

CANADIAN JOURNAL OF DENTAL HYGIENE · JOURNAL CANADIEN DE L'HYGIÈNE DENTAIRE
THE OFFICIAL JOURNAL OF THE CANADIAN DENTAL HYGIENISTS ASSOCIATION

CJDH



JCHD

OCTOBER 2015 · VOL. 49, NO 3

PM44063062

Competencies for Canadian baccalaureate dental hygiene education: A Delphi study, Part 2

Hand function evaluation for dental hygiene students

CDHA national conference scientific abstracts

EDITORIALS

Looking back, looking forward

Technology is not the enemy

Using an evidence-based approach to advise potential dental hygiene students

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Front cover: ©iStockphoto.com/aleksandarvelasevic, modified to represent the seasonal publication of the journal.

ISSN 1712-171X (Print)

ISSN 1712-1728 (Online)

Canada Post Publications Mail agreement

#40063062. Return undeliverables to CDHA,
1122 Wellington St W, Ottawa, ON K1Y 2Y7

Printed by Dollco/LoweMartin Group.



THE CANADIAN DENTAL
HYGIENISTS ASSOCIATION
L'ASSOCIATION CANADIENNE
DES HYGIÉNISTES DENTAIRES

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The *Canadian Journal of Dental Hygiene* is the official peer-reviewed publication of the Canadian Dental Hygienists Association (CDHA). Now 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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Looking back, looking forward

Katherine Zmetana, DipDH, DipDT, EdD

Change is in the air. Students and faculty have begun another whirlwind year of clinic and academic classes; clinicians are back from too-short holidays to resume daily routines; and researchers are applying for grants to fund their next big project.

Fall is a time of transition in the cycle of life, and transition is happening at CJDH as well. This month's issue marks my last as scientific editor. After almost six years, it is time to welcome a new editor and a new perspective. I look forward to leaning back and enjoying future issues with a fresh, if not more relaxed, eye.

In looking back over my term, I realize I have seen several changes through the years. The journal moved from a bimonthly publication to a quarterly format, and the Canadian Dental Hygienists Association (CDHA) introduced a new quarterly magazine to feature shorter articles. Both publications then moved to web-only publishing for half the issues and now are moving to a triannual publishing schedule. Along the way, some format and style modifications were made to enhance the journal's professional profile and to improve readability. An annual award for best research article was implemented, and the initiative has now expanded to two awards in order to recognize the contribution of literature reviews as well as that of original research. The journal is indexed in biomedical databases—CINAHL, EBSCOhost, ProQuest, Scopus, and Thomson Gale—and, thanks to our open access policy, is easily accessible online to readers around the world. It will soon, we hope, be included in Medline.

These accomplishments reflect the contributions of our increasing numbers of national and international authors; they are also the result of the teamwork that happens behind the scenes. CDHA supports the journal at arm's length—that is, it provides financial, technical, and administrative assistance for publication—but it does not interfere with the content. Articles are not commissioned, they are offered freely by researchers. And all content goes through a scholarly review and an editing process to avoid bias and to ensure high standards of quality and trustworthiness.



Katherine Zmetana

The editorial board, composed of accomplished dental hygiene researchers and authors, meets twice a year to propose and discuss journal policies, to reflect on the content and quality of the articles, to evaluate the merit of published articles for awards, to advise on reviewers, and to plan future directions. Board members also participate actively by providing peer reviews and writing guest editorials in their areas of expertise.

The smooth running of the full publication process relies on the in-house managing editor, who is faced with the daunting task of collecting and cataloguing manuscripts, tracking peer reviews, copyediting articles, and preparing all components for publication—in print and online.

So you might ask, what exactly does the scientific editor do? My job has been to ensure what could be called “quality control” at various stages of the each issue's development through to publication. I ultimately decide what papers will be published in the Journal.¹ But there is a process to follow before that happens.²

First it is important to remember that the scientific editor has the responsibility to inform and educate readers. To that end, she (or he) makes clear and rational editorial decisions to ensure the best selection of content. The editor screens submitted manuscripts before sending them out for review to ensure that they fit within the scope of the journal, that they meet standards of quality and interest, and that they contribute to the larger body of scientific knowledge. She (or he) carefully considers reviewer comments to determine the article's scientific merit, to recommend revisions where needed, and to give final approval for the move to publication. To achieve this, the scientific editor must promote thoughtful, fair, constructive, and informative critique of the submitted work to the author.²

With this role comes the responsibility to improve the overall quality and readability of the publication wherever possible. “Editors of scientific journals have responsibilities toward the authors who provide the content of the journals, the peer reviewers who comment on the suitability of manuscripts for publication, the journal's readers and

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the scientific community, the owners/publishers of the journals, and the public as a whole.”²

But over and above the routine decisions regarding content, “the [scientific] editor of the journal determines the philosophical direction of the publication.”³ The editor’s background, interests, and expertise inevitably influence this direction. My experience has been mainly in public health, teaching, research, and publishing, thus I naturally relied on what I could contribute in these areas. My goal has been to support and mentor new writers and researchers, to welcome and encourage students to take an interest in research, to maintain quality, and to encourage readability in academic writing. My editorials reflected these interests.

One thing to remember is that even editors need editors. And I am thankful for the eagle eye of our managing editor, Megan Sproule-Jones, who knows how to make writers and editors look good as well as keep everything to deadline. I thank Dr. Susanne Sunell for her mentorship when I took on this position and I welcome Dr. Salme Lavigne into the editorial fold with enthusiasm. I congratulate her on bringing her broad expertise to stimulate and promote CJDH internationally.

I look back over the last six years with a sense of accomplishment and with pride in making my small contribution to our profession. I look forward to new ideas and to renewed momentum in oral health research in a profession that is such an integral component of overall health care and that continues to gain credibility in biomedical research.

IN THIS ISSUE

We are pleased to publish part 2 of **Susanne Sunell, Joanna Asadoorian, Cynthia Gadbury-Amyot, and Heather Biggar’s** critical research on the required competencies for Canadian baccalaureate dental hygiene education (p. 101). Their article examines the Delphi study data on the differentiation between diploma and baccalaureate dental hygiene programs and outcomes. This issue of the journal also features original research by **Sara Taft, Deborah Dotson, and Randy Byington** on the hand function of dental hygiene students and the potential of targeted exercises to improve both hand function and instrumentation scores over time (p. 115). In anticipation of the Canadian Dental Hygienists Association’s upcoming national conference in Victoria, BC, we offer you the abstracts to the research studies that will be presented as part of the scientific program (p. 123), as well as a complete list of the poster presentations. In addition, editorial board member **Indu Dhir** presents a fascinating review of classroom technologies that can engage and motivate today’s students (p. 93), and **Mandy Hayre** reflects on the factors that must be weighed when selecting a dental hygiene program (p. 95). Finally, incoming scientific editor **Salme Lavigne** provides a comprehensive review of *The oral-systemic health connection: A guide to patient care* (p. 137), and **Donna Taylor and Nadine Milos** respond to pieces that were published in our June 2015 issue (p. 141). As always, you will find a complete subject and author index at the end of this final issue of the volume year (p. 145).

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Technology is not the enemy

Indu Dhir, MS, RDH

As someone who has been in the Education field for more than 15 years, I've seen many changes in the way that technology has shaped the classroom experience. When I first started out, I used overhead transparencies and wrote on a white board because we did not have computers in the classrooms. So, when computers were purchased for classrooms and I could develop PowerPoint presentations, I was ecstatic. That was just the beginning: Little did I know what the future would hold.

Today we are inundated with technology—people around us are constantly on their mobile phones, tablets, and laptops. I agreed with the CDHA president's November 2014 editorial, "Personal technology in the classroom," and her comments that these devices are sometimes distractions to learning.¹ But her words also made me think that this is not necessarily the case in every instance. In my opinion, those who come to the classroom to learn will learn; those who are not interested will be easily distracted. These inattentive students may be paying attention to their cell phones, studying for the test coming up in the next hour, putting the finishing touches on the assignment for the end of the day or talking to the person sitting next to them.

I suggest we look at technology through a different lens. Let's think of it as a tool to engage and motivate students, enhancing how we teach and how our students learn. Viewed in a positive way, technology can improve our ability to communicate and collaborate with other colleagues within our programs. It can assist in making us more knowledgeable, not only about the courses we teach, but also about our programs as a whole, and it can help us to meet the needs of a diverse student body.

As educators, we can use technology among ourselves to improve the program and student experience. For example, the Canadian Academy of Dental Health and Community Sciences (CADH) has begun using a web-based curriculum management system called Atlas, which provides users access at any time and from any place. Within the system, faculty members document how they teach each course by providing course objectives, linking resources, identifying methods or activities to teach the concepts, and reviewing how the course and its objectives



Indu Dhir

meet the program outcomes. Through this program, faculty members have the capability to note activities that work or do not work. This information is instantaneously available to other faculty to view (but not to change). This valuable tool allows colleagues to learn from each other, determine how their course(s) link to other courses, recognize how content builds on previous learning, and see how each course links to the program outcomes. It has been used to identify overlaps and gaps in the curriculum, which can then be addressed globally. And, when students tell an instructor, "No one ever introduced

me to this topic," the instructor can easily search Atlas and point out to the student where, in fact, the topic was or will be taught.

