrative highlights from discussion papers include "it is important to engage peers, communicate and correct behaviours for patient centrred care" and "research will continue to grow, but making sure to collaborate with one another will only speed up the process."

DEVELOPING PRELICENSURE INTRPROFESSIONAL COLLABORATIVE CARE CURRICULA

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Purpose: The practice standard of "collaborate with others" requires prelicensure programs to prepare students to be entry-to-practice competent interprofessional collaborative care (IPCC) practitioners. This is a must for program accreditation and a must from a health care perspective. The Rady Faculty of Health Sciences, University of Manitoba (RFHS/UM) offers 9 prelicensure programs through the Colleges of Dentistry (CoD), Medicine (CoM), Nursing (CoN), Pharmacy (CoP), and Rehabilitative Sciences (CoRS) as follows: dentistry, dental hygiene, physician assistant, physiotherapy, occupational therapy, respiratory therapy, medicine, nursing, and pharmacy. The RFHS/UM established the Office of Interprofessional Collaboration (OIPC) with one IPCC academic/scholar from each of the 5 colleges. The purpose of the OIPC was to create a longitudinal undergraduate IPCC curriculum in which students from all 9 programs learn about, with, and from each other. Along with creation comes evaluation; hence the OIPC maintained both formative and summative evaluation throughout the iterative development and delivery of year 1 of the 2-year didactic curriculum. **Significance:** If health care providers are expected to be IPCC practitioners then curricula should be designed to best prepare them for this role. **Approach/Key features:** The OIPC curriculum is informed by 2 models: Stark and Lattuca's Academic Plan and D'Amour and Onandasan's IPE/IPC model. Mixed methodology was used to evaluate the first-year delivery. College councils, dialogue with community leads, curriculum retreats, surveys, and student focus groups are examples of data gathering methods. **Evaluation:** Year 1 of the curriculum involved 52 first-year student IPCC learning cohorts (>95% participation rate). Respective college curricula councils enabled cohorts to participate, per term, in 1 face-to-face simulation-based facilitated session, 2 online guided discussions, 1 assignment, and 1 reflection. Focus groups and survey responses indicate the curricula helped students understand the importance of IPCC to future practice and that authenticity and meaningful learning are critical to IPCC curricula. Funding for this project was provided by Rady Faculty of Health Sciences, University of Manitoba.

COMMUNITY HEALTH

PRACTICE ADAPTATIONS OF DENTAL HYGIENISTS IN ALBERTA, CANADA, ACCORDING TO COMMUNITY WATER FLUORIDATION STATUS

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Problem statement: Communities across Canada are revisiting their community water fluoridation (CWF) status, with some opting to discontinue. Understanding the impact of CWF cessation on children's dental caries requires consideration of other possible changes that may also impact children's caries rates. One such factor is practice adaptations by dental hygienists, perhaps undertaken in an effort to offset an anticipated impact of fluoridation cessation. **Purpose:** To examine whether, or the extent to which, dental hygienists in Alberta engaged in practice adaptations according to the CWF status of the community in which they work. **Methods:** All dental hygienists in Alberta were invited to complete an online questionnaire asking about changes to their dental hygiene practice since CWF cessation or, for those in non-cessation communities, during a similar timeframe. Reported practice adaptions were compared between those working in CWF cessation communities versus still-fluoridated communities using chi-square analysis. The University of Calgary's Conjoint Health Research Ethics Board approved the study. **Results:** A total of 154 dental hygienists provided information on practice adaptations. Compared to dental hygienists working in still-fluoridated communities, those working in CWF cessation communities were: 1) more likely to report increasing recommendations for more frequent in-office fluoride treatments (e.g., fluoride gel) (p = 0.03); and 2) less likely to report decreasing recommendations for more frequent radiographs (x-rays) to detect decay (p = 0.03). There were no differences between the 2 groups on attitudes towards CWF, a potential confounder. **Conclusions:** CWF cessation appears to be occurring more frequently in Alberta and elsewhere. Research on CWF cessation and its implications for population oral health is complex, and must consider other factors (aside from CWF cessation) that may have changed during the same time. This study found that dental hygienists report having adapted their practice regarding recommendations for frequency of in-office fluoride treatments and dental radiographs. Funding for this project was provided by Dr. Lindsay McLaren's Applied Public Health Chair award (http://www.cihr-irsc.gc.ca/e/49128.html), which is funded by the Canadian Institutes of Health Research (Institute of Population & Public Health and Institute of Musculoskeletal Health & Arthritis).

COMMUNITY ORAL HYGIENE SERVICES ON HYPERTENSION AND DIABETES AMONG MIDDLE-AGED AND ELDERLY KOREANS

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Problem statement: Community oral hygiene services for non-invasive periodontal dental care can be applied as a community program to people with hypertension and diabetes. **Purpose:** This study aimed to evaluate the effects of a community-based oral hygiene service for patients with hypertension and type 2 diabetes mellitus in Korea. **Methods:** The study used a 1-group pretest-posttest and interrupted time-series design and lasted 8 months. A total of 151 participants (45% male and 55% female, 63±8.4 years) were included in the study. Participants included patients with hypertension (62%), diabetes (12%), and both (26%). The objective oral hygiene and subjective self-reported periodontal status were compared before and after the study. Changes in HbA1c levels from the first and last visits were analysed using the paired t-test. Blood pressure and objective periodontal status were analysed using repeated measures ANOVA to evaluate changes. Subjective periodontal status was evaluated using a chi-square test. All analyses were performed using SPSS 21 (Chicago, IL). This study was approved by the IRB of Wonju College of Medicine, Yonsei University (YWDR-15-2-027). **Results:** Participants maintained stable blood pressure at each of the 4 sessions, and their HbA1c levels were significantly lower at the fourth session ($p < 0.05$). A lower frequency of subjective swelling was reported at the fourth (37.9%) compared to the first (55.6%) session. Further, significantly fewer cases of calculus and bleeding were observed at the fourth session ($p < 0.05$), and significantly more patients reported having no gum problems at the fourth session (43.1% vs 27.2%; $p < 0.05$) than the first session. **Conclusions:** Community oral hygiene services reduced plaque scores and led to self-perceived improvements in symptoms of gum swelling and bleeding. Findings indicate that community oral hygiene services provided by dental hygienists can promote periodontal health, and may help in the management of hypertension and diabetes.

NO-COST DENTAL CARE IN EXCHANGE FOR COMMUNITY SERVICE HOURS: PARTICIPATING PATIENTS' AND DENTISTS' RESPONSES

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Problem statement: Because oral health is fundamental to maintaining overall health, all people should be granted access to oral health care. A lack of access to oral health care exists among vulnerable and underserved populations in the United States. **Purpose:** The purpose of this study was to evaluate a program in which patients volunteer in their community in exchange for receiving no-cost dental care. The motivations, attitudes, and perceptions of the participating patients and volunteer dentists were assessed. **Methods:** This cross-sectional study obtained background information from 66 adults originally interested in this program. Survey data were received from 27 of 38 patient participants and 10 of 11 dental participants, including demographics, dental treatment received or provided, experiences with the program/volunteering, and recommendations for program improvement. Volunteer dentists received no incentive for program participation. The IRB at the University of Michigan determined this study was exempt from oversight. **Results:** Types of treatment provided by volunteer dentists as part of the Pay It Forward Program included non-urgent services such as oral hygiene education, examination, radiographs, prophylaxis, scaling and root planing, extractions, and simple restorations. The average dollar amount of services provided to each patient was $1,153. Pain was the main motivating factor for 70% of the patients who sought treatment. Patients volunteered an average of 33 hours. Patients reported significant oral health improvements from before (very good/excellent 4%) to after program involvement (very good/excellent 44%). The majority of patients and dentists rated the program and all of its aspects very positively. There were no statistically significant differences between those who enrolled in the program and those who did not enroll in relation to age, household income or distance from the program. **Conclusions:** Innovative efforts to increase access to oral health care for underserved and uninsured adults should be explored in addition to advocating for policy changes. Funding for this project was provided by the University of Michigan Rackham Graduate Student Research Grant and the Rackham Block Grant Award.

SMILES FOR MILES: LESSONS LEARNED IN SOCIALLY AND CULTURALLY RESPONSIVE CARE

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Purpose: The University of Manitoba pledges to contribute to the cultural, social, and economic well-being of Manitobans. Canada received over 300,000 new permanent residents in 2016. Half arrived through economic immigration programs and approximately 60,000 came as refugees. The School of Dental Hygiene (SDH) aims to create culturally responsive care curricula, meet community needs, and ensure dental hygiene care plans (DHCP) reflect community- and person-centred needs. **Significance:** Manitoba received the third largest influx of newcomers. Though immigrants in general experience good health, refugees do not and often have a much lower health status reflective of trauma, malnutrition, and infectious disease. Many have not benefited from oral health care. A key determinant of health is health care (HC) services. Many HC providers lack cultural proficiency and are not prepared for the cultural diversity of the population. Health beliefs and practices are culturally informed. Lacking the understanding of these from a practitioner perspective results in poor person-centred care plans. Both prelicensure and professional development curricula must ensure HC practitioners enable, advocate, and promote health for all. **Approach/Key features:** Four steps were taken to incorporate minimal cultural competence within the prelicensure curriculum as follows: 1) collaborate with primary HC clinics serving newcomers to offer DH care (DHC); 2) establish a Smiles for Miles donation fund to cover the cost of DHC for newcomers via the SDH clinic; 3) develop a curriculum that results in culturally reflective DHCP; 4) explore formative and summative client feedback mechanisms. **Evaluation:** Since February 2016, 22 newcomers received DHC thanks to $8,000 in donations from the community and industry. Program viability has been established. Measures of client satisfaction are promising based on return rates. A major student theme was heightened awareness of needs of newcomers. Curriculum planning is in progress to weave theory with practice to promote culturally responsive care.

USING THE PDSA QUALITY IMPROVEMENT MODEL TO PROVIDE DENTAL HYGIENE SERVICES TO YOUTH WITH TYPE 2 DIABETES

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Purpose: College of Dentistry, School of Dental Hygiene, University of Manitoba collaborates with the Diabetes Education Resource for Children and Adolescents (DER-CA) interprofessional collaborative (IPC) team. Dental hygiene (DH) services are provided as part of the education and surveillance of the youth at the DER-CA type 2 diabetes clinic. The majority of children followed in this program are of self-declared First Nation heritage. The first 3 cycles of the Plan-Do-Study-Act (PDSA) Model for Improvement moved the collaboration from a prelicensure DH student rotation to Bachelor of Science IPC service learning (SL) for a registered DH. The goal was to promote IPC dialogue regarding youth oral health and type 2 diabetes management. **Significance:** There is limited knowledge and research involving youth with type 2 diabetes and their oral health. Incorporating a DH assessment has helped the IPC team consider oral–systemic health within the care plan. **Approach/Key features:** A fourth PDSA cycle responded to 3 questions pertaining to what, how, and how will you know as follows: 1) advance contribution of DH as part of the IPC team; 2) incorporate DH findings within the electronic record; and 3) DH participation in IPC team dialogue. The PDSA involved creation and implementation of a DH assessment template, participation in the IPC team preclinic meetings, oral health assessments and information sessions for the youth, and scheduling of IPC dialogue regarding DH findings to the IPC team. **Evaluation:** The PDSA resulted in DH weekly participation in IPC dialogue and the incorporation of the DH assessment within the electronic record. Future PDSA cycles are underway to evolve the SL to a DH independent practice within an IPC team. Access to DH care remains an issue for various ethnic youth. Programs such as the DER-CA promote the need for DH care as part of the youths' overall health.