In my years as an educator and administrator, I have seen students with a variety of needs and backgrounds enter the program. Some have family commitments, some need to work, some face health challenges, some have learning disabilities, some feel entitled, and most need immediate gratification and stimulation. We are constantly looking for ways to help these students succeed. So it is important to employ a variety of teaching methods to meet their needs.² Adding technology as a tool will help us to achieve this goal.

Unfortunately, many instructors have been reluctant to incorporate technology into their teaching practices. I suspect the reluctance stems from unfamiliarity with appropriate classroom technologies. Nonetheless, I encourage you to leverage technology within your teaching to encourage student engagement with the content and to support their learning. According to Shibley, using technology helps to reduce passive learning.³ In one of his recent courses, students were asked to create a video about an assigned textbook chapter for peers to view before facilitating an in-class discussion on the same topic. Students found the exercise to be a positive one and valued the work they created. This technique, known as a "flipped classroom," allows students to become actively involved in both the learning and teaching processes. One easy way to try this technique is to use the resources that accompany textbooks. About four years ago, the CADH implemented Evolve, a publisher-based learning management system to provide course content to students. Faculty began to

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integrate the use of online interactive activities such as quizzes, labelling diagrams, crosswords, and animation videos that provided instantaneous feedback to students on their performance. Students actively took part in these activities and even asked faculty to develop and share more activities of this nature.

Another handy aid is the students' own smart phones. Instead of fighting the use of these personal devices in the classroom, educators can use them to grasp how well students understand the concepts that are presented. Adam-Uyder suggests using student response systems for this purpose.⁴ I have recommended that faculty ask their students a variety of questions, including multiple choice, true or false or short answer questions using Socrative, a free online application that collects responses instantaneously. There is no cost associated with this app, it is easy to use, students love it because of its anonymity, and the responses help faculty tailor their teaching to student needs. These devices are also excellent communication tools for letting students know when you have made changes to a course schedule, cancelled a class or booked any new events. The CADH has also developed a Facebook page to communicate school or class closures. It certainly beats the old system of calling everyone!

When students are having difficulty, web-based resources that fit with the teaching principles can help students improve their understanding in certain areas. I have referred students to online activities that engage and immerse them in the content. Many times these are activities offered through their textbook publisher or through free online video tutorials at Khan Academy. If such technology aids are going to be successful, however, instructors should follow-up with students to see what action they have taken. I have found that, when students commit themselves and complete the recommended activities, they increase their understanding within the deficient areas, resulting in better personal academic outcomes.

An endless number of tools are available to help educators and students. I am constantly on the lookout for tools that are easy to use and do not come with a hefty price tag. In the last few years, I have explored some to see how they work and introduced them to the CADH faculty. A short list of useful educational technologies for the dental hygiene classroom appears in the text box at the end of this editorial.

Technology is all around us and is here to stay. Dental hygiene educators need not be scared of the technology but rather should use it to benefit themselves and their students. Instructors play an important role in student learning, as do the teaching methods chosen. Because technology is readily available and has become easier to use, it is prudent to incorporate it in ways that engage and support learning, rather than purely for entertainment. I will leave you with an apt quote from David Warlick, an educator and speaker who says, "We need technology in every classroom and in every student and teacher's hand, because it is the pen and paper of our time, and it is the lens through which we experience much of our world."⁵

SUGGESTED EDUCATIONAL TECHNOLOGIES FOR THE DENTAL HYGIENE CLASSROOM

Atlas—a web-based curriculum management system (<http://www.rubicon.com>)

AWW—a web-based whiteboard (<https://awwapp.com>)

Jeopardy Labs—a tool to develop jeopardy game templates (<https://jeopardylabs.com>)

Knovio—a tool for developing online presentations (<http://www.knovio.com>)

Pass It!—an exam preparation tool that gives students the ability to test their knowledge and generate statistics on performance, so that they can track and compare how they are doing over time (<http://passitgame.com>)

Puzzlemaker—an app for making puzzles (www.discoveryeducation.ca/free-puzzlemaker/)

RubiStar—a rubric development tool (<http://rubistar.4teachers.org/index.php>)

Socrative—a free real-time questioning app (<http://www.socrative.com>)

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Using an evidence-based approach to advise potential dental hygiene students

Mandy Hayre, DipDH, BDS, PID, MEd

I am often asked by prospective applicants which dental hygiene school offers the “best” education. It’s a difficult question to answer without showing bias. My response has certainly evolved over the years with the changing landscape of dental hygiene education. Early in my career I felt confident in recommending all schools of dental hygiene. Today, however, I would temper that response for a variety of reasons. In recent years we have seen schools that have been unable to attain accreditation, or have high rates of failure on the national board exam, or that closed on short notice leaving students short of their dental hygiene education. Moreover, not all schools are alike. Instructors, clinicians, and new graduates should consider all aspects of this question when approached by clients or community members for advice.

Here are some factors that applicants should think carefully about when deciding on their dental hygiene school of choice:

1. **Accreditation:** The Commission on Dental Accreditation of Canada (CDAC) evaluates oral health educational programs and health facilities to determine eligibility and to grant accreditation.¹ If a school is not accredited, there is no evidence that it meets the standards set out by the commission. In this case, a new graduate may face additional steps and costs or may not be eligible to register to practise in most jurisdictions in Canada. To determine a program’s accreditation status, visit CDAC’s website at https://www.cda-adc.ca/cdacweb/en/search_for_accredited_programs/²
2. **National board exam results:** The National Dental Hygiene Certification Board (NDHCB) is responsible for the development, administration, scoring, and results reporting of the standardized



Mandy Hayre
CDHA President/Présidente de l'ACHD

Conseiller les candidats étudiants en hygiène dentaire au moyen d'une approche fondée sur les faits

Les étudiants, candidats à l'admission, me demandent souvent de nommer l'établissement d'hygiène dentaire qui offre la « meilleure » formation. Cette question est difficile à répondre, en toute impartialité. Ma réponse s'est certainement transformée au cours des années en raison de la constante évolution de la formation en hygiène dentaire. Au début de ma carrière, je n'hésitais pas à recommander tous les établissements d'hygiène dentaire. Par contre, aujourd'hui j'aurais tendance à tempérer mes propos pour diverses raisons. Depuis quelques années, nous avons vu des établissements incapables d'obtenir l'agrément, qui ont enregistré des taux élevés d'échec à l'examen de certification nationale, ou qui ont fermé leurs portes sur

un court préavis empêchant les étudiants de terminer leur formation en hygiène dentaire. D'ailleurs, les établissements ne sont pas tous pareils. Les enseignants, les cliniciens et les nouveaux diplômés devraient prendre en considération tous les éléments lorsque des clients ou des membres de la communauté leur demandent conseil sur cette question.

Voici quelques facteurs qui méritent une réflexion approfondie de la part des candidats à l'admission lorsqu'il s'agira de choisir un établissement en hygiène dentaire :

1. **Agrément :** La Commission de l'agrément dentaire du Canada (CADC) évalue les programmes de formation en santé buccodentaire et les établissements de santé afin de déterminer ceux qui sont admissibles à l'agrément et ceux à qui elle peut l'accorder¹. Si un établissement n'est pas accrédité, il n'y a aucune preuve qu'il est conforme aux exigences de la commission. Dans ce cas, un nouveau diplômé peut devoir prendre des mesures additionnelles et assumer des coûts supplémentaires ou peut ne pas avoir le droit d'exercer dans la plupart des juridictions canadiennes. Pour vérifier si un programme est accrédité, visitez le site Web de la CADC au https://www.cda-adc.ca/cdacweb/fr/Recherchez_les_programmes_denseignement_dentaire_agrees/².
2. **Les résultats de l'examen national de certification :** Le Bureau national de la certification en hygiène dentaire (BNCHD) est chargé d'élaborer, de gérer, d'évaluer et de transmettre les résultats de l'examen normalisé national écrit, que les diplômés doivent réussir dans

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national written board exam that graduates must pass in all jurisdictions in Canada except Quebec to qualify for registration as a dental hygienist.³ The NDHCB reports exam performance by date and school on its website, which provides an indication of the success of each program. Potential students can see how each school's graduates performed by checking the website at <http://www.ndhcb.ca/#!exam-results/ca69>.⁴

3. *Public or private institution:* An inherent difference between private for-profit institutions and publicly funded institutions is found in their layers of accountability and reporting requirements. Moreover, private schools must not only balance their books, but also turn a profit to stay in business; therefore, many instructional decisions may be restricted by financial concerns. Both types of institutions can offer quality programs, and either one may meet a student's individual needs. But students should investigate the pros and cons of either choice by looking at cost, admission requirements, tuition refund policies, grievance policies, semester breaks, accreditation and board results, and institutional supports.
 4. *Physical space:* Students spend long days and even some weekends in classrooms, labs, and clinic. Therefore, it is important to consider the layout and ergonomics of the learning space. Do the facilities provide an operatory for each student? Is there a locker room? Are classrooms equipped with the latest teaching technologies? Does the program offer modern technology such as digital radiography? Are amenities, such as the cafeteria, library, and student services, close and accessible? Does the institution provide access to a professionally administered library with periodicals, interlibrary loan service, textbooks, computers, major research databases (such as PubMed), and study help?
 5. *Location:* Many students like to be able to study and live at home. If a particular institution is close by, it may be a foregone conclusion that this is the school to attend. If a move is required, however, investigate the city and school campus before making a decision. Consider the cost of living in different cities. Look at whether the school has student residences or what the rental climate is like. Weather may also be a consideration if leisure and sports activities such as skiing are important!
 6. *Reputation:* To get an honest opinion of reputation, talk to instructors, current students, and program graduates about their experience. There is no such thing as an easy dental hygiene program, so prospective students should not let someone saying "it was a tough program" deter them.
- toutes les juridictions canadiennes, à l'exception du Québec, afin d'être admissibles à l'obtention du permis d'exercer à titre d'hygiénistes dentaires³. Le BNCHD communique les résultats sur son site Web, selon la date et l'établissement, ce qui fournit une indication du succès de chaque programme. Les candidats étudiants peuvent voir les résultats des diplômés de chaque établissement en consultant le site Web au <http://www.ndhcbfr.ca/#!resultats-dexamen/ca69>.⁴
3. *Établissement public ou privé :* Les établissements privés, à but lucratif, et les établissements financés par les fonds publics ont de différents paliers de responsabilité et de différentes exigences de rapport. En outre, les établissements privés doivent non seulement équilibrer leurs budgets, mais doivent aussi être rentables pour rester en affaires; par conséquent, les décisions pédagogiques peuvent être influencées par des préoccupations d'ordre financier. Les deux types d'établissements peuvent offrir des programmes de qualité et l'un ou l'autre peut répondre aux besoins individuels des étudiants. Néanmoins, les étudiants devraient peser le pour et le contre des deux options en évaluant le coût, les exigences d'admission, les politiques de remboursement des droits de scolarité, les politiques de griefs, les congés de session, l'agrément et les résultats d'examen de certification, et l'appui institutionnel.
 4. *Espace physique :* Les étudiants passent de longues journées et même quelques fins de semaine en classe, dans les laboratoires et en clinique. Il est donc important de prendre en compte l'aménagement et l'ergonomie des lieux d'apprentissage. L'établissement fournit-il une salle opératoire pour chaque étudiant? Y a-t-il une salle de casiers-vestiaires? Les salles de classe sont-elles dotées des technologies d'enseignement les plus récentes? Le programme donne-t-il accès à des technologies modernes comme la radiographie digitale? Les services de base comme la cafétéria, la bibliothèque et les services aux étudiants sont-ils près de vous et accessibles? L'établissement fournit-il accès à une bibliothèque professionnellement gérée qui comprend des périodiques, un service de prêt entre bibliothèques, des manuels, des ordinateurs, d'importantes bases de données de recherche (telles que PubMed), et de l'appui aux études?
 5. *L'emplacement :* Plusieurs étudiants aiment pouvoir étudier et vivre à la maison. Si un établissement particulier est près du domicile, il est possible que le choix d'établissement soit conclu d'avance. Si par contre un déménagement est requis, évaluez la ville et le campus scolaire avant de prendre votre décision. Tenez compte du coût de la vie au sein des différentes villes. Vérifiez si l'établissement a des résidences pour les étudiants ou évaluez le marché des logements. La météo peut aussi être un facteur à envisager si les loisirs et les activités sportives comme le ski sont importants!
 6. *Réputation :* Pour avoir une franche opinion sur la réputation d'un établissement, parlez aux enseignants, aux étudiants actuels et aux diplômés du programme au sujet de leur expérience. Un programme d'hygiène dentaire facile n'existe pas, alors les étudiants potentiels ne devraient pas être découragés si quelqu'un leur dit que le programme était « très difficile ». Les étudiants doivent maîtriser

Students must master many competencies, and educators must push students to achieve them! However, all work and no play does not mean a superior program either. Ask about the program's philosophy, attitudes towards students and staff, student supports, and recreational activities.

7. *Cost*: When comparing programs, students should not rely on tuition costs alone because there are many other expenses incurred in dental hygiene education. Before committing to a school, ask questions about the investment required. For example, ask about the costs of instruments and textbooks; supply, rental, and lab fees; uniforms and shoes; and any additional equipment, such as a power scaler or loupes. Remember also that program length may affect the cost. Will a student loan cover these expenses or will additional lines of credit be required? After the total expenses for each program are determined, a more informed decision can be made.
8. *Application process*: Students need to consider entrance requirements such as prerequisites, related experience, and portfolio submissions. Other considerations include whether the program accepts students based on a waitlist (and, if so, how long it is) or if it is competitive entry, how large the class size is, and how many students are accepted each year.
9. *Faculty qualifications*: My firm belief is that educators need formal education in teaching to be the best educator they can be. In fact, I would argue this to be true for any discipline. I would not see a doctor who did not have medical training, I would not have my car fixed by a mechanic who was not ticketed, and I would not enroll my children in a class where the teacher did not have a pedagogical background. The teaching of dental hygiene is no different. Ask if instructors have credentials beyond their dental hygiene diploma. Also ask about the ratio of instructors to students in the clinic. Typically, the lower the ratio, the more opportunity students have for individual instruction.
10. *Personal career goals*: Students should define their own career goals and expectations when considering programs. For example, if candidates have aspirations to further their education or pursue a career in education, public health or research, they may want to consider a program that offers the opportunity for further educational growth, such as a baccalaureate or graduate degree. International partner schools, field school opportunities, volunteer programs, and student exchanges are also opportunities to ask about. These are wonderful value-added components that contribute richly to future job possibilities.

plusieurs compétences et les enseignants doivent encourager les étudiants à réussir! Cependant, travailler sans répit ne signifie pas que le programme est meilleur qu'un autre. Renseignez-vous sur la philosophie du programme, l'attitude envers les étudiants et les membres du personnel, l'appui aux étudiants et les activités récréatives.

7. *Coût* : Lorsque les programmes sont comparés, les étudiants ne devraient pas uniquement fonder leur décision sur les droits de scolarité, parce que la formation en hygiène dentaire engage plusieurs autres dépenses. Posez des questions au sujet de l'investissement requis avant de confirmer votre choix d'établissement. Par exemple, informez-vous du coût des instruments et des manuels scolaires; le coût des fournitures, de la location d'articles et des laboratoires; des uniformes et des souliers; et de tout autre équipement supplémentaire nécessaire, comme un détartreur mécanique ou des loupes. Rappelez-vous aussi que la durée du programme pourrait avoir une incidence sur le coût. Un prêt étudiant pourrait-il couvrir tous ces frais ou des marges de crédit supplémentaire seront-elles nécessaires? Après avoir déterminé le coût total de chaque programme, il sera plus facile de prendre une décision éclairée.
8. *Processus de traitement des demandes* : Les étudiants doivent considérer les exigences d'admission telles que les cours préalables, l'expérience connexe et la présentation d'un portfolio professionnel. Il faut aussi prendre en considération d'autres facteurs d'admission tels que : les étudiants sont-ils admis selon une liste d'attente (et quelle en est la longueur, le cas échéant) ou, si l'admission repose sur la concurrence, quelle est la taille moyenne des classes et combien d'étudiants l'établissement admet-il par année?
9. *Qualifications du corps professoral* : Je suis fermement convaincue que les enseignants doivent avoir une éducation formelle en enseignement pour être les meilleurs éducateurs possible. D'ailleurs, je dirais que cela est vrai pour toute discipline. Je n'irais pas voir un médecin qui n'aurait pas de formation médicale, je ne ferais pas réparer ma voiture par un mécanicien qui ne détiendrait pas un certificat de qualification, et je n'inscrirais pas mes enfants à un cours enseigné par un professeur sans formation pédagogique. C'est la même chose pour l'enseignement de l'hygiène dentaire. Demandez si les chargés de cours ont des attestations d'études en plus de leur diplôme en hygiène dentaire. Demandez aussi le ratio entre le nombre d'enseignants et le nombre d'étudiants en clinique. Généralement, moins il est élevé, plus les étudiants auront des possibilités d'enseignement individuel.
10. *Objectifs personnels de carrière* : Les étudiants devraient définir leurs propres objectifs et attentes de carrière lorsqu'ils examinent les programmes. Par exemple, si les candidats ont l'intention de poursuivre leurs études ou d'entreprendre une carrière en enseignement, en santé publique ou en recherche, ils envisageront peut-être un programme qui favorise la poursuite d'une formation complémentaire, comme un baccalauréat ou un diplôme d'études supérieures. Les établissements scolaires partenaires, les occasions de stages pratiques, les programmes de bénévolat et les échanges d'étudiants sont aussi des

Potential students can find the information they need by performing website and social media searches, attending program information sessions, asking to observe a student for a day, if possible, and talking to graduates and instructors of programs. They just need to know the right questions to ask. I also like to advise students that if they are considering a number of good schools, there is no harm in applying to more than one as this may get them into a program sooner—which means starting their chosen career sooner!