EFFECTIVENESS OF EARLY PEDIATRIC DENTAL HOMES: A SCOPING REVIEW

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Objective: The Canadian Dental Hygienists Association, Canadian Dental Association, and Canadian Pediatric Society advise that children should see a dental professional no later than age 1. The dental home model is based on the concept of developing an ongoing relationship between the practitioner and patient where oral health care is delivered in a comprehensive, continually accessible, coordinated, and family-centred way. This scoping review examined literature on the effectiveness of early pediatric dental homes based on clinical, behavioural, and cost parameters. **Search strategy/Selection criteria:** Seven key databases (MEDLINE-Ovid, PubMed, CINAHL, Embase, Cochrane Database of Systematic Reviews, Scopus, and BioMed Central) were searched using "dental home" and "dental homes" as key words. No limits were placed on the search strategy. Searches were conducted up to and including April 2016. Criteria for inclusion were studies that had examined preschool-aged populations and had focused on parameters to assess effectiveness of dental homes. **Data collection and analysis:** In total, 232 non-duplicate citations were identified for title and abstract review, of which 7 articles met the inclusion criteria and were included in the final analysis. Data extraction and synthesis were completed by the first author and verified by the co-author. **Main results:** Six primary studies and one systematic review were included in the final data set. Current evidence generally supports the effectiveness of early pediatric dental homes for improving clinical outcomes (i.e., dmft scores) and behavioural outcomes (i.e., including utilization of future dental care services), and offering potential cost benefits. However, exact quantifications of the impact on clinical and behavioural outcomes as well as cost benefits vary due to heterogeneity of study design and methodological considerations related to level of evidence in the studies. **Conclusions:** The current body of evidence predominately substantiates the establishment of a dental home model as an effective practice to improve early pediatric oral health.

UNMET NEEDS/ACCESS TO CARE

PREDICTORS OF PREVENTIVE AND EMERGENCY DENTAL SERVICE USE WITH DIABETES STATUS USING ANDERSEN AND NEWMAN FRAMEWORK MODEL

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Problem statement: Little is known about the pattern of dental services utilization among adults with diabetes. **Purpose:** The purpose of this study was to assess factors that predict the likelihood of adults with diabetes using preventive and emergency dental services. **Methods:** A cross-sectional study was conducted, using the Andersen and Newman Framework of Health Services Utilization dimensions (predisposing, enabling, and illness variables) to predict dental service utilization using 2001–2002 NHANES dataset, which was the last year of dental service usage inclusion. The target population was US adults, 18 years of age or older; n = 4707 based on inclusion/exclusion criteria. Statistical Analysis Software (SAS®) was utilized to accommodate the NHANES sampling design and weights. Data analysis was achieved using chi-square and multinomial logistic regression with a hierarchical (blockwise) entry of predictor variables. This study has IRB approval (number 757668-1). **Results:** Results reveal that individuals with diabetes were significantly (p = 0.0002) less likely to utilize dental services in the past 12 months compared to individuals without diabetes. Based on odds ratios, significant predictors in the preventive service utilization model were gender, marital status, age, education, income, regular source of care, dental insurance, self-reported pain, and recommended care based on oral exam findings. Significant predictors in the emergency service utilization model were unmarried status, age, education, regular source of care, dental insurance, self-reported painful tooth, and recommended care based upon oral exam findings. **Conclusions:** Diabetes status is a significant predictor of not having a preventive dental visit, even after controlling for age, gender, marital status, income, race/ethnicity, and education based on the results. These findings are a concern given the evidence supporting integrating oral health with diabetes management care. Further research is needed to compare results with current dental visits by individuals with diabetes.

CHILDREN'S ORAL HEALTH CARE FROM THE PERCEPTION OF THE CAREGIVER SEEKING IN-HOSPITAL DENTAL TREATMENT FOR THEIR CHILDREN

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Problem statement: Dental caries continues to be the most chronic childhood disease, and treatment of this disease is the most common day surgery for children in Canada. Oral disease is experienced most by socioeconomically disadvantaged individuals. It is recommended that children first visit a dental professional by age 1. **Purpose:** The research objectives were to examine the utilization of oral health care services by children with unmet dental needs and to determine the caregiver's perception and utilization of the oral health care system in Nova Scotia. **Methods:** This study utilized a cross-sectional design. A questionnaire based on the Framework for the Access to Care was given to caregivers (n = 62) of children undergoing dental treatment at the Izaak Walton Killam Health Centre. **Results:** Less than a quarter (23%) of the children visited a dentist by the recommended age of 1ne. The mean age that caregivers perceived to be the recommended age of first visit was 2.29. The mean age that caregivers first sought dental care for their children was 2.69. Forty-four percent of children had caries at that time. Alternate dental care settings were preferred by over half (51%) of caregivers for children's dental care. There was an overrepresentation of Aboriginal children (10%); low-educated caregivers (41.2%); and families from rural communities (50.4%) and low-income threshold (53.8%). **Conclusions:** This study supports current evidence that socioeconomically disadvantaged individuals are vulnerable to oral diseases. The ability to offer services in settings that are easily accessed by vulnerable populations, such as community and school-based clinics and primary care settings, influences preventive outcomes. Utilizing dental hygienists, dental therapists, and primary care providers in alternate practice settings should be considered. This research study received ethics approval from Athabasca University REB #22011 and the IWK Health Centre REB# 1021493).

KNOWLEDGE, MOTIVATIONAL, AND BEHAVIOURAL EFFECTS OF PROVIDING ORAL HEALTH INFORMATION TO PRE AND POSTNATAL PARENTS

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Problem statement: Despite improvements in oral health status in recent decades, dental decay is still the most common preventable childhood disease worldwide. **Purpose:** To investigate whether providing an oral health educational intervention results in improvements in oral health knowledge among pre and postnatal parents and caregivers, and to explore the motivations and attitudes of parents towards oral health (REB#2015-093). **Methods:** A mixed-methods design included pre and postintervention components and a semistructured interview. In Phase I, participants attended an oral health education session where oral health knowledge and attitudes were assessed prior to and immediately following the education session. In Phase II, participants were offered a free dental debridement; they participated in a brief semistructured interview regarding their oral health motivations and behaviours and completed a second postquestionnaire on oral health knowledge and attitudes. **Results:** Thirty-three participants attended the oral health education sessions and completed Phase I; of those, 5 chose to complete Phase II. The education session was effective at improving participants' total knowledge scores. Scores on 13 questions increased significantly, from 7.70±2.64 (mean±SD) (median 7) before the education session, to 11.24 ±2.27 (mean±SD) (median 12), immediately after the session ($p < 0.001$). This knowledge was retained into Phase II. Despite the limited number of participants, 4 overall themes emerged: 1) participants are knowledgeable about the importance of oral health; 2) they believe their teeth and their children's teeth are important; 3) knowledge provides minimal increases to motivation and attitude change; and 4) factors such as income, education, and social support influence the adoption of positive oral health behaviours. **Conclusions:** Oral health education is successful at increasing parents' knowledge; however, new research on clinician techniques and strategies that address the social determinants of health are needed to improve parent and patient motivations towards improved oral health behaviours.

SOUTH TEXAS ORAL HEALTH NETWORK (STOHN) & THE TOOTH FAIRY PROJECT

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New programs: The purpose of this study is the collaboration between STOHN and The Tooth Fairy Project to collect deciduous teeth for analysis and increase knowledge and awareness of practitioners to grow their confidence in educating their patient population about potential environmental exposure risks. This collaboration between medicine and dentistry provides emerging science to dental practitioners; an important process in engaging families in discussions about environmental exposures. The goal is to enroll 10 dentists, each enrolling 20 parents. **Significance:** Neurodevelopmental disorders (ND), such as autism spectrum disorder (ASD), affect 1 in 68 births. Previous studies show that awareness of exposure risk during pregnancy in South Texas is low. Therefore, it is important to increase provider knowledge and awareness to enable greater communication with their patients. Local practice-based research networks in South Texas are important communities that potentially impact large numbers of patients. This study engages practitioners in an ongoing national study with minimal impact on their practice. **Approach/Key features:** Enrollment is through use of continuous recruitment of STOHN members and referred general and pediatric offices. Practitioners are contacted by phone and in person. Upon completion of Human Subject Protection training, each office is provided a training manual and "lunch-and-learn" education on ND and environmental exposure. They are trained in engaging their patients, provided prepaid packaging for donated teeth, and supported in survey completion. Lists of interested patients are generated and used to contact them by the study coordinator. Each child who donates will receive a personalized thank you letter from the Tooth Fairy. Providers are highlighted for their participation in our monthly newsletter. **Evaluation:** Evaluation is threefold: Practitioner enrollment and retention success and difficulties; survey of increased knowledge, awareness and improved attitude about communicating risks to their patients; and number of completed surveys submitted with donation of teeth. UTHSCSA IRB Protocol # HSC20170132E.

THE EFFECT OF SOCIAL DETERMINANTS ON INTERGENERATIONAL CARIES OF SOMALI REFUGEE MOTHERS AND THEIR CHILDREN

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Problem statement: Strong evidence links a mother's oral health to her children's caries experience when living in non-mobile environments. Yet a pilot study indicated that this relationship is disrupted when families are forced to migrate. **Purpose:** This study was conducted to further test the correlation of mother–child caries in multiple Somali day care centres, and to assess social determinants of health associated with child caries experience. **Methods:** Somalia-born mothers and their dentate children up to age 12 years enrolled at Somali day care facilities located in Minnesota were eligible for the study approved by the University of Minnesota IRB. Clinical screenings provided the dependent variables of dmfs and DMFS counts. Independent variables were gained through face-to-face surveys, with mothers recording demographic information, mother's oral health knowledge (KOCH index), beliefs, fatalism (OHF), behaviours, and neighborhood characteristics. Data analyses included descriptive statistics, Spearman's correlation, and linear mixed effects models adjusting for maternal and child age, and mother's education, age at migration, and years lived in the US. **Results:** Data were collected from 98 mothers and 294 children at 9 sites. The mean age was 34.0 years for mothers and 7.8 years for children. No correlation was found between mother and children's primary ($r = 0.16$, $p = 0.23$) or permanent ($r = -0.17$, $p = 0.78$) caries experience. Statistical significance was found between child dmfs and mother's knowledge of the purpose of fluoride ($p < 0.01$) and family's main drinking water source ($p < 0.05$); and between child DMFS and mother's likelihood of returning consent forms to child's school ($p < 0.0001$). **Conclusions:** Preliminary results indicated that clinicians' previously accepted knowledge that mothers and their children have similar caries experience is questionable when applied to those subjected to forced migration (e.g., refugees). Factors related to the knowledge and consumption of fluoride and written parental consent to participate in school-based sealant programs were related to child caries experience.

THE NEED FOR INDEPENDENT DENTAL HYGIENE PRACTICE OF THE PUBLIC DENTAL HYGIENISTS IN KOREA

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Problem statement: Globally, interest in independent dental hygiene practice has been increasing. However, in Korea, dental hygienists are only allowed to practise under the direct supervision of a dentist, and the number of public dentists has decreased. This decrease in available supervising dentists has made it difficult to practice public dental hygiene. Further, the supervision requirement does not allow for independent dental hygiene practice. Interest for independent public dental hygiene practice is unknown. **Purpose:** The purpose of this study was to identify the demand for public dental hygienists to practise independently and the scope of services provided. **Methods:** A survey was sent to 159 Korean public dental hygienists who were randomly sampled from the 1531 Korean public dental hygienists. All participants provided written informed consent. Questions on the survey assessed the need for independent practice of public hygienist duties in 2 categories: public oral health and preventive dental treatment. Participants were asked to select the following options for each task: direct supervision, indirect supervision or independent dental hygiene practice (IRB No. CR317015 by Yonsei University). **Results:** Public dental hygienists were very interested in both independent public oral health practice and preventive dental treatment. Identified high-demand services in public oral health practice included oral health education, fluoride mouth rinsing, and oral health project-related administrative services. In preventive dental treatment, high-demand services included toothbrushing instruction and use of oral care devices. Public dental hygienists were very interested in independent performance of oral health education, fluoride mouth rinsing projects, and instruction about toothbrushing and oral care devices. **Conclusions:** Public dental hygienists in Korea are interested in practising independently to provide oral health education, including oral care instructions, and fluoride mouth rinsing projects. This study was supported by the Korea Society of Public Health Dental Hygienists (2016-02).

WORKFORCE MODELS

A LINK BETWEEN DIET, TOOTH DECAY, AND PERIODONTAL DISEASE IN UNDERSERVICED RURAL UGANDA

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Goals: Bridge to Health Medical and Dental, a Canadian humanitarian organization, has built a partnership with a local not-for-profit health care organization. Collectively, we conduct outreach missions to underserved communities and provide medical and dental care, improve health care delivery systems, train local health care workers, and educate the residents of these communities. Oral prophylaxis, composite restorations, extractions, and dentures are provided; however, our focus is on education, prevention, and sustainability. **Significance:** Greater than 50% percent of the population in rural southern Uganda suffer from oral diseases impacting their overall health, largely preventable with education and proper dental hygiene. In addition, remote villages are hindered by extreme financial barriers and access to care. **Approach/Key issue:** Our mobile team collected and analysed qualitative and quantitative data from remote villages. Decay rates and severity, acid erosion, calculus formation, and gingival inflammation were documented on school-aged children segregated by village and gender. In addition, villagers were questioned on what they grow and eat. **Evaluation:** Gross rampant decay rates upwards of 98% were linked to villages cultivating sugar cane. Decay rates of 63% with severe acid erosion were found in villages producing pineapple crops. Moderate alkalinity from Irish potatoes and sweet potatoes leads to heavy calculus formation and gingival inflammation. The neutral pH combination found in a village growing bananas and potatoes proved to have the lowest decay rate at 36% combined with the least amount of calculus and gingival inflammation. While efforts must continue to focus on education, it is imperative to include diet along with oral hygiene instructions. Further collaboration with medical providers linking diet, systemic disorders, and oral conditions supports enhanced interventions.

DENTAL THERAPY PRACTICE PATTERNS IN MINNESOTA: A BASELINE STUDY

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Problem statement: Dental therapy legislation in Minnesota was based on the premise that a differently constituted dental workforce would extend primary oral health services to underinsured and underserved populations. The first cohort of dental therapists (DT) began practicing in 2012, yet little is known about how this provider is used in practice. **Purpose:** The purpose of this descriptive study was to obtain baseline knowledge of dental therapists' practice patterns in Minnesota. **Methods:** Four dental practices were sampled purposefully to obtain various practice types and geographic locations in Minnesota. Secondary data were collected from software databases in each practice between January and March 2015. Data were used to describe employment characteristics, types of patients seen, and applied scope of practice of dental therapists. Data 6 months pre and postemployment of the DT were collected to determine if dentists' practice patterns changed after a DT was employed. Categorical variables and dental procedure categories were reported using frequencies and percentages. Work undertaken by the dentist pre and postemployment of the DT was tested within each dental practice for a total of 4 chi-square tests. A Bonferroni correction was used to account for the multiple testing (p = 0.0125). This study was deemed exempt from IRB review by AT Still University, Arizona IRB Committee (IRB # 2014-174). **Results:** Dental therapists were employed full time and saw an average of 6.8 patients per day, 90% of whom were uninsured or on public assistance. Restorative services comprised 68% of work undertaken. Dentists delegated a full range of procedures within the dental therapy scope of practice indicating trust and acceptance of the DT. Dentists in 2 practices began to take on more complex dental procedures after a DT joined the practice. **Conclusion:** Dental therapists are expanding access to dental care in rural and metropolitan areas of Minnesota.

A NEW MIDLEVEL PROVIDER IN OREGON: DENTAL HYGIENISTS' PERCEPTIONS

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Problem statement: As the US faces an increasing demand for oral health care, many states are examining alternative provider models and the role of the dental hygienist to meet their access to care crisis. **Purpose:** The purpose of this study was to assess Oregon dental hygienists' opinions on scope of practice limitations and perceived need for a midlevel provider in Oregon. **Methods:** A survey was mailed in December 2013 to a 30% (n = 1231) sample of Oregon dental hygienists (DHs), which included all expanded practice permit (EPP) holders (n = 351). All other survey recipients were randomly selected from the total 4101 registered DHs in Oregon. The 32-question survey assessed scope of practice, midlevel provider, current practice, and demographics. A total of 444 surveys were returned (response rate of 36%). The study was approved by the Pacific University IRB. **Results:** Over half (59%) of DHs surveyed believe a midlevel provider is needed in Oregon. EPP holders and members of the American Dental Hygienists' Association (ADHA) were significantly more likely to believe a midlevel provider was needed ($p < 0.0001$). Ninety-one percent (n = 400) of respondents agreed or strongly agreed that if a midlevel provider were introduced in Oregon it should be a registered dental hygienist. Forty-three percent (n = 186) of respondents were interested in becoming midlevel providers, and 47% of respondents (n = 203) believed the education for a midlevel provider should consist of training ending in a bachelor's degree. The majority of those interested in becoming a midlevel provider (74%, n = 137) prefer to gain their education through online teaching with a clinical internship. **Conclusions:** DHs in Oregon believe there is a need for a midlevel dental provider and that this provider should be a registered dental hygienist. Those interested in developing a curriculum for a midlevel provider should consider including online teaching with a clinical internship component. Funding for this project was provided by a Legislative Grant from the ADHA.

CROSS-SECTIONAL ASSESSMENT OF THE PRACTICE PATTERNS OF EXPANDED FUNCTION DENTAL AUXILIARIES IN MAINE

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Problem statement: To address the oral health access crisis, the State of Maine has enacted independent practice dental hygiene, public health supervision, expanded function dental auxiliary (EFDA) for registered dental hygienists and Dental Assisting National Board Certified dental assistants (CDAs), and most recently the dental hygiene therapist (DHT). Limited assessment has been conducted on the effectiveness of any of the workforce models. **Purpose:** The purpose of the study was to assess a) the implementation of EFDAs in dental practices; b) geographic practice patterns of EFDAs regarding at-risk and underserved populations; and c) EFDA attitudes regarding preparatory and continuing education. **Methods:** The study was deemed exempt by the University of Michigan IRB (HUM00121000). A 20-question survey was sent both via email and traditional mail to all 73 licensed EFDAs in Maine. SPSS software was used for analysis. **Results:** A response rate of 59% (n = 43) was achieved. Only 12% of respondents practised in a community or public health setting, while the majority of respondents practised in private offices. Regarding access to care, 53% indicated their practice did not accept Medicaid coverage, while 58% reported making a moderate to significant impact on access to care. However, 35% reported working in Penobscot County, which is not a dental provider shortage area. The most frequently provided services were restorative services (72%), topical fluoride (40%), sealants (37%), and child prophylaxis (26%). Over 80% of respondents reported less than half of their continuing education courses being relevant to EFDA practice. Over 20% felt specific, additional topics in preparatory education could increase access to care. **Conclusions:** EFDA providers in Maine are providing much needed services, however they may not be providing access to care for the intended at-risk and underserved populations in certain geographic areas. Further research is needed on this topic.

DENTAL HYGIENE PRACTICE

NATIONAL STUDY OF ORAL CANCER SCREENING PRACTICES

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Problem Statement: Oral cancer has a high mortality rate which is often attributed to delays in diagnosis. Registered dental hygienists (RDHs) are instrumental in detection and referral of suspicious lesions. No national study of Canadian RDH oral cancer screening (OCS) practices has been completed. **Purpose:** This study investigates whether RDHs are routinely conducting OCS. Factors that may mediate OCS provision and ability to discuss sensitive topics with patients are also examined. **Methods:** A cross-sectional survey design was used. A web-based survey was developed, pretested, and validated prior to dissemination. The survey link was mailed out nationally through dental hygiene colleges and associations. Only practicing RDHs were prompted to complete the survey. Descriptive statistics were used to identify data trends. The McNemar test was used for categorical dependent data; nonparametric tests (Mann-Whitney U and Kruskal-Wallis) were used to analyse Likert questions; multiple regression was used for prediction of continuous outcomes; and Spearman's correlation was used for detecting relationships. Bonferroni's correction was applied to reported p values with multiple comparisons. Ethics approval was obtained from the University of Alberta Research Ethics Board (Pro00055150). **Results:** A total of 256 surveys were used for analysis, primarily from Ontario, Alberta, and Nova Scotia. Sixty-four percent of RDHs reported conducting OCSs during their regular process of care. Ninety-six percent of intraoral components are inspected in an OCS compared to 73% of extraoral components. Confidence in OCS technique was high (70%) but those with a bachelor's degree reported feeling more prepared than those with a diploma (p = 0.002). The average time to conduct an OCS was 4 minutes, with the majority agreeing there is sufficient time to conduct the screening (57%). Only 37% felt their education prepared them to discuss sensitive topics. **Conclusions:** RDHs are conducting OCSs more than two-thirds of the time, however they lack comfort in discussing sensitive topics.

UNDERSTANDING THE MEANING OF THE HEAD AND NECK CANCER PATIENT AND PARTNERS' ORAL/DENTAL LIVED EXPERIENCES

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Problem statement: Treatment for head and neck (H&N) cancer can lead to experiences of intense symptom distress, particularly within the oral cavity and pharynx. Understanding these and their impact on physical, emotional, and psychosocial effects could support patient- and family-centred care. **Purpose:** The purpose of this study was to develop an understanding of patient and partners' oral/dental lived experiences in the context of H&N cancer. This understanding will provide critical insights for health care providers and decision makers to support patient and family-centred care. **Methods:** Hermeneutic phenomenology as described by Max van Manen guided this study. Purposive sampling was used to recruit 13 study participants. Each participant completed a semi-structured interview, which was digitally recorded and transcribed verbatim. A prolonged engagement with the data and interpretive memos led to the articulation of phenomenological meaning of the experiences within the final interpretation. This study received institutional REB and site access approval. **Results:** Treatment has a profound and sustained impact on the H&N cancer patient and his or her partner. During treatment, difficulties with eating, pain, xerostomia, and weight loss were reported. Long-term, persistent eating difficulties, xerostomia, dental disease and its related cost were distressing to participants. Despite effects that impeded adequate nutritional intake, participants resisted the placement of a percutaneous endoscopic gastrostomy tube. The process of resistance was complex and influenced by meanings associated with becoming and living as a cancer patient. The symbolic meaning of food and eating impacted the participants' subjective concepts of self and illness. **Conclusion:** The intensity and extent of the patient experiences described suggest that there is a critical need to develop interventions that respond to living with symptoms of H&N cancer. This study has given voice to the participant experience, which should inform and guide the development of clinical practice and recommendations.