As dental hygiene professionals we have an obligation to uphold standards of good practice and to provide evidence-based information when advising future students and members of the community about the best qualities of dental hygiene programs. I encourage you to consider the many elements that enter into making such an important decision in finding the best personal match.

A good education is the greatest gift you can give yourself or anyone else.
—Mahtab Narsimhan

possibilités à exploiter. Ces magnifiques éléments à valeur ajoutée contribuent grandement aux possibilités d'emplois futures.

Les candidats étudiants peuvent trouver les renseignements dont ils ont besoin en faisant des recherches sur Internet et sur les sites de médias sociaux, en assistant aux séances d'information sur les programmes, en demandant, si possible, d'observer un étudiant pour une journée, et en discutant avec les diplômés et les enseignants des programmes. Ils doivent seulement savoir quelles questions poser. J'aimerais aussi conseiller aux étudiants que s'ils examinent plusieurs bons établissements, cela peut être une bonne idée de faire une demande d'admission à plusieurs endroits, car cela pourrait leur permettre d'être admis à un programme plus rapidement – ce qui veut dire commencer la carrière de leur choix plus vite!

À titre de professionnels en hygiène dentaire, nous sommes tenus de respecter les normes de pratiques optimales et de fournir de l'information factuelle lorsque nous conseillons de futurs étudiants et des membres de la communauté sur les meilleures qualités d'un programme d'hygiène dentaire. Je vous encourage à évaluer les nombreux facteurs qui entrent en jeu lorsqu'il s'agit de trouver le programme qui vous convient le mieux et de prendre cette décision si importante.

Le plus beau cadeau que vous pouvez vous offrir, ou offrir aux autres, est une bonne éducation.
—Mahtab Narsimhan

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Competencies for Canadian baccalaureate dental hygiene education: A Delphi study, Part 2

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ABSTRACT

Background: The outcomes of Canadian dental hygiene baccalaureate education have been explored by the Canadian Dental Hygienists Association and Dental Hygiene Educators Canada. However, these outcomes were stated in broad terms so it was often challenging to differentiate between diploma and baccalaureate education. **Purpose:** The aim of the study was to identify competencies for Canadian baccalaureate dental hygiene education and, in so doing, to clarify the boundary between diploma and baccalaureate education. **Methods:** A 3-round Delphi study was conducted with a purposeful sampling approach to obtain the views of Canadian dental hygiene experts. Participants were asked to rate each of the baccalaureate sub-competencies in terms of its "substantive difference" from diploma competencies using a 4-point scale ranging from "to a great extent" to "not at all." They were also asked to rate their confidence in their responses. **Results:** Twenty-four dental hygienists met the inclusion criteria and were invited to participate in the online study; 10 respondents completed Round 3 representing a 42% response rate. The domains with $\geq 50\%$ of their sub-competencies rated as being substantively different ("to a great extent") from diploma education were advocacy (100%), policy use (100%), research use (91%), health promotion (88%), coordination (63%), clinical therapy (56%) and oral health education (50%). **Discussion and Conclusion:** All the domains appear to make some contribution to the analysis of the differences between diploma and baccalaureate education. These data support the view that dental hygiene education reflects a continuum of gradually increasing abilities in domains that are central to diploma and baccalaureate education. The domains and associated sub-competencies identified as best explaining differences between diploma and baccalaureate dental hygiene education were advocacy, policy use, research use, and health promotion. Baccalaureate education was viewed as distinct from diploma education as these graduates gained abilities to work with groups, communities, and populations; to operate within a public policy and governmental context; and to provide services in diverse practice settings.

RÉSUMÉ

Contexte : Les résultats de la formation en hygiène dentaire de niveau du baccalauréat au Canada ont été étudiés par l'Association canadienne des hygiénistes dentaires et par les Éducateurs en hygiène dentaire du Canada. Cependant, ces résultats d'apprentissage, définis en termes généraux, n'ont pas facilité la différenciation entre la formation menant au diplôme et celle menant au baccalauréat. **Objectif :** La présente étude avait pour objet de déterminer les compétences liées à la formation en hygiène dentaire de niveau du baccalauréat au Canada et ce faisant, de préciser la frontière entre la formation menant au diplôme et celle menant au baccalauréat. **Méthode :** Une étude Delphi en 3 phases a été menée à l'aide d'une méthode d'échantillonnage ciblée en vue d'obtenir les opinions d'experts canadiens en hygiène dentaire. Les participants ont été invités à évaluer chacune des sous-compétences du baccalauréat sur le plan des « différences importantes » par rapport aux compétences du diplôme, selon une échelle d'évaluation en 4 points allant « de façon importante » à « pas du tout ». Ils devaient aussi évaluer le degré de certitude de leur réponse. **Résultats :** Vingt-quatre hygiénistes dentaires canadiens ont satisfait aux critères d'inclusion et ont été invités à participer à l'étude en ligne. Dix personnes ont complété le troisième tour, ce qui correspond à un taux de réponse de 42 %. Les domaines de la formation menant au baccalauréat dont 50 % ou plus des sous-compétences ont été évaluées comme étant très différentes (« de façon importante ») de celles de la formation menant au diplôme étaient le plaidoyer (100 %), la mise en pratique des politiques (100 %), l'utilisation de la recherche (91 %), la promotion de la santé (88 %), la coordination (63 %), la thérapie clinique (56 %) et l'éducation en matière de santé buccodentaire (50 %). **Discussion et conclusion :** Tous les domaines semblent ajouter à l'analyse des différences entre la formation menant au diplôme et celle menant au baccalauréat. Les données confirment l'idée que la formation en hygiène dentaire reflète une échelle progressive de compétences dans des domaines qui sont indispensables à la formation menant au diplôme et à celle menant au baccalauréat. Les domaines et les sous-compétences ciblés comme étant ceux qui démontrent le plus efficacement la différence entre la formation menant au diplôme et celle menant au baccalauréat en hygiène dentaire étaient le plaidoyer, la mise en pratique des politiques, l'utilisation de la recherche et la promotion de la santé. La formation menant au baccalauréat était perçue comme étant distincte de celle menant au diplôme, puisque les diplômés de programmes de baccalauréat ont acquis la capacité de travailler auprès des groupes, des collectivités et de la population; de travailler dans le cadre de politiques publiques et d'un contexte gouvernemental; et de fournir des services dans de milieux de pratique variés.

Key words: baccalaureate degree, competencies, Delphi technique, dental hygiene education, dental hygienists

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Submitted 18 March 2015; revised 12 June 2015; accepted 20 July 2015

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INTRODUCTION

For the past 3 decades, national organizations involved with the oral health professions have created important documents about the outcomes of dental hygiene education.^{1,2,3,4} The resulting outcomes have been largely defined from the perspective of abilities; some are described as learning outcomes^{1,2} while others refer to competencies.^{3,4} While competencies were initially technical in nature, today they are used to express complex cognitive outcomes.⁵ Over time these terms have merged to reflect different points on a continuum ranging from very specific to very general statements, with learning outcomes being on the general end of the scale.⁶ In this article the terms will be used as they are expressed in different national documents; the word “ability” will be used as a generic term to encompass both competencies and outcomes. Essentially the terms all describe the intentions of education as expressed through the “knowledge, skills and attitudes”⁶ necessary for the practice of a profession.

The first document directed to outcomes of dental hygiene education was created in the 1980s⁵ to support national accreditation, and it used the language of competencies with its focus on the technical abilities as did many documents of this era. It was followed by initiatives of the Association of Canadian Faculties of Dentistry (ACFD) in the early 1990s⁷; this work was directed to strategic planning and some of the recommendations were then furthered through the Canadian Dental Hygienists Association (CDHA)⁸ and its Task Force on Dental Hygiene Education.¹ One component of the task force’s work included the development of learning outcomes for diploma, baccalaureate, master’s, and doctoral education. These learning outcomes focused on broad statements that defined dental hygiene education and worked from the assumption that each subsequent credential incorporated and expanded on the previous ability statements. CDHA then requested Dental Hygiene Educators Canada (DHEC) to conduct further research on the learning outcomes for diploma and baccalaureate dental hygiene education.²

The work of DHEC resulted in the development of five generic learning outcomes supplemented by nine contextualized ones for baccalaureate education, which attempted to capture the continuum of learning from diploma to baccalaureate education.² This document had limited value as it was framed in broad, generic terms and was perceived to be associated with a specific organization; it failed to be integrated in other national documents in any substantive manner.

During the development of the provincial⁹ and national^{1,2} dental hygiene documents related to baccalaureate abilities, many of the discussions focused on the differences in outcomes between diploma and baccalaureate dental hygiene education. This question was particularly challenging given that there are 2-year and 3-year diploma programs in Canada. See http://www.cdha.ca/cdha/Education/Students/Dental_Hygiene_Schools___Programs/CDHA/Education/Students/Dental_Hygiene_Schools___Programs.aspx for the listing of accredited diploma programs in Canada.