ORAL CANCER SCREENING: BREAKING THE TIME BARRIER

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Problem statement: It is an ethical responsibility for dental hygienists to perform oral cancer screenings (OCS). Previous studies have revealed that dental hygienists perceive themselves as knowledgeable about OCS, but are not transferring this knowledge into practice. Time constraints have been identified by dental hygienists as the main barrier to performing OCS on all clients. **Purpose:** 1) To determine how long it takes senior dental hygiene students, recent graduates, and dental hygiene faculty to conduct an intra and extraoral examination; 2) to determine the time required to complete the salivary gland function (SGF) testing component of the intra/extra oral examination. **Methods:** Ethics approval was obtained from the Research Ethics Board at Dalhousie University. A convenience sample of 28 participants (13 students, 9 alumni, 6 faculty) completed an intra and extraoral examination according to criteria taught at the School of Dental Hygiene, Dalhousie University while being timed. The total time to complete the exam and the time required for the SGF were recorded by calibrated researchers. Descriptive statistics were used to summarize the data via SPSS Statistics version 23. **Results:** The overall mean time (±SD) to perform the full examination was 5 min 26 s ± 1 min 4s (students: 5 min 23 s ± 51 s; alumni: 4 min 40 s ± 28 s; faculty: 6 min 42 s ± 1 min 2 s). The mean time (±SD) to perform the SGF test was 49 s ±12 s (this time was similar for all groups). **Conclusion:** Time has been reported by dental hygienists to be the main barrier to performing oral cancer screenings, however we have shown that a comprehensive intra and extraoral exam takes approximately 5.5 minutes. Performing SGF as part of the exam (considered non-essential for oral cancer screening) accounts for approximately 18% of this time. This translates to less than one minute which may not be clinically significant in practice. Further research is needed on means of reducing barriers (real or perceived) to routine practice of oral cancer screenings.

DENTAL RADIOGRAPHIC PRESCRIBING PRACTICES: A SURVEY OF DENTAL HYGIENISTS IN THE UNITED STATES

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Problem statement: Potential harm from ionizing radiation has led to the development of guidelines, which may or may not be followed by clinicians, for the protection of patients and practitioners from unnecessary radiation exposure. **Purpose:** This study surveyed US dental hygienists regarding radiology prescribing practices. **Methods:** The survey, consisting of 62 knowledge and practice items pertaining to dental x-rays, was based on the 2012 American Dental Association (ADA) and Food and Drug Administration (FDA) guidelines, *Dental Radiographic Examinations: Recommendations for Patient Selection and Limiting Radiation Exposure*. The study was granted exempt status by TAMBCD's IRB. The survey link was emailed to 10,000 subscribers of *Dimensions of Dental Hygiene* magazine and posted for its 40,000 Facebook followers. **Results:** Of the 517 survey respondents, 505 confirmed their identity as dental hygienists. Data analysis included descriptive statistics, cross tabulations, and chi-square analyses. Approximately 46% reported the dentist determined the need for radiographic films or images, and 42% reported the decision was made by the dental hygienist. Eighty-two percent stated a clinical examination was not performed prior to obtaining radiographs, and 70% reported radiographs were ordered based on a set time interval. Approximately 36% exposed radiographs based on insurance reimbursement. For adult recall patients with no clinical caries and low caries risk, general and corporate dental practices obtained bitewing radiographs more frequently (every 12 months) than educational institutions ($p < 0.05$). For children and adolescent recall patients without caries and low caries risk, corporate dental practices obtained bitewing radiographs more frequently on children (every 6 months) than educational institutions ($p < 0.05$); for adolescent patients, corporate and general dental practices preferred to acquire bitewing radiographs every 12 months, whereas educational institutions preferred every 18 months ($p < 0.05$). **Conclusions:** These findings suggest the respondents' practices did not fully adhere to the 2012 ADA/FDA guidelines for prescribing dental radiographs.

RCT TESTING THE EFFICACY OF NATURAL TOOTHPASTE ON THE CONTROL OF CARIOUS PROCESS: A NEW ERA OF THERAPEUTIC EFFICACY IN PRIMARY PREVENTION

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Problem statement: According to recent NHANES statistics, the prevalence of caries in at-risk individuals increased between 1994 and 2012, despite exposure to various fluoride products. Likewise, natural dental products are more and more prevalent even though they contain no therapeutic agent and in time would contribute to a rise in carious lesions. **Purpose:** Proposed trial aims to test a natural toothpaste solely containing 25% concentrated xylitol as the anticarious therapeutic agent as well as an anticariogenic antibacterial agent. **Methods:** A voluntary sample of 201 dyads (mother–6-month-old infant) were recruited from Pristina and randomly allocated to either test or control groups. The trial group consisted of twice a day toothbrushing with xylitol toothpaste for 24 months. The control group was exposed to normal preventive toothpaste with or without fluoride. Samples were collected at baseline and endpoint. A longitudinal prospective design was applied. Primary dependent variable was dmfs generated from ICDAS system. Primary independent variable was SM categories of infection from 0 to $>10^5$ SM/mL of saliva. Analysis used SAS software. The Ethical Committee of Pristina University approved this study. **Results:** Final group composition was 99 for the control group and 102 for the trial group. Twice daily 25% xylitol toothpaste exposure for 24 months led to a mean dmfs of 2.7 units for tested participants compared to 6.7 units for the control group by 60% ($p = 0.001$). This toothpaste also significantly reduced SM infection among test group participants between the ages of 6 and 30 months ($p = 0.001$). **Conclusion:** In the current study, natural strict 25% xylitol toothpaste used daily reduced the caries process, carious lesions, caries risk, and cariogenic bacteria. This study was funded by RSQB of Quebec.

USE OF THE ICDAS FOR MEASURING DENTAL CARIES: A SCOPING REVIEW

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Objective: To explore how overall caries was summarized for patients examined using the International Caries Detection and Assessment System (ICDAS). **Search strategy/Selection criteria:** A systematic database search up to July 2016 was carried out using PubMed, Ovid MEDLINE, Cochrane library, and ISI Web of Science electronic databases. Only studies that used the ICDAS for dental caries examinations were included. Studies were excluded if the examination was done for the validation/calibration of the ICDAS or if the examination was not done for the whole dentition. Measures used to report patients' overall caries were considered. Search terms for both caries and ICDAS were used. **Data collection and analysis:** Data extraction was done by 2 reviewers separately. Indices and measures used to summarize patients' caries level were evaluated in the selected studies. The index or measure of caries used and how it was calculated were extracted. Studies were grouped and summarized according to the index or measure used. **Results:** A total of 70 papers were selected. Of the selected articles, 56 were cross-sectional studies, 8 were randomized clinical trials, and 6 were cohort studies. A total of 40 different measures of caries were used. Individual ICDAS scores were the most commonly used measures as it was used in 17 studies. A total of 6 different dmft/DMFT and 7 different dmfs/DMFS combinations at different caries cut-off points were used. Two studies used mean ICDAS and one study used mean ICDAS in carious teeth. The Maximum ICDAS score and total ICDAS were used once. **Conclusions:** Most studies presented caries using categorical characteristics of the ICDAS. There are variations in the utilization of the system in summarizing caries between the studies. These inconsistencies do not allow comparison between different studies. Therefore, a consistent summary measure that reflects patient caries level is needed.

A RANDOMIZED 2-MONTH CLINICAL TRIAL EVALUATING ANTIGINGIVITIS EFFICACY OF STABILIZED STANNOUS FLUORIDE DENTIFRICE VERSUS TRICLOSAN DENTIFRICE

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Problem statement: Various antimicrobial oral hygiene products are available to help protect patients against plaque-induced gingivitis, a common oral health disease characterized by gingival bleeding and inflammation. Clinical data comparing treatments would be useful to help assist dental hygienists with home hygiene recommendations. **Purpose:** To compare the efficacy of 2 antigingivitis dentifrices—a stabilized stannous fluoride (SnF_2) and a positive control with triclosan—over a 2-month period. **Methods:** This was a randomized, positive-controlled, double-blind, parallel-group, IRB-approved clinical trial involving generally healthy adults with mild-to-moderate gingivitis. Two hundred qualifying subjects were randomized 1:1 to the 0.454% stabilized SnF_2 dentifrice (Crest® PRO-HEALTH™ Clean Mint) or positive control dentifrice with 0.3% triclosan/0.243% sodium fluoride (Colgate® Total®). Dentifrice was distributed with a soft manual flat-trim toothbrush. Subjects were instructed to brush with their respective dentifrice according to each manufacturer's instructions. The following efficacy and safety evaluations were conducted at baseline and month 2: Gingival Bleeding Index, Modified Gingival Index, and Oral Soft Tissue. Treatment groups were compared using analysis of covariance with baseline value as covariate. All statistical tests were 2-sided with a 5% level of significance. **Results:** One hundred ninety-seven subjects were evaluable; 98 in the triclosan group and 99 in the SnF_2 group. Both groups showed a significant reduction in bleeding sites from baseline ($p < 0.0001$). The mean number of bleeding sites in the SnF2 group was reduced from 20.7 at baseline to 11.2 at month 2, compared to baseline and month 2 means of 21.95 and 14.3, respectively, for the triclosan group. The difference between groups at month 2 represented 21.8% fewer bleeding sites for the SnF_2 group compared to the triclosan group ($p < 0.0001$). **Conclusions:** In this clinical study, the stabilized SnF_2 dentifrice provided greater gingival bleeding reductions than the triclosan dentifrice.

A RANDOMIZED CLINICAL TRIAL TO MEASURE EROSION PROTECTION BENEFITS OF A STABILIZED STANNOUS FLUORIDE DENTIFRICE VERSUS A CONTROL DENTIFRICE

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Problem statement: Dental erosion is a common condition characterized by loss of enamel from external acids, such as acidic foods and beverages. Stabilized stannous fluoride (SnF_2) dentifrice has been shown to offer protective benefits against erosion. **Purpose:** To compare the enamel protection efficacy of a stabilized SnF_2 dentifrice and a marketed control dentifrice in a 10-day in situ erosion model. **Methods:** This was a single centre, double-blind, randomized, 2-treatment, and 3-period crossover clinical study approved by an IRB. The study was conducted with 12 healthy adults. Each study period comprised 10 treatment days. Subjects were randomized to one of two treatments each period: 1) Experimental 0.454% stabilized SnF_2 dentifrice (Crest® PRO-HEALTH™ Clean Mint) or 2) Sodium fluoride dentifrice with potassium nitrate marketed for erosion protection (Sensodyne® Pronamel®). Subjects wore an intraoral appliance retaining 8 polished human enamel samples. Subjects used the assigned dentifrice, brushing lingual surfaces and then swishing, twice a day. Erosive challenge with orange juice occurred a total of 4 times on each treatment day. Enamel samples were measured using noncontact profilometry at baseline and day 10 for surface changes. Statistical analyses utilized a general linear mixed model with period and treatment as fixed effects and subject as a random effect. **Results:** The SnF_2 dentifrice provided 26.9% greater erosion protection relative to the control dentifrice at day 10 ($p < 0.03$). Enamel loss adjusted means at day 10 were 9.117μm for the SnF_2 dentifrice and 12.471μm for the control. **Conclusion:** This stabilized SnF_2 dentifrice provided greater erosion protection than a control dentifrice marketed explicitly for antierosion benefits.