The online survey and Delphi study conducted by DHEC from 2002 to 2003 suggested that the difference between the 2 credentials existed in the increased abilities of baccalaureate graduates to:²

- think critically
- communicate and negotiate
- support research initiatives
- work in interprofessional teams
- facilitate change
- provide services in diverse practice contexts

However, other studies of the outcomes of baccalaureate education tended to focus on issues related to career options, remuneration, and general educational and career pathways.¹⁰⁻¹³ More recently 2 Canadian studies have directed attention to outcomes in terms of abilities. Kanji et al. explored the outcomes of baccalaureate education through a phenomenological design using CDHA email broadcasts to obtain participants (n=16).¹⁴ The study focused both on the “personal outcomes and dental hygiene practice outcomes” of Canadian degree completion experiences. From a personal perspective respondents identified an increase in self-confidence and perceived credibility in addition to an increased appreciation for ongoing professional/educational development and interest in additional education. From a practice perspective the subjects identified an increased knowledge base as well as increased critical thinking and evidence-based practice decision-making abilities. Respondents also talked about providing more comprehensive care, which they termed “a higher level of care.” They did not refer to their technical abilities, but rather their judgements. The study by Sunell et al. was directed to specific abilities associated with a new bylaw in British Columbia (51% response rate; n=123).¹⁵ The respondents were specifically asked if their abilities in specific areas had improved, not changed or worsened with degree completion education. The authors found a similar focus on gaining an increased knowledge base and cognitive abilities, such as critical thinking, problem solving, and research use.

The Canadian federal and provincial governments have articulated outcomes for various credentials as part of the approval process for new credentials. In 2007 the Council of Ministers of Education, Canada (CMEC) developed a *Ministerial Statement on Quality Assurance of Degree Education in Canada*.¹⁶ This document defines the outcomes for baccalaureate, master’s, and doctoral degrees from a number of different perspectives including one based on outcomes expected of graduates. The expectations include the following:

- “depth and breadth of knowledge
- knowledge of methodologies and research
- application of knowledge
- communication skills
- awareness of limits of knowledge
- professional capacity/autonomy”¹⁶

eTable A provides descriptions of each expectation (eTables A–R are available at www.cdha.ca/pdfs/Profession/Journal/sunell_eTables2.pdf). The provinces have created documents that operationalize these concepts,^{17,18,19} and the document from the Council of Ontario Universities (COU)¹⁷ is particularly helpful as it includes expectations for 3-year and 4-year baccalaureate degrees (eTable B).

The College Standards and Accreditation Council (CSAC) also established generic learning outcomes for 2- and 3-year programs in Ontario’s colleges of applied arts and technology.²⁰ They included the following:

- analytical skills including critical thinking, problem solving and decision-making
- communication skills
- numeracy skills
- technological skills including computer literacy
- interpersonal skills

These documents provided a lens through which to explore the boundary between diploma and baccalaureate education from a dental hygiene perspective.

What are the expected abilities from the 4th year of baccalaureate dental hygiene education? This question was explored through the Delphi study reported on in Part 1 of this research,²¹ which presented the abilities that achieved a 70% consensus level from the study respondents. That article focused primarily on data that defined the boundary between baccalaureate and master’s degree programs. In this article, the analysis is focused more specifically on the boundary between diploma and baccalaureate dental hygiene education. Which of the consensus-achieved competencies reflect a substantive difference between diploma and baccalaureate education? This is an important question for Canadian dental hygiene educators, regulators, students in diploma and baccalaureate dental hygiene programs, candidates applying to dental hygiene programs, and others involved in working with dental hygienists.

METHODOLOGY

The Delphi study was organized as a collaborative research project involving the members of an advisory committee appointed by CDHA, which funded the study. The committee members included representatives of national organizations such as the Commission on Dental Accreditation of Canada (CDAC) and Canadian Association of Public Health Dentistry (CAPHD), representatives of regulatory organizations in provinces with baccalaureate dental hygiene education, program directors of the 4 Canadian baccalaureate dental hygiene programs, and 2

American program directors. The advisory members were involved in the development of the draft competencies and the analysis of the data after each round of the study. Their work was conducted through teleconferences, emails, and a one-day meeting at the end of the study; CDHA’s contractor for this study was also a committee member.

The Delphi approach was selected as it is a consensus building process using a series of anonymous surveys^{22–24}; it has been used extensively in the health professions for curriculum issues.^{23–25} It is designed to provide evidence on questions that are challenging to answer through experimental designs. Additionally, the Delphi approach helps to reduce the effect of “group think,” which often occurs with face-to-face sessions, and to decrease barriers related to time, resources, and geographic distance.^{22–26} Initial discussions about the Delphi technique suggested the use of 3 rounds to increase the reliability of the data.²⁷ However, the potential for respondent fatigue prompted some authors to recommend that rounds beyond 2 may not be productive.^{26,28,29}

Generic domain headings were selected to align with those in Canadian literature related to interprofessional education^{30,31} and international literature in the health professions.^{32–42} These headings were then clarified by a broad, general competency statement—a domain competency—which was described in more depth through detailed statements. The stratified descriptions were labelled as domain headings, domain competencies, and sub-competencies.

The draft competency document for the study was developed by CDHA’s Advisory Committee based on a literature review of national and international resources and existing baccalaureate dental hygiene program curricula.²¹ It used a similar structure to the *National Dental Hygiene Competencies for Entry-to-Practice*,⁴ which included a set of “core competencies” that reflected the interprofessional nature of the dental hygiene profession and “dental hygiene service competencies” that encompassed the specialized services provided by dental hygienists. One further addition was made: a “knowledge of the discipline” competency was included to direct attention to the foundational knowledge that underpins the profession. A pilot phase involving directors (n=4) of dental hygiene baccalaureate degree programs in the United States was conducted through the Survey Monkey site.

A purposeful sampling process based on validated criteria for professional expertise⁴³ was used to select the 24 respondents who were invited to participate in the Delphi; these individuals had identified themselves as experts²¹ in the profession and expressed an interest in participating by completing an online survey sent by CDHA to all its members.

In Round 1 and Round 2 the respondents were asked to rate the importance, relevance, and realistic nature of the domains and the sub-competency statements within the

domains; these data helped to clarify the boundary between baccalaureate and master's education. To highlight the boundary between diploma and baccalaureate education, respondents in Rounds 1 and 2 were asked to rate each sub-competency in terms of its "substantive difference" from diploma education. The research instrument included a 4-point scale ranging from "to a great extent" to "not at all" with an additional "do not know" option. In Round 2 the respondents were also asked to rate their confidence in their ratings in order to assess the validity²³ of the data from the other questions. Open-ended questions were included to provide opportunities for respondents to clarify their views and make recommendations. The question related to the substantive differences of the competencies was not present in Round 3, which asked the respondents to accept, edit or reject the competencies that had not achieved the 70% consensus level.²¹

Statistical analysis focused on the examination of frequency data, and thematic analysis was used to investigate areas of divergence and commonality in the written comments. Ethics approval was given by the University of Manitoba Research Ethics Board.

RESULTS

Initially, 24 individuals expressed an interest in participating in the study and met the inclusion criteria. Round 1 was started by 16 (66%) respondents and completed by 11 (46%). Those who submitted data for Round 1 were then invited to become involved in Round 2. Of the 16 who were invited, 12 (50%) began Round 2 and 9 (39%) finished the round. Those who started Round 2 were subsequently invited to contribute to Round 3. Of the 12 who were invited, 10 (42%) began and completed Round 3.

The majority of respondents in all rounds of the study had over 24 years of dental hygiene practice experience (Table 1). They represented a variety of practice contexts including private practice, postsecondary education, research, and administration. Public health practitioners were represented in Rounds 1 and 2, but not in Round 3. Some shifts appear to have occurred in practice settings during the study as there was no representation from hospital/agency/facility practice in the first 2 rounds, but it did occur in Round 3. Respondents had a range of professional roles in their practices, with the educational and presenter roles predominating in most rounds.

Almost all respondents held a master's degree as their highest credential as this was an inclusion criterion; 2 respondents with a doctorate were invited and one completed the study. The study included respondents from 6 of the 8 provinces with dental hygiene diploma programs and from 3 of the 4 provinces with dental hygiene baccalaureate degree programs.

Round 1 included 14 domains and 120 sub-competencies generated from the literature. The respondents recommended 2 more sub-competencies, which were introduced in Round 2. The final consensus-

achieved competencies included 13 domains and 98 sub-competencies. See Part 1²¹ for a comprehensive discussion of the consensus-achieved competencies.

Of the Round 1 sub-competencies, 11 were taken directly from the national entry-to-practice competencies.¹⁶ Consensus to retain 7 of these sub-competencies was achieved, while the remaining sub-competencies were either shaped through editorial changes (n=2), amalgamated due to being too specific (n=1) or deleted because of redundancy (n=1).

When exploring the substantive difference issue from the perspective of the totals of a "great extent" and "some extent" data, the 7 retained entry-to-practice sub-competencies rated as being substantively different were as follows:

- Communication (80%) (n=1)
- Collaboration (56%) (n=1)
- Research use (89% and 89%) (n=2)
- Disease prevention (68%) (n=1) and
- Oral health education (68% and 56%) (n=2)

The majority of the respondents viewed the sub-competencies from the above domains as being substantively different from diploma education.