PLAQUE AND GINGIVITIS EFFECTS OF AN OSCILLATING-ROTATING ELECTRIC RECHARGEABLE TOOTHBRUSH WITH AN ANGLED-BRISTLED BRUSH HEAD VERSUS A SONIC TOOTHBRUSH

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Problem statement: Clinical trials have shown advantages of oscillating–rotating (O-R) electric rechargeable toothbrushes versus sonic toothbrushes in reducing plaque and gingivitis. Most studies have evaluated comparable brush models (e.g., premium handles). Comparing a premium model to a mid-range model would further dimensionalize the relative efficacy of these technologies. **Purpose:** To evaluate an O-R electric (mid-range model) toothbrush with an angled-bristled brush head to a marketed sonic (premium model) toothbrush in reducing plaque and gingivitis over 8 weeks. **Methods:** This was a randomized, examiner-blind, parallel-group, 8-week, IRB-approved clinical trial. Generally healthy adults with mild-to-moderate plaque and gingivitis were assessed for baseline whole mouth gingival margin and approximal plaque, gingivitis, and gingival bleeding using the Rustogi Modified Navy Plaque Index, Modified Gingival Index, and Gingival Bleeding Index. One hundred fifty subjects were randomized 1:1 to the O-R brush (Oral-B® Professional Care 1000 with Oral-B® CrossAction® brush head) or the sonic brush (Sonicare® DiamondClean with DiamondClean brush head). Subjects brushed twice daily, 2 minutes per brushing, with their assigned toothbrush and standard fluoride dentifrice for 8 weeks. Plaque and gingivitis were reassessed at week 8 using the same methods. **Results:** One hundred forty-eight subjects completed the trial (75 O-R, 73 sonic). Statistically significant reductions in plaque and gingivitis ($p < 0.001$) were demonstrated by both toothbrushes over 8 weeks. Differences between groups were statistically significant for all plaque and gingivitis measures ($p < 0.001$) favouring the O-R brush. At week 8, the O-R brush demonstrated 27.7% to 46.8% greater plaque removal and 34.6% to 36.4% greater gingivitis reductions than the sonic brush. There were no adverse events. **Conclusions:** The mid-range O-R toothbrush handle with the angled-bristled brush head was more effective at reducing plaque and gingivitis than a premium sonic model.

3-YEAR EVALUATION OF MANUAL AND ELECTRIC RECHARGEABLE TOOTHBRUSH EFFECTS ON PRE-EXISTING GINGIVAL RECESSION

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Problem statement: Gingival recession is multifactorial. It is has been purported that toothbrushes that are highly effective at plaque removal could have a higher risk of trauma, leading to gingival recession. **Purpose:** To compare the effects of brushing with an oscillating-rotating (O-R) electric rechargeable toothbrush or a standard manual toothbrush on pre-existing gingival recession over approximately 3 years. **Methods:** This was a controlled, parallel group, randomized clinical trial approved by the International Medical & Dental Ethics Commission Freiburg. Healthy subjects with pre-existing recession (>2 mm) were randomized into 1 of 2 groups: O-R toothbrush or ADA reference manual toothbrush. Subjects brushed their teeth twice daily, for 2 minutes per brushing, with their assigned toothbrush and standard fluoride toothpaste. The same examiner assessed subjects for clinical attachment loss and probing pocket depths at 6 sites per tooth at baseline and months 12, 18, and 35. Gingival recession was calculated at pre-existing sites as the difference between clinical attachment loss and probing pocket depths. Safety was assessed by hard and soft oral tissue examinations. **Results:** One hundred and nine subjects were enrolled and 75 completed the study (37 in O-R, 38 in manual). Mean gingival recession (SD) for sites with initial recession did not differ significantly between groups after approximately 3 years ($p > 0.05$). Means (SD) at baseline and 3 years were 2.35 mm (0.35) and 1.90 mm (0.58), respectively, for the O-R group and 2.26 mm (0.31) and 1.81 mm (0.66), respectively, for the manual group. The reduction in recession was significant ($p < 0.001$) for both groups. There were no adverse effects on hard or soft tissues in either group. **Conclusions:** Pre-existing gingival recession was not adversely affected by brushing with an O-R or manual toothbrush over 3 years. In fact, both groups showed a reduction in recession.

ASSESSING PERIODONTAL DISEASE BY MEASURING MOLECULAR BIOMARKERS OF INFLAMMATION IN GINGIVAL CREVICULAR FLUID

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Problem statement: There are cases of periodontitis non-responsive to typical treatment strategies. These cases demonstrate a need for novel treatment options focused on molecular interventions. **Purpose:** The purpose of this study was to determine the expression of recently discovered pro- and anti-inflammatory mediators: TREM-1, TREM-2, RAGE, HMGB-1, and their soluble forms: sTREM-1, sTREM-2, and sRAGE in gingival crevicular fluid (GCF) during gingivitis and periodontitis to discover an appropriate target for future molecular interventions. **Methods:** The research protocol was approved by the Creighton University IRB (#1015786-1). Fourteen participants (5 healthy, 4 gingivitis, 5 periodontitis) consented and were enrolled in this blinded, ex vivo study. GCF samples were collected via PerioPaper® during scheduled appointments. Expression levels of TREM-1, TREM-2, RAGE, HMGB-1 and their soluble mediators in GCF samples were measured using commercially available ELISA kits. **Results:** Analysis of ELISA assays revealed greater expression of TREM-1 in GCF from patients with gingivitis (26,672 pg/mL) and periodontitis (15,118.8 pg/mL) compared to healthy subjects (5091.6 pg/mL). Protein expression of RAGE, sTREM-1, and sTREM-2 were higher in healthy samples (2323.9; 1,511; and 202,871.5 pg/mL respectively) compared to periodontitis (103.2; 1229.8; and 37,101 pg/mL) with no expression in gingivitis samples. TREM-2 was found to be expressed only in samples from patients with periodontitis (2790.9 pg/mL) and HMGB-1 only in patients with gingivitis (13,246 pg/mL); sRAGE was not detectable in any of the samples. However, only differences in the expression level of HMGB-1 reached the threshold for statistical significance. **Conclusions:** Results from this study highlight potential differences in the expression levels of specific biomarkers between gingivitis and periodontitis. More research is needed, however, with a larger sample size, to draw definitive conclusions or elucidate a target for future molecular interventions to arrest periodontal diseases.

EFFICACY OF SODIUM CHLORITE PLUS ZINC GLUCONATE ON VOLATILE SULFUR COMPOUND HALITOSIS: A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED PILOT STUDY

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Problem statement: There are no published clinical research data on the efficacy of sodium chlorite plus zinc gluconate, whether in the form of a mouthrinse or in any other composition, on halitosis. **Purpose:** This quantitative study aimed to assess the efficacy of sodium chlorite plus zinc gluconate (SC+ZG) mouthrinse in adults with halitosis. **Methods:** This randomized, double-blind, placebo-controlled study used the Yaegaki et al. standardized oral malodor clinical research protocol. The study was approved by the MCPHS University IRB and open to adults 18 years and older, who complained of or had been told they had halitosis. Seventeen of 22 recruited subjects followed pretesting preparation. On test day, baseline measurements of hydrogen sulfide (H_2S), methylmercaptan (MM), and dimethyl sulfide (DMS) were obtained using an OralChroma® CHM-2 gas chromatograph. Subjects were randomized to SC+ZG or placebo rinses. Supervised subjects rinsed with 15 mL of SC+ZG or placebo for 60 seconds and subsequently gargled with a second dose of the assigned mouthrinse for 30 seconds. Subjects were not permitted to eat or drink for 3 hours after the rinsing and gargling regimen, at which time measurements were repeated. **Results:** Using analysis of variance (ANOVA) for continuous variables and Fisher's Exact Test for categorical variables, there were no statistically significant differences in demographics between the groups. Differences in effect estimates between treatment arms were found in mean gas concentrations of H_2S and MM from baseline to postrinse. Mean H_2S gas concentration decreased by 16.4 ppb (95% CI -54.9, 22.1) in the treatment group, but only by 2.9 ppb (95% CI –11.7, 5.9) in the placebo group and by 28.4 ppb (95% CI –54.8, –1.9) and 11.2 ppb (95% CI –31.8, 9.3) for MM gas in the treatment and placebo arms, respectively. Results were not inferentially statistically significant for any of the VSCs, likely due to the study being underpowered. **Conclusions:** Study findings did not support evidence of efficacy of SC+ZG on halitosis.

CALIFORNIA DENTAL HYGIENISTS' KNOWLEDGE, ATTITUDES, AND PRACTICES REGARDING POLYPHARMACY AND OFF-LABEL DRUGS

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Problem statement: To date, there have been insufficient studies published concerning the knowledge, attitudes, and practices of dental hygienists regarding polypharmacy and off-label drug recognition and use. **Purpose:** This study examined the knowledge, attitudes, and practices of dental hygienists in California regarding polypharmacy and drugs used for off-label purposes both in medicine and dentistry. **Methods:** In a cross-sectional design, knowledge, attitudes, and practices (KAP) related to off-label drugs and polypharmacy were assessed via an online survey tool. The sample included licensed dental hygienists registered with the Long Beach and Tri-County Dental Hygienists' Associations in Southern California (N = 360). Participant characteristics were calculated using descriptive statistics. ANOVA was used to assess differences in knowledge, attitudes, and practices when compared to 3 key variables: highest academic/professional degree, experience, and license type. This study was approved by the Human Subjects Committee, Idaho State University's IRB (IRB-FY2016-379). **Results:** One hundred seven surveys were returned for a 34% response rate. Over half of respondents (53%) held an associate degree for their license, most (72%) worked in a general dentistry setting, and 46% had practised 15 years or less. Results revealed very low knowledge levels with 25% of respondents answering zero knowledge items correctly. Furthermore, no significant differences in knowledge and practices related to off-label drugs or polypharmacy were found based on type of licensure, highest degree achieved or years of experience. However, participants holding a bachelor's degree or higher were significantly more confident (p = 0.011) in discussing polypharmacy with patients and colleagues. **Conclusion:** Participants showed a generally low level of knowledge related to off-label drugs and polypharmacy regardless of their level of education, years of experience or type of dental hygiene licensure. These results indicate a profound need for increasing content in pharmacology in both entry-level programs and continuing education courses.

COMPARISON OF DENTAL HYGIENIST AND PATIENT PERSPECTIVES ON CHAIRSIDE ORAL HYGIENE INSTRUCTION

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Problem statement: Dental hygienists fully embrace their role in providing oral hygiene instructions (OHI) and recommendations to improve the health of their patients, and yet acknowledge that most of their patients do not comply with their recommendations. The issue may not be one of compliance but one of understanding and memory of the specifics of the instructions. **Purpose:** The purpose of the study was to compare perceptions of patients and dental hygienists (DHs) on OHI provided during the patient's appointment to understand the barriers to effective communication and adoption of oral hygiene recommendations. **Methods:** After obtaining consent, 8 focus groups were conducted. DHs were interviewed on their OHI protocol and their patients' adherence to instructions. Patients were interviewed separately regarding OHI provided during their appointments and their memory of the OHI provided. Sitting in a separate room with a one-way mirror, DHs viewed a focus group of patients who were not their own patients. **Results:** Themes that emerged were: all DHs feel they are effective in providing OHI, however patients revealed they do not understand or remember most of what the DH says. Patients feel vulnerable if OHI is given while they are in a supine position or simultaneously with scaling procedures. Also, many patients indicated that OHI is not remembered from the time of their appointment to the next time they perform oral care at home without digital or printed reminders. **Conclusions:** DHs need to change the environment in which OHI are given and provide tools to facilitate the conversation with patients to overcome barriers of understanding and memory. OHI should be given separately from other procedures and with patients in an upright position to give them the ability to absorb information and clarify if needed. Printed materials or digital tools and videos may improve understanding and retention which can improve oral health. Funded by Colgate Oral Pharmaceuticals, Inc.

IMPLEMENTING THE PEDIATRIC ORAL QUALITY OF LIFE (POQL) INSTRUMENT INTO PRACTICE: INITIAL RESULTS

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Problem statement: Combining quality of life measures with traditional oral health assessment measures has been promoted by the World Health Organization and the US Department of Health and Human Services (Healthy People 2020) as a holistic approach to health and health care, yet adoption has been slow in clinical practice. **Purpose:** To evaluate qualitative feedback from practitioners administering the Pediatric Oral Quality of Life (POQL) survey in 2 community health organizations. **Methods:** This study was approved by the University of Missouri–Kansas City IRB (#16-086). Modified versions of the POQL were administered to children and parents or guardians by practitioners in fall 2016. A 17-item survey investigating best practices for implementing the POQL into practice was completed. **Results:** Twelve of nineteen practitioners (63%) provided full responses. Six were dental hygienists, 3 were dental assistants, 2 were office administrators and 1 was a dentist. The majority reported being employed full time and had worked in their organization for 2 to 3 years. All child POQLs were completed chairside at various times during the appointment. Practitioners reported it took approximately 5 minutes to administer and that most children were receptive although not always sure why they were being asked how they felt about their teeth and mouth. Parents and guardians raised no objections to filling out the POQL. Several practitioners reported that the POQL provided greater insight about the child and his or her oral health. When asked about challenges, practitioners noted the need to explain or rephrase questions, fitting the POQL into the workflow, and amount of time to implement. **Conclusion:** These early results show that implementing an OHRQoL measure in practice requires little time while providing a more complete picture of the impact of a child's oral condition. Funding source: NIDCR (UH2DE025510).

DENTAL PROFESSIONALS' PERCEPTIONS OF SUGAR CONSUMPTION AND OBESITY ADVICE IN DENTAL PRACTICE

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Problem statement: The incidence of obesity is rising despite international initiatives. The World Health Organization has challenged all health care providers to contribute to efforts targeting increased awareness of healthy weight dietary choices among their patients. **Purpose:** The aim of this study was to explore dental professionals' perceptions of extending advice to patients on sugar consumption and oral health to include overweight/obesity information. **Methods:** This cross-sectional, international questionnaire of clinical dental professionals collected data electronically between April and August 2016. The questionnaire was developed using existing validated questions covering these domains: willingness and confidence, knowledge of the association between obesity, sugar consumption and oral health, self-evaluated abilities on screening and giving advice regarding sugar consumption and obesity, and potential barriers to providing advice. IRB approval was obtained. **Results:** 245 dental professionals (20 to 65 years) consisting of 79.6% females and 20.4% males completed the survey. Results showed the majority of dental professionals (75.3%) would be willing to give advice on obesity/overweight if a relationship between obesity/overweight and oral health was found. Significant misconceptions about obesity as a disease and its relationships to oral health were evident. Differences based on age, gender, and profession were not found. Although 88.3% of dental professionals are already providing counselling for oral and general health matters, less than 30% would start a conversation with their patients addressing sugar consumption and obesity. Lack of training and understanding of obesity as a disease was highlighted as a potential barrier to providing advice. **Conclusions:** Although dental professionals showed willingness to expand sugar consumption counselling beyond oral health messages, confidence is lacking. Further training is indicated to understand the association between sugar consumption, overweight/obesity, and their association with oral or general health.

DENTAL HYGIENISTS' ATTITUDES TOWARDS AND CONFIDENCE RELATED TO PROVIDING NUTRITION AND EXERCISE COUNSELLING

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Problem statement: The obesity epidemic in the US is of grave health and economic concern. Evidence suggests that consistent messaging should be provided by all health professionals to help patients improve their dietary and exercise habits. As preventive specialists, dental hygienists (DH) are well placed to take part in the interprofessional promotion of healthy nutrition and exercise habits for their patients. **Purpose:** The aim of this study was to examine the attitudes and confidence of US dental hygienists in providing nutrition and exercise counselling, and to determine what factors are associated with confidence in providing such counselling. A secondary aim was to compare these national results with those from a previously published study conducted in North Carolina. **Methods:** A cross-sectional design was used. A 54-question survey, previously used in the NC study and obtained with permission, was emailed by the American Dental Hygienists' Association to its 13,846 members. Data were collected via SurveyMonkey software. Descriptive statistics were calculated for attitudes and barriers, and compared to the NC results. A regression model was used to determine factors associated with confidence. IRB approval was obtained from Columbia University. **Results:** The response rate was 11% (n = 1575). Ninety-two percent of respondents felt that DH have a role in patients' overall nutrition; only 40% expressed interest in helping patients with obesity establish a plan for weight loss goals. Age ($p < 0.0001$), self-reported obesity ($p < 0.0271$), and place of work ($p < 0.0012$) were statistically significant predictor variables of confidence in providing counselling. Primary barriers included fear of offending the patient (94%) and lack of time (93%). Findings between the US and NC studies were generally comparable. **Conclusions:** While most US dental hygienists are interested in helping patients with their overall health, they report low to moderate confidence in providing nutrition and exercise counselling for weight management.

MENTORING UNDERGRADUATE DENTAL HYGIENE STUDENTS IN RESEARCH: ULTRASONIC TIP SELECTION PRACTICES OF DENTAL HYGIENISTS

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Problem statement: Faculty-mentored research with undergraduates has been identified as a need in US higher education. This study present steps involved in faculty-mentored research and the results from one research project. Ultrasonic instrumentation is an important aspect of periodontal therapy and has distinct advantages in comparison to hand instrumentation. However, little is known about the ultrasonic tip selection practices of dental hygienists. **Purpose:** The purpose of this study was to examine the strategies and variety of ultrasonic tip selection used by dental hygienists in treating patients. **Method:** Using a survey research design, dental hygienists responded to an online questionnaire designed by the researchers that was pilot tested to improve content validity. All responses were confidential and IRB approval was obtained from Weber State University. The data were analysed using descriptive statistics. **Results:** Dental hygienists were contacted via email with a response rate of approximately 20% (n = 44). Names and email addresses were obtained from the professional association. Most respondents (47.7%) indicated they used an ultrasonic 1 to 3 times a day to treat patients with mild, moderate or severe periodontal disease. While a large majority (88.6%) of the respondents felt it was clinically beneficial to use more than one tip during the treatment of a periodontal patient, most dental hygienists (42%) use 2 types of ultrasonic tips for periodontal instrumentation, and several respondents (37%) use just 1 tip. Respondents also identified the type of tip used the majority of the time. **Conclusion:** While dental hygienists noted the importance of using multiple tips for ultrasonic therapy with periodontal patients, a large percentage appear to limit the number of tips they use.

MENTORING UNDERGRADUATE DENTAL HYGIENE STUDENTS IN RESEARCH: ULTRASONIC INSTRUMENTATION PRACTICES OF DENTAL HYGIENISTS WITH PERIODONTAL PATIENTS

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Problem statement: Faculty-mentored research to improve authentic learning for undergraduate students has been identified as a need in US higher education. This presentation highlights procedures for faculty-mentored research and presents findings from one research project. Ultrasonic instrumentation has been identified as a salient therapeutic treatment for periodontal disease. However, little is known about the actual practices of dental hygienists when using ultrasonic therapy for periodontal patients. **Purpose:** The purpose of this study was to ascertain the length of time ultrasonic therapy is used for periodontal patients and obtain information about the strategies dental hygienists use in monitoring ultrasonic tip wear. **Method:** Using a survey research design, dental hygienists responded to an online questionnaire designed by the researchers that was pilot tested to improve content validity. All responses were confidential, and IRB approval was obtained from Weber State University. The data were analysed using descriptive statistics. **Results:** Dental hygienists' names and email addresses were provided by the professional association; individuals were contacted via email with a response rate of approximately 20% (n = 44). The most frequent length of time (full mouth debridement) spent with ultrasonic instrumentation for a patient with mild bone loss was 16 to 30 minutes (51% of respondents); for patients with moderate or severe bone loss it was 31 to 45 minutes (54% and 52%, respectively). Time spent on ultrasonic instrumentation for a periodontal maintenance patient was split almost equally between 1 to 15 minutes (50% of respondents) and 16 to 30 minutes (47.7% of respondents). Dental hygienists either monitor tip wear when the tip breaks (32%) or monthly (34%), and they monitor tip wear using a wear indicator card (over 70%). **Conclusion:** While the literature has suggested that more than 20 minutes of instrumentation per quadrant is needed for adequate removal of light to moderate subgingival calculus, dental hygienists appear to spend less than this length of time when treating periodontal patients.

COMPARISON OF CALCULUS DETECTION AMONG DENTAL HYGIENISTS USING AN EXPLORER AND ULTRASONIC INSERT

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Problem statement: The main goal of periodontal therapy is to disrupt the calculus harbouring biofilm that triggers the inflammatory response. The explorer is mainly used to detect calculus and the ultrasonic instrument is mainly used to remove calculus. The efficiency in dental hygiene care may improve if the ultrasonic instrument could be used in the detection and removal of calculus. **Purpose:** The purpose of this study was to compare the rater reliability of calculus detection among registered dental hygienists when using the ODU 11/12 explorer and Thinsert® ultrasonic instrument. **Methods:** Upon IRB approval, this study utilized a repeated measures design that involved 3 dental hygiene faculty from The Ohio State University Dental Hygiene Program and 30 patient participants from the Ohio State University community. Using the ODU 11/12 explorer and Thinsert® ultrasonic instrument, calculus was evaluated on 6 standardized teeth and on 4 possible surfaces per tooth. Data were analysed to evaluate for intrarater reliability, interrater reliability, sensitivity, specificity, PPV, and NPV. **Results:** Intrarater reliability was calculated by comparing calculus evaluations using the explorer and Thinsert® by each rater. Mean Kappa averages were found in the full agreement range (Kappa = 0.726, n = 2160, $p < 0.01$). Interrater reliability was calculated by comparing all raters' calculus evaluations using the explorer and Thinsert®. The average measure of intraclass coefficient (ICC) value was 0.782 with a 95% confidence interval (CI) of 0.749 to 0.810 ($F[1439, 2878] = 4.852$, $p < 0.01$). When using the Thinsert® to evaluate for the presence or absence of calculus, there was a sensitivity of 75%, specificity of 97%, PPV of 81%, and NPV of 94%. **Conclusions:** Efforts can be focused on developing tactile sensitivity when using the Thinsert® ultrasonic instrument in the assessment, treatment, and maintenance of periodontal disease.