In Round 1 all sub-competencies received a rating of $\geq 51\%$ with regard to being substantively different, based on the totals of a "great extent" and "some extent." The data found in eTables C–O (www.cdha.ca/pdfs/Profession/Journal/sunell_eTables2.pdf) are presented in descending order, beginning with those domains rated highest (advocacy–100%) for greatest difference between diploma and baccalaureate to lowest (collaboration–11%). There were fluctuations in the ratings between the 2 rounds, some of which can be attributed to the respondents' recommendation that the degree of difficulty of the verbs be decreased to make them more realistic for baccalaureate education.²¹ The original verbs were often described as being more appropriate for master's level education.

Tables 2 and 3 summarize the frequency data of the Round 2 substantive difference ratings. Table 2 presents the total of the "great extent" and "some extent" ratings in each domain expressed as the number of sub-competencies within each percentage range. In Table 3 the focus is narrowed to the ratings in the "great extent" category, highlighting the sub-competencies that were perceived to be the most substantively different (rated at 50% or higher).

The domains with the sub-competencies that were rated as being most substantively different from diploma abilities to a "great extent" (Table 3) were as follows:

- Advocacy (100%)
- Policy use (100%)
- Research use (91%)
- Health promotion (88%)
- Coordination (63%)
- Clinical therapy (56%)
- Oral health education (50%)

Table 1. Characteristics of invited sample and respondents who completed the Delphi²¹

Respondent characteristics	Invited sample (n=24)	Round 1 respondents (n=11)	Round 2 respondents (n=9)	Round 3 respondents (n=10)
Years in practice (with each respondent having ≥ 8 years of practice)				
Between 8 and 16 years	4	0	1	2
Between 17 and 24 years	6	2	2	1
Over 24 years	14	9	6	7
Primary practice area				
Private practice	1	0	1	1
Public health practice	2	1	1	0
Hospital/facility/agency practice	0	0	0	1*
Postsecondary education – educator	8	2	1	1
Postsecondary education – researcher and educator	8	5	4	3
Administration	2	3	2	3
Other	3			1
Secondary practice area				
Private practice	9	2	3	3
Public health practice	0	0	1*	0
Hospital/facility/agency practice	2	0	0	0
Postsecondary education – educator	4	1	2	2
Postsecondary education – researcher and educator	2	2	0	0
Administration	3	1	0	1
Not applicable	4	5	3	3
Other	0	1	0	1
<i>*There appear to have been some shifts in practice settings during study.</i>				
Professional role positions (with each respondent having 2 or more positions)				
Educator (with students)	23	10	7	5
Presenter	22	8	8	7
Evaluator	19	7	5	6
Implementer of programs/services	18	7	6	4
Clinician	17	4	5	4
Consultant	17	7	4	4
Researcher	16	9	6	3
Creator of programs/services	16	5	6	4
Administrator/manager	16	6	5	6
Highest level of education (master's level or higher required)				
Master's degree	22	10	8	9
Doctoral degree	2	1	1	1
Primary province of practice				
Alberta	4	0	0	0
British Columbia	7	2	3	3
Manitoba	2	1	1	1
Nova Scotia	2	1	1	1
Ontario	6	4	3	3
Québec	2	2	1	1
Saskatchewan	1	1	0	1

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Table 2. Total of "some extent" and "great extent" ratings of the substantive difference in each domain expressed as the number of sub-competencies within each percentage range^a

Domains	Substantive difference ratings in Round 2 Total of "some extent" & "great extent" data							Total ability statements
	40%–49%	50%–59%	60%–69%	70%–79%	80%–89%	90%–99% ^b	100%	
Advocacy	-	-	-	-	6	-	-	6
Policy use	--	-	-	-	4	-	1	5
Research use	-	-	-	-	5	-	6	11
Health promotion activities, initiatives, and programs	-	-	-	1	6	-	-	8
Coordination	-	-	-	4	4	-	-	8
Clinical therapy	-	-	-	6	3	-	-	9
Oral health education	-	1	1	3	3	-	-	8
Leadership	-	-	1	4	4	-	-	9
Integration of knowledge of the discipline	-	1	-	2	1	-	1	5
Disease prevention activities, initiatives, and programs	-	-	2	1	4	-	-	7
Professionalism	1	2	1	1	0	1	-	6
Communication	-	-	-	1	2	1	3	7
Collaboration	-	1	2	1	3	-	2	9

^aThe data from eTables C–O have been summarized here. The sums of the "some extent" and "great extent" substantive difference ratings for each competency have been placed in a cell that reflects the sum range. For example, in the advocacy domain, the sums of the 6 sub-competencies were all in the 80%–89% range as substantively different, while the sums of 4 sub-competencies in the policy use domain were located in the 80%–89% range (n=4) and the sum of one sub-competency was in the 100% cell for a total of 5 competencies.

^bThere are only 2 data in this column as it was not numerically possible with 9 respondents.

Table 3. Percentage of sub-competencies per domain that were rated $\geq 50\%$ as substantively different to a "great extent" in Round 2^a

Domains	Substantively different sub-competencies		
	Rated $\geq 50\%$	Total in domain	Percentage rated $\geq 50\%$
Advocacy	6	6	100%
Policy use	5	5	100%
Research use	10	11	91%
Health promotion activities, initiatives, and programs	7	8	88%
Coordination	5	8	63%
Clinical therapy	5	9	56%
Oral health education	4	8	50%
Leadership	4	9	44%
Integration of knowledge of the discipline	2	5	40%
Disease prevention activities, initiatives, and programs	2	7	29%
Professionalism	1	6	17%
Communication	1	7	14%
Collaboration	1	9	11%

^aThis table summarizes the data specific to the ratings of the sub-competencies as substantively different to a great extent. The first cell identifies the number of sub-competencies that received a rating of 50% or higher. The second cell identifies the total number of sub-competencies in each domain. The third cell identifies the percentage of sub-competencies in each domain that received a rating of 50% or higher as substantively different to a great extent.

Table 4. Relationship between CMEC expectations and domain competencies in which expectations are emphasized

Expectations	Ontario 4-year bachelor's degree ^a	Domain competencies
Depth and breadth of knowledge	<ul style="list-style-type: none"> • Developed knowledge... • Critical understanding of overall and specialized area in discipline • Developed ability to gather, review, etc. • Compare alternative hypotheses or creative options • Skills for developed critical thinking 	<ul style="list-style-type: none"> • Integration of knowledge of discipline • Research use • Coordination • Collaboration • All domains in dental hygiene services
Knowledge of methodologies and research	<ul style="list-style-type: none"> • An understanding of methods of enquiry or creative activity...that enables the student to evaluate the appropriateness of different approaches to solving problems using well-established ideas and techniques. • Describe and comment upon particular aspects of current research or equivalent advanced scholarship. 	<ul style="list-style-type: none"> • Research use
Application of knowledge	<ul style="list-style-type: none"> • Critically evaluate...data • Use a range of established techniques to initiate and undertake critical evaluation of arguments, assumptions, abstract concepts, and information • Apply underlying concepts, principles, and techniques of analysis, both within and outside the discipline; where appropriate use this knowledge in the creative process • Frame appropriate questions for the purpose of solving a problem; solve a problem or create a new work • Make critical use of scholarly reviews and primary sources 	<ul style="list-style-type: none"> • Integration of knowledge of discipline • Research use • All domains in dental hygiene services
Communication skills	<ul style="list-style-type: none"> • Communicate information, arguments, and analyses accurately and reliably, orally and in writing to a range of audiences 	<ul style="list-style-type: none"> • Communication • Collaboration • Coordination • All domains in dental hygiene services
Awareness of limits of knowledge	<ul style="list-style-type: none"> • An understanding of the limits to their own knowledge and ability, and an appreciation of the uncertainty, ambiguity, and limits to knowledge and how this might influence analyses and interpretations 	<ul style="list-style-type: none"> • Professionalism • Research use
Professional capacity/autonomy	<ul style="list-style-type: none"> • Skills necessary...for exercise of initiative, personal responsibility, and accountability in both personal and group contexts • Manage their own learning... • Skills for decisionmaking in complex contexts 	<ul style="list-style-type: none"> • Professionalism • Collaboration • Coordination • Leadership • All domains in dental hygiene services

^aBased on the analysis of Council of Ontario Universities.¹⁷

The remaining domains all included some sub-competencies rated at $\geq 50\%$ in the “great extent” category but there were fewer of these sub-competencies in each domain:

- Leadership (44%)
- Integration of knowledge (40%)
- Disease prevention (29%)
- Professionalism (17%)
- Communication (14%)
- Collaboration (11%)

Study participants were also invited to rate their confidence in their ratings about substantive differences. All items except one were rated $\geq 70\%$; the one exception focused on the potential role of oral health professionals in the management of incidents, outbreaks, and emergencies (rated at 68%).

The respondents provided additional data through their comments about the sub-competencies and how they are developed over time. The following quotes reflect this discussion about the continuum of learning:

They [abilities in communication] certainly reflect competencies that would/should be better developed in baccalaureate students ... however most are necessary and incorporated at the diploma level.

Emphasis on finding, retrieving, and applying best evidence in critical thinking and clinical practice would normally increase from diploma to baccalaureate.

Some [policy use competencies] must be included at the diploma level and many will be enhanced with graduate education.

Others addressed the substantive difference question. Some framed their ideas in broad terms while others were more specific. Some examples of that discussion follow:

Level in research use is one of the biggest noted differences in degree completion students. Although they [diploma graduates] arrive in class with the basics, their ability to compile and make a decision using research is limited.

I find diploma-level students upon entering degree program know very little about policy development. ... This is certainly an area that is to be developed further.

The diploma competency [in health promotion] is evident at the individual level but the degree level has emphasis on the community or public or government level.

Perhaps one clear way to distinguish between diploma level and baccalaureate level is the emphasis on individuals versus organizations and communities.

The greatest differences [in clinical therapy] are likely to be with regard to services in diverse contexts in community settings and with diverse populations.

The challenge of differentiating between diploma and baccalaureate outcomes in the Canadian dental hygiene context was identified by several respondents and related to the *National Dental Hygiene Competencies for Entry-to-Practice: Release 3*⁴ that was not associated with a credential. The following comments were made in the Round 1 data when the verbs were written at a higher level. They provide insights into a policy issue that may be important in understanding the findings from this study:

First, I wonder if the present diploma competencies that exist today are at ... a higher level than other diploma level health workers. ... We set the standard very high when these [ETP competencies] were developed. Whether these competencies were ever achieved is another issue entirely.

A historical problem in the “emerging professions” has been this need to “be everything” at ETP when other established professions have had a “natural evolution” that is by far more realistic ... basic degree at ETP, advanced degrees moving along the scholarship continuum. The vast majority of the abilities proposed thus far for the BScDH are far along that continuum. Why, because the diploma abilities [ETP competencies] are written at a high level which if truly, honestly evaluated are not achieved at the time of ETP with a diploma.

DISCUSSION

Overall the respondents had experience in a wide range of professional roles and practices over many years; they all held a credential above the baccalaureate level. This

suggested that the respondents possessed the depth of knowledge accompanied by diverse responsibilities and experiences to enable them to participate in deliberations about baccalaureate dental hygiene education.

All of the domains included sub-competencies rated as being substantively different at $\geq 50\%$ in the “great extent” category and appear to make some contribution to the analysis of the differences between diploma and baccalaureate education. This finding is supported by governmental and health professional policy documents that suggest an ongoing development of domains in baccalaureate and master’s programs (eTable P).^{3,16-18,33,35,36,38-40,44-47}

These data support the view that dental hygiene education reflects a continuum of gradually increasing abilities in domains that are central to diploma and baccalaureate education. Previously, Sunell et al. also found that differences between diploma and baccalaureate education appear to lie in the further development of abilities initially acquired in diploma education.¹⁵ The differences were suggested to be in the deepening of knowledge and abilities focused on practice judgements. A recent study by Kumm et al. identified baccalaureate nursing outcomes met, partially met or not met by associate degree programs in Texas according to faculty members of those programs.¹⁹ The narrative comments illustrated that competencies were often rated as partially met as a result of the “depth and breadth” characteristics not being fulfilled.

The expectations of undergraduate and graduate education developed by the CMEC¹⁶ (eTable A) and operationalized by the provinces (eTable B) also reflect such a continuum.^{16-19,45} The CMEC expectations are threaded throughout the domain competencies, and are particularly apparent in the domains related to research use, integration of knowledge and communication, for example. In addition, all of the expectations are evident in the problem-solving abilities inherent in the process of dental hygiene care model referred to as ADPIE (Assessment, Diagnosis, Planning, Implementation, and Evaluation). Table 4 highlights the domain competencies in which each of the CMEC expectations are emphasized. The Ontario resource¹⁷ was selected for this exploration given its unique Canadian analysis of baccalaureate education from a 3-year and 4-year perspective.

The domains and their associated sub-competencies that appear to best explain the differences between diploma and baccalaureate dental hygiene education include advocacy, policy use, research use, and health promotion. Many of these differences appear to be expressed through the cognitive aspects fundamental to dental hygiene practice. See eTable Q for a summary of the research studies and policy documents that support the differences between diploma and baccalaureate competencies identified in this Delphi study.^{2,13-15,19,44}

The substantive differences of the advocacy (eTable C) and policy use (eTable D) domains are supported by the Kumm et al.¹⁹ study; outcomes related to evidence-based practice, health care policy, and advocacy were included in the competencies that were not met by associate degree programs. The associate nursing faculty members indicated that the policy area included content better taught in baccalaureate programs. The Texas Board of Nursing Committee (TBNC) examines the advocacy abilities of diploma/associate degree graduates' with regard to individuals and families, whereas baccalaureate graduates are examined on their ability to advocate in the policy area.⁴⁶ It is important to keep in mind that the diploma/associate degree nursing programs in Texas reflect 60 to 72 credit hours whereas the baccalaureate programs in nursing reflect 120 to 130 credit hours.

The research use domain (eTable E) is also supported by other studies. In the DHEC study, 77% of respondents agreed or strongly agreed that baccalaureate graduates would have increased abilities to support research initiatives when compared to diploma graduates.² In the qualitative study by Kanji et al., the outcomes of baccalaureate education included themes around critical thinking and evidence-based decision making.¹⁴ Sunell et al. also found that the differences between diploma and baccalaureate education were often described in the context of research use and, more specifically, abilities related to the critique of methodology, analysis of information, prioritization of elements, extrapolation of information, and practice judgements.¹⁵

The domain of health promotion (eTable F) is best understood by exploring the difference in providing services for individuals as opposed to groups, communities, and populations. As one respondent indicated, "perhaps one clear way to distinguish between diploma level and baccalaureate level is the emphasis on individuals versus organizations and communities." A respondent from the Kumm et al. study indicated that "our curriculum focuses on assessing patients and families; it does not extend to groups, communities or populations."¹⁹ The TBNC differentiates between diploma/associate degree and baccalaureate degree education by focusing on the differences in patients served: the patients of diploma/associate degree graduates include individuals and their families; the patients of baccalaureate graduates include individuals, families, populations, and communities.⁴⁶ In the Portillo et al. study of 26 baccalaureate degree completion programs in the United States, respondents reported core courses in research (n=23), practicum, internship/externship (n=17), and advanced community oral health (n=12).¹³ Public or community health was also identified as an area of emphasis in 10 programs. This is not to suggest that dental hygiene diploma graduates have no experience in community practice. However, they may not have reliably demonstrated their abilities nor gained

the depth and breadth in such contexts comparable to baccalaureate graduates given the limited time available in diploma programs for such field experiences.

Other sub-competencies in other domains were also viewed as being substantively different to a great extent. In the coordination domain (eTable G) the greatest difference involved abilities around quality assurance standards and culturally relevant approaches. This finding is supported by the Kumm et al. study, in which quality assurance was indicated as being better taught at the baccalaureate level.¹⁹ Increased coordination abilities were also present in the Sunell et al.¹⁵ data and the TBNC⁴⁴ competencies.

In the clinical therapy domain (eTable H), the sub-competencies that had the highest ratings as substantively different were the assessment abilities. Similarly, Sunell et al. reported abilities in the assessment and evaluation area as rated higher (in the 65% to 85% range for improved) compared to the diagnosis, planning, and implementation abilities that ranged from 55% to 71% improved.¹⁵ Graduates discussed their increased abilities from an evidence-based perspective and related them to better and safer care. Respondents in the Kumm et al. study indicated that diploma graduates lacked experience with a variety of clinical settings and clinical populations.¹⁹ In the Kanji et al. study the client care focus was expressed through the theme of "comprehensive care" with its emphasis on critical analysis and an increased knowledge base to support client education and other services; respondents indicated that the quality of their care had improved with baccalaureate education.¹⁴ The difference in clinical therapy appears to reflect an increased depth of critical thinking, rather than increased competence with technical skills.

The sub-competencies with higher ratings in the oral health education (eTable I) domain included a focus on the dissemination of information, health literacy, and integration of oral health issues. The respondents in Kanji et al. discussed their increased confidence in and ability to provide client education.¹⁴ This domain is also supported by Portillo et al. who found that 66% of the degree completion programs included a course on educational methodology.¹³

The sub-competencies that had the highest ratings in the leadership (eTable J) domain involved political awareness, initiating and managing change, continuous improvement, and vision of the profession. These data are supported by several sources. The DHEC respondents² agreed or strongly agreed (77%) that the ability to facilitate change was a distinction of baccalaureate education. The *Core Competencies for Public Health in Canada*²⁶ developed at the baccalaureate level included a leadership domain; a related document³ in dental public health showed how leadership could also be developed at the diploma level. In addition, Portillo et al. found that 31% of the dental hygiene degree completion programs in the United States included a course on leadership.¹³

The sub-competencies that had the highest ratings

in the knowledge integration (eTable K) domain focused on research use and evaluation. This finding is supported by federal and provincial documents^{16-19,45} and other studies^{14,15}. The respondents in the Kanji et al.¹⁴ and Sunell et al.¹⁵ studies also discussed an increased knowledge base associated with baccalaureate education and linked this discussion with their increased abilities to use research.