DEVELOPING AN OBSERVATIONAL METHOD FOR ASSESSING DENTAL HYGIENISTS' INJURY RISK

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Problem statement: Dental hygienists have a high prevalence of work-related musculoskeletal disorders (WMSDs) due to repetitive motions and sustained postures, which often begin as a student when learning instrumentation skills. The majority of studies use self-reported methods to measure signs and symptoms, and research has primarily focused on instrument design. Currently, there is no standardized method for evaluating risk factors for developing repetitive hand injuries. **Purpose:** Develop and pilot-test an observational method, video recordings, for evaluating performance and body positions of dental hygiene (DH) students during instrumentation to determine their risk for developing WMSDs. **Methods:** With IRB approval and informed consent from participants and their patients, videos of 5 student DHs were obtained while providing patient care. Two stationary cameras captured a wide-angle view of body positions and a close-up view of the hand and wrist during scaling. Videos were coded by activity, time spent in each clock position (CP), and area of the mouth (AOM). Sustained postures (i.e., >45 seconds in one CP/AOM) were evaluated using RULA (rapid upper limb assessment), a validated instrument to assess the exposure to ergonomic risk factors including arms and wrists, neck, trunk, and legs. Scoring ranged from 1 to 7. **Results:** Average appointment time was 178 minutes (2.9 hours). Instrumentation comprised 57% of the appointment time, 82% of which was spent performing hand scaling. Students worked most frequently in the 9-CP (40% of the time), with equal time in each AOM. Sustained postures were noted in 71 video segments. Overall RULA scores were distributed around modes of 4 and 6, and the most frequent poor postures were wrist and neck flexion. **Conclusions:** RULA scores indicate moderate risk for these DH students. Video recordings were found to be feasible; however, adding a third view may improve analysis of sustained postures. Additionally, assessing hand strain during scaling will assist in evaluating risk for WMSDs. Funding for this project was provided by CDC/NIOSH Grant R01-OH010665.

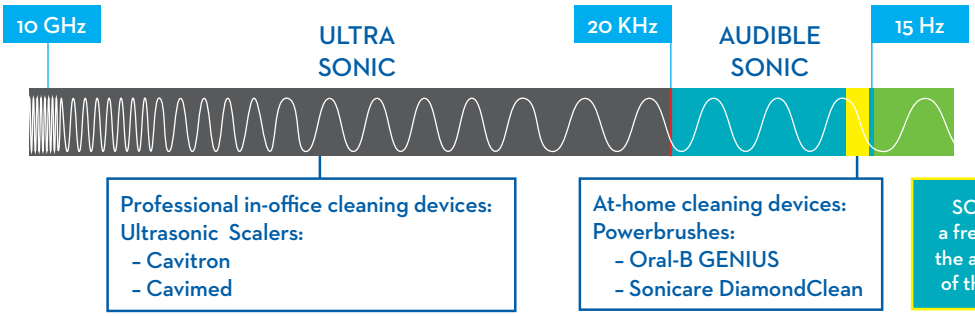
DEBUNKING POWERBRUSH MYTHS

MYTH
At-home sonic powerbrushes can achieve the results of professional in-office ultrasonic scaling devices

REALITY

- ALL powerbrushes can be considered SONIC but SONIC does not equal ULTRASONIC
- NO at-home powerbrushes can achieve professional scaling results

SONIC SCALE
How "sonic" are leading powerbrushes?[1]



MYTH
Sonic powerbrushes create fluid movement to clean "beyond the bristles" for superior removal of plaque biofilm

REALITY

ALL powerbrushes require bristle contact to effectively clean teeth

High frequency movements of both oscillating-rotating and side-to-side powerbrush mechanisms create a dynamic fluid force resulting in a unique brushing experience

Oral-B® Pro CrossAction
Oscillating/Rotating Pulsating Action

Sonicare DiamondClean
Side-to-side Action

ORAL-B® GENIUS™ vs. Sonicare Facts

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Oral-B Oscillating-Rotating-Pulsating Power Toothbrush accepted by the ADA.[4]

*Merriam-Webster online dictionary. Available at: https://www.merriam-webster.com/dictionary/sonic

References: **1.** Data on file at P&G Canada. **2.** Ccahuana-Vasquez RA. An Eight-Week Clinical Evaluation of an Oscillating-Rotating Power Toothbrush with a Brush Head Utilizing Angled Bristles Compared with a Sonic Toothbrush in the Reduction of Gingivitis and Plaque. *J Clin Dent* 2015;26:80–85. **3.** Klukowska M, Grender J M, Conde E *et al.* A six-week clinical evaluation of the plaque and gingivitis efficacy of an oscillating-rotating power toothbrush with a novel brush head utilizing angled CrissCross bristles versus a sonic toothbrush. *J Clin Dent* 2014;25(2):6-12. **4.** Oral Health. Product Spotlight. Oral-B Power Toothbrushes to Receive ADA Seal of Acceptance. Cited: January 2018. Available at: https://www.oralhealthgroup.com/products/oral-b-power-toothbrushes-receive-ada-seal-acceptance/

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CJDH ethics policy

Approved by the CJDH editorial board on 9 April 2014; revised 19 January 2015

AUTHORS' RESPONSIBILITIES

Authorship Criteria

Authors and co-authors of accepted manuscripts will be required to complete an authorship information form, on which they must specify their contribution to the work described in the manuscript. This information will be kept on file at the Editorial Office.

Authorship credit will be assigned only to individuals who meet all of the following criteria. Each author must have

- contributed to study conception and design or data acquisition or data analysis, AND
- contributed to writing or critically reviewing the article, AND
- approved the final version of the article submitted for publication.

These authorship criteria are in accordance with the statement on authorship issued by the International Committee of Medical Journal Editors (www.icmje.org). The acquisition of funding, data collection or general supervision of the research group does not constitute authorship. Individuals who have made such a contribution to the manuscript should instead be listed in the acknowledgements section.

Conflict of Interest

Authors should disclose any conflict of interest, perceived or real, that could undermine the integrity of the research presented. Conflicts of interest may arise from employment circumstances, sources of funding or personal financial interests, among others.

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Manuscripts based on studies funded by contracts (not grants) from any source including commercial firms, private foundations or governments must be accompanied by a statement describing both the authors' and the sponsor's role in the design of the study; the collection, analysis and interpretation of data; the writing of the paper; and the decision to submit the paper for publication. The journal will not review or publish manuscripts based on studies that are conducted under conditions that allow the sponsor to have sole control of the data or to withhold publication.

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Upon acceptance of a manuscript, all authors must submit a signed copyright transfer form. Where applicable, authors may also be required to include

- a signed acknowledgement form from anyone

Code d'éthique du JCHD

Approuvé par le comité de rédaction du JCHD le 9 avril 2014; révisé le 19 janvier 2015

RESPONSABILITÉS DES AUTEURS

Critères du statut d'auteur

Les auteurs et les coauteurs de manuscrits approuvés devront remplir un formulaire de statut d'auteur, dans lequel ils devront préciser leur contribution au travail décrit dans le manuscrit. Cette information sera conservée au bureau de rédaction du journal.

Le statut d'auteur sera attribué à ceux et celles qui auront respecté tous les critères suivants. Chaque auteur doit avoir :

- participé à la conception de l'étude ou à l'acquisition des données ou à leur analyse; ET
- participé à la rédaction ou à la révision critique de l'article; ET
- approuvé la version finale de l'article à être publié.

Ces critères de statut d'auteur sont conformes à la déclaration faite à ce sujet par le Comité international des rédacteurs de revues médicales (www.icmje.org). L'obtention de financement, la collecte de données ou la supervision générale du groupe de recherche ne permettent pas d'obtenir le statut d'auteur. Le nom des personnes qui ont ainsi contribué au manuscrit doit plutôt apparaître dans la section « remerciements ».

Conflits d'intérêts

Les auteurs doivent divulguer tout conflit d'intérêts, apparents ou réels, qui pourraient compromettre l'intégrité de la recherche présentée. Les conflits d'intérêts peuvent être attribuables, entre autres, à la situation d'emploi, aux sources de financement ou aux intérêts financiers personnels.

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La source de financement de l'étude doit être identifiée dans tous les manuscrits.

Tous manuscrits fondés sur des études financées par des contrats (et non par des subventions), peu importe sa provenance : entreprises commerciales ou fondations (privées ou gouvernementales), doivent être accompagnés d'une déclaration décrivant le rôle des auteurs et des commanditaires dans : la conception de l'étude, la collecte, l'analyse et l'interprétation des données, la rédaction de l'article, et la décision de soumettre l'article pour fins de publication. Le journal ne fera pas l'examen et ne publiera pas de manuscrits fondés sur des études effectuées dans des conditions qui permettent aux commanditaires d'avoir le contrôle exclusif des données ou de puvoir empêcher la publication.

Exigences légales

À la suite de l'approbation du manuscrit, tous les auteurs doivent fournir une copie signée du formulaire de transfert des droits d'auteurs. S'il y a lieu, les auteurs peuvent être requis d'inclure :

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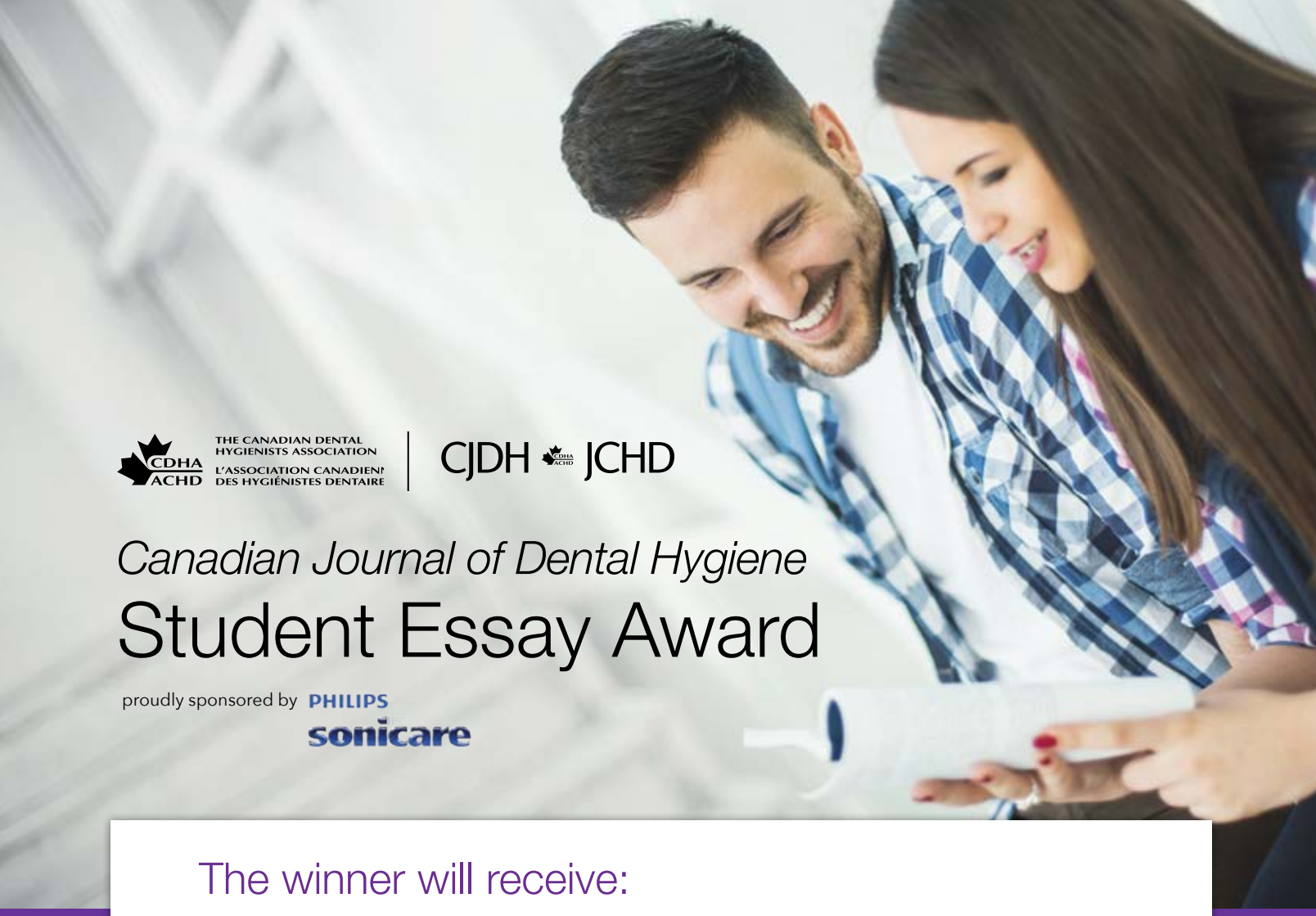

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Authors are also required to provide the journal with written confirmation that they have received permission to reproduce material (tables, figures, etc.) from other published sources. This confirmation should include a signature from the copyright holder (usually the publisher of the original material).