The sub-competencies in disease prevention, professionalism, communication, and collaboration appear to be more similar to diploma education than those in the other domains. However, these domains each included at least one sub-competency that was rated at 50% or higher in the “great extent” category. In the disease prevention domain (eTable L), the sub-competency focused on evidence-based issues. In the professionalism domain (eTable M) the sub-competency pertained to dealing with ambiguities and incomplete information. The CMEC¹⁶ and COU¹⁷ expectations also identify “an appreciation of the uncertainty, ambiguity and limits of knowledge as being related to 4-year baccalaureate programs.” The evaluation theme was evident in the sub-competency in the communication domain (eTable N), and coaching, mentoring, and networking were the focus of the sub-competency in the collaboration domain (eTable O). However, an examination of the combination of the “some extent” and “great extent” data reveals that many of the sub-competencies in these three domains articulate areas in which degree graduates gain further depth of abilities. From a regulatory perspective, the COU expectations of “initiative” and “accountability” are identified as being distinctive of 4-year as opposed to 3-year baccalaureate education (eTable B).¹⁷

Further qualitative analysis was conducted to explore the themes across domains as expressed in overlapping verbs and phrases in the sub-competencies and respondents’ comments (eTable R). The critical thinking perspective with a particular emphasis on the use of research permeates the sub-competencies across domains. This finding is supported by other studies in Canada,^{2,14,15} and by federal and provincial documents.^{16-19,45} Another related theme from this analysis is “evaluation” from a quality assurance perspective; it was associated with measuring, monitoring, and reporting across the domains.

Since the implementation of the 6-term dental hygiene diploma in the Ontario colleges and institutes, the great majority of Canadian diploma programs require 3 academic years; hence the Delphi study focused on the abilities of 4th year. While the CMEC¹⁶ articulated the expectations of baccalaureate, master’s and doctoral programs, no sources of comparative information could be found for diploma and baccalaureate outcomes. The documents about diploma outcomes tend to be generic in nature, focusing on abilities such as critical thinking, problem solving, communication, numeracy, and interpersonal abilities²⁰ without clarifying the difference between 2- and 3-year diplomas let alone

baccalaureate degrees. However, the COU document compares the expected outcomes of 3-year and 4-year baccalaureate degrees (eTable B).¹⁷ These differences are expressed through such phrases as:

- *general* knowledge versus *developed* knowledge
- *broad* understanding versus *critical* understanding
- critical thinking versus *developed* critical thinking
- using a *basic range* of established techniques versus using *a range* of established techniques
- communicating *accurately and reliably* versus communicating *information, arguments, and analyses accurately and reliably*
- exercising *personal responsibility and decision-making* versus exercising *initiative, personal responsibility and accountability in both personal and group contexts*

These examples support the views of the respondents who suggested that some of the competencies currently expressed as Canadian diploma outcomes may be at a 4-year baccalaureate level and that these competencies “if truly, honestly evaluated are not achieved” within diploma programs. This perspective is also supported in the TBNC document, which differentiates between diploma/associate degree and baccalaureate nursing abilities (eTable Q).⁴⁴ The fact that seven of the sub-competencies taken directly from the entry-to-practice document⁴ were rated over 50% (ranging from 56% to 89%) as substantively different from diploma competencies also suggests that the entry-to-practice competency document may not be realistic for diploma programs.

The national entry-to-practice competencies⁴ had their intended effect of moving dental hygiene education forward as evidenced by the addition of 2 terms to the Ontario programs. However, the document may also be obfuscating the discussions about differences between diploma and baccalaureate competencies, as well as negatively influencing efforts to establish baccalaureate dental hygiene programs as recommended in the *Pathways to Support the Oral Health of Canadians*.⁴⁸ This is an example of destructive interference between policy documents within a profession.

Another confounding variable in our policy environment is that many dental hygienists in Canada are self-initiating at the diploma level, while the standard for self-initiation in the great majority of health professions occurs at the baccalaureate level. This reality suggests that dental hygiene diploma graduates have abilities that are commonly attributed to baccalaureate graduates in other health professions, which again blurs the boundaries between diploma and baccalaureate education within our profession and externally.

Given the results of this study, it would be timely to review the 2008 national entry-to-practice competencies. They may not realistically reflect the ETP standard for the

profession and thus may create challenges for dental hygiene education, examination, accreditation, and regulation.

To capture the results of the Delphi study, the following definition of baccalaureate graduates was developed. Graduates of baccalaureate dental hygiene programs

are primary oral health care providers guided by the principles of social justice who specialize in services related to health promotion, disease prevention, oral health education, and clinical therapy.

are skilled in applying scientifically sound research to practice decisions and making autonomous judgements to support not only individuals but also groups, communities, and populations, allowing them to increase control over and improve their oral health.

are able to provide oral health services for diverse clients including those with evolving medically complex needs throughout the life cycle. They have had the opportunity to provide services in a variety of practice environments where they have worked collaboratively with clients and members of their support network such as guardians, and other professionals to enhance the quality of life of their clients and the public.

have an increased potential to improve access to dental hygiene services through their advocacy abilities and more nuanced understanding of the policy process, interprofessional collaboration, health promotion, and research use.

Limitations

While validated criteria⁴³ were used in the selection of the study participants, the selection process may still have introduced a source of error.^{22,23,24,26} CDHA's email solicitation of experts resulted in 370 expressions of interest, but only 62 respondents had a master's credential or higher; the majority had diploma education. The number was further reduced as 35 respondents had not published in a journal or book, been recognized with an award or presented by invitation in the past 3 years. Of the remaining 27 respondents, 3 were eliminated as the only network they identified was CDHA membership; they had not been involved in their profession at a local, provincial or national level and they did not indicate any networks within their employment organization or external to it within the past 3 years.

Given the self-selection process, the response was lower than anticipated. However, another group of experts who also met the inclusion criteria (n=10) was involved in the study through the creation of CDHA's Advisory Committee. The development of the initial competency framework is often described as the first step in the Delphi process.^{24,50} The experts on the advisory committee generated the draft competency document that formed the basis of the Delphi study using a consensus approach. They were immersed in ongoing collaborative analyses

involving the integration of data within the subsequent rounds. Their involvement lasted over a 2-year period and helped to offset the low response rate that is not unique to our study^{50,51} or the dental hygiene profession.⁵² Sixteen program directors were involved in an American Delphi study of clinical competence for initial licensure, representing a 7% response rate.⁵⁰

As many proponents of the Delphi approach suggest, the selection of experts, number of experts, and number of rounds to include are often influenced by the question being posed and the funding available.^{22,23,26} The methodological parameters selected for the study were all grounded in the literature pertaining to the Delphi approach. Respondents expressed confidence in their ratings; only one item was rated below 70% confidence and it pertained to the potential role of oral health professionals in the management of incidents, outbreaks, and emergencies, a role that is an emerging issue in oral health.¹⁵ While other groups of respondents may have provided different ratings, the outcomes of this study help to expand our understanding of the boundaries between diploma and baccalaureate dental hygiene education.

CONCLUSION

Dental hygiene education includes a group of domain competencies that are foundational to all dental hygiene education credentials. The domains provide a framework for exploring the continuum of dental hygiene education from diploma to master's degree. However, the domains and associated sub-competencies that best explain differences between diploma and baccalaureate dental hygiene education are advocacy, policy use, research use, and health promotion. These differences are mainly expressed through increased knowledge and depth of abilities in cognitive areas and diverse practice contexts.

The results of this study have the potential to support work in post-secondary education including that of educators and administrators as they deal with program implementation, articulation, and transfer activities. This study may also inform the work of other national organizations including regulatory, accreditation, and examination organizations. The data have already been used to develop a standalone document reflecting 4-year baccalaureate dental hygiene education.⁵³ It would be helpful to explore the views of baccalaureate graduates regarding the outcomes of their education; such data would help to support or question the competencies arising from this Delphi study and their substantive difference from diploma outcomes. A review of the national entry-to-practice competencies⁴ is also recommended. It is important to expand our understanding of the abilities gained through diploma and baccalaureate education; this study provides a waypoint from which to develop this knowledge.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the staff members at the Canadian Dental Hygienists Association for their support and input in this study; it was their commitment to an evidence-based approach that resulted in the implementation of the Delphi study. We would also like to thank the other members of the advisory committee who collaborated in this project over a 2-year period: Rebecca Chisholm, Sharon Compton, Bonnie Craig, Michele Darby, Stephanie Gordon, Patricia Grant, Stacy Mackie, Susan Matheson, and Nancy R Neish.

DUALITY OF INTEREST STATEMENTS

Susanne Sunell: I was paid as a consultant for the design, implementation, and analysis of the Delphi study, and also served as a representative of the Canadian Association of Public Health Dentistry on the Canadian Dental Hygienists Association (CDHA)'s Advisory Committee. My remuneration also included partial