Prior publication

Authors should ensure that their submitted manuscript is original work and has not been submitted or published elsewhere in any written or electronic form. The manuscript should not be currently under review by another body. This does not include abstracts prepared and presented in conjunction with a scientific meeting and subsequently published in the proceedings.

RESEARCH ETHICS

Manuscripts that involve investigations on human participants must give the name of the ethics committee that approved the study. Manuscripts describing studies in which there was direct contact with humans must describe how informed consent was obtained. In studies on patients with conditions that may affect their ability to give fully informed consent, the manuscript must describe how the authors determined that the participants were capable of giving consent, if consent was obtained from the participants rather than guardians.

RESEARCH MISCONDUCT

Fabrication, falsification, plagiarism

Allegations of fabrication or falsification of data, or of plagiarism will be investigated fully by the Scientific Editor. All evidence of misconduct will be shared with the authors; authors will be asked to provide a detailed explanation for the evidence found. The journal recognizes that many instances of research misconduct arise from a lack of understanding of reporting and citation requirements. Once the investigation is complete, an editorial decision will be made regarding publication, correction or retraction of published material.

RESPONSIBILITIES OF THE REVIEWERS

Reviewers must declare any real, potential or perceived conflict of interest prior to accepting the invitation to

dépassant le soutien administratif et que l'auteur tient à nommer;
- un formulaire de communication personnelle signé (si l'auteur veut en citer une dans son article);
- un formulaire de consentement signé par tout patient ou toute patiente dont le cas est décrit dans l'article ou de toute personne apparaissant dans une image et reconnaissable.

Les auteurs sont aussi tenus de fournir au journal un document écrit confirmant avoir reçu la permission de reproduire le matériel (tableaux, figures, etc.) provenant d'autres publications. Cette confirmation doit aussi inclure une signature de la personne qui détient les droits d'auteur (habituellement l'éditeur du matériel original).

Publication antérieure

Les auteurs doivent s'assurer que le manuscrit qu'ils soumettent est une œuvre originale et qu'il n'a été ni présenté ni publié ailleurs en format papier ou électronique. Le manuscrit ne doit pas être en cours d'examen par un autre organisme ou une autre personne. Cela n'inclut pas les résumés préparés et présentés lors de réunions scientifiques et subséquemment publiés dans le compte-rendu.

ÉTHIQUE DE LA RECHERCHE

Le nom du comité d'éthique qui a approuvé une étude comprenant des recherches sur des sujets humains doit être indiqué sur les manuscrits. Dans le cas des sujets de recherche impliquant un contact humain direct, les manuscrits doivent préciser la méthode utilisée pour obtenir le consentement éclairé des participants. Lorsque l'état de santé des patients peut influencer leur capacité à donner un consentement pleinement éclairé, il est impératif que les auteurs spécifient la façon par laquelle ils ont déterminé que les participants étaient aptes à donner leur consentement dans l'éventualité où celui-ci ait été obtenu des participants et non pas de leurs représentants légaux.

INCONDUITE EN RECHERCHE

Fabrication, falsification, plagiat

Le rédacteur scientifique mènera une enquête minutieuse sur toutes allégations de fabrication ou de falsification de données et de plagiat. Les auteurs seront avisés de toute preuve de mauvaise conduite; ceux-ci devront fournir des explications détaillées pour les preuves établies. Le journal reconnait que plusieurs instances d'inconduite en recherche résultent d'un manque de compréhension des exigences en matière de report et de citations. À la fin de l'enquête, une décision éditoriale sera prise au sujet de la publication, de la correction ou de la rétractation du matériel en question.

RESPONSABILITÉ DES RÉVISEURS

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review. They must be capable of providing an objective and thorough assessment of the work submitted.

Manuscripts under review must be treated as confidential documents both during and after the completion of peer review. The manuscript must not be shown to or discussed with others without prior consent from the Scientific Editor. Research or insights gained from a reading of the manuscript must not be used for personal advantage.

If a reviewer suspects that the manuscript includes text or ideas that have not been properly attributed, he or she should contact the Scientific Editor immediately and provide as much detail (citations to the original work) as possible.

For research involving human subjects, if a reviewer feels that confidentiality or anonymity has been breached, he or she should advise the Scientific Editor accordingly.

RESPONSIBILITIES OF THE SCIENTIFIC EDITOR

The Scientific Editor is responsible for maintaining the academic integrity of the journal. He or she oversees a rigorous, double-blind peer-review process, and has the authority to accept or reject manuscripts after carefully considering the evaluations of the reviewers. Editorial decisions must be free from bias and based solely on the quality, originality, clarity, and relevance of the research to the journal's readership. Authors who disagree with an editorial decision must be advised of their right to appeal.

The Scientific Editor must investigate all concerns of possible research misconduct or ethical breaches, either in reference to a submitted manuscript or to a published article. This investigation should be swift, transparent, and thorough. The Scientific Editor should be willing to publish corrections, clarifications, retractions, and apologies when needed.

Together with the Editorial Board, the Scientific Editor monitors and upholds the journal's publishing ethics at all times.

CJDH APPEAL PROCESS

Appeals of editorial decisions may be submitted by e-mail (journal@cdha.ca) to the Scientific Editor, who will take the appeal forward to the Canadian Dental Hygienists Association's Research Advisory Committee. The committee members may decide to seek a further review or reject the submission. There are no opportunities for a second appeal.

doivent pouvoir fournir une évaluation objective et exhaustive du travail présenté.

Les manuscrits en cours d'examen doivent être traités comme des documents confidentiels avant et après l'achèvement de l'examen par des pairs. Le manuscrit ne doit pas être montré ni faire l'objet d'une discussion avec d'autres personnes avant d'avoir reçu l'approbation de la Rédactrice/du Rédacteur scientifique. L'information ou les connaissances obtenues à la suite de la lecture du manuscrit ne doivent pas servir à des fins personnelles.

Si un réviseur soupçonne que le manuscrit comprend des passages ou des idées qui n'ont pas été attribués à juste titre, il ou elle doit immédiatement communiquer avec la Rédactrice/le Rédacteur scientifique et lui fournir tous les détails possibles (citations de l'œuvre originale, etc.).

Si un réviseur pense que la confidentialité ou l'anonymat n'ont pas été respectés en ce qui concerne la recherche sur des sujets humains, il doit en aviser la Rédactrice/le Rédacteur scientifique.

RESPONSABILITÉS DE LA RÉDACTRICE/DU RÉDACTEUR SCIENTIFIQUE

La Rédactrice/le Rédacteur scientifique est responsable de maintenir l'intégrité didactique du journal. Il ou elle supervise un processus rigoureux, soit un examen par les pairs en double-aveugle, et il ou elle a l'autorité d'approuver ou de rejeter les manuscrits après avoir soigneusement considéré l'évaluation des réviseurs. Les décisions éditoriales doivent être libres de tout préjugé et doivent uniquement être fondées sur la qualité, l'originalité et la clarté (compréhensibilité) de la recherche et de sa pertinence en fonction du lectorat du journal. Les auteurs qui sont en désaccord avec une décision éditoriale doivent être avisés de leur droit de faire appel.

La Rédactrice/le Rédacteur scientifique doit enquêter toutes les inquiétudes d'inconduite en recherche ou de fautes d'éthique possibles, soit en ce qui concerne un manuscrit qui a été présenté ou un article qui a été publié. L'enquête doit être rapide, transparente et exhaustive. La Rédactrice/le Rédacteur scientifique doit être prêt à publier des corrections, des clarifications, des rétractations et des excuses si nécessaire.

En collaboration avec les membres du comité de rédaction, la Rédactrice/le Rédacteur scientifique doit, en tout temps, surveiller et respecter l'éthique de publication.

PROCÉDURES D'APPEL DU JCHD

Les demandes d'appels à des décisions éditoriales doivent être adressées par courriel à la Rédactrice/au Rédacteur scientifique (journal@cdha.ca) qui les présentera au comité consultatif de recherche de l'Association canadienne des hygiénistes dentaires. Les membres du comité peuvent demander un nouvel examen ou rejeter la soumission. Un deuxième appel n'est pas permis.

An Invitation for Authors

The *Canadian Journal of Dental Hygiene* (CJDH) invites manuscript submissions in English or French that make a significant contribution to the dental hygiene body of knowledge and advance the scientific basis of practice. Manuscripts must address one of the following *Canadian Dental Hygienists Association 2015-2018 Research Agenda* (www.cdha.ca/researchagenda) themes:

- Risk assessment and management
- Access to care and unmet needs
- Capacity building of the profession

and must be of the following types:

- Original research articles
- Literature/narrative reviews
- Systematic reviews
- Scoping reviews
- Short communications/case reports
- Position papers
- Letters to the editor

Please consult our ***Guidelines for Authors*** for detailed information on the required components of each manuscript type, including our referencing style. These guidelines and our ***Ethics Policy*** governing authorship, conflict of interest, research ethics, and academic misconduct are available online at www.cdha.ca/cjdh. All presubmission enquiries and final submissions should be directed to journal@cdha.ca

CJDH Looks Forward to Hearing from You!

Une invitation pour les auteurs

Le *Journal canadien de l'hygiène dentaire* (JCHD) invite les auteurs à soumettre des manuscrits en anglais ou en français pour apporter une contribution importante à l'ensemble des connaissances de l'hygiène dentaire et pour faire progresser la base scientifique de la pratique. Les manuscrits doivent traiter d'un des thèmes du *Programme de recherche en hygiène dentaire 2015–2018 de l'Association canadienne des hygiénistes dentaires* (http://files.cdha.ca/profession/research/DHResearchAgenda_FR.pdf) qui suit :

- L'évaluation et la gestion du risque
- L'accès aux soins et les besoins non comblés
- La mise en valeur du potentiel de la profession

et doivent faire partie des types suivants :

- Articles de recherche originaux
- Revues narratives et de la littérature
- Revues systématiques
- Revues de la portée
- Articles courts ou études de cas
- Exposés de position
- Lettres à la rédactrice

Veuillez consulter notre document ***Lignes directrices pour les auteurs*** afin d'obtenir de l'information détaillée sur les éléments essentiels de chaque type de manuscrit, y compris le style qu'il faut suivre pour citer les références. Ces lignes directrices et notre ***Code d'éthique*** qui régissent le statut d'auteur, les conflits d'intérêts, l'éthique de la recherche et l'inconduite scolaire sont accessibles en ligne au www.achd.ca/jchd. Toutes questions préalables à votre soumission et toutes soumissions finales doivent être transmises à l'adresse : journal@achd.ca.

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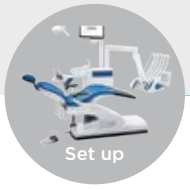

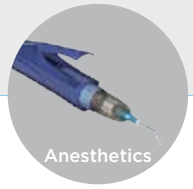

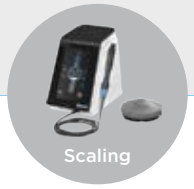

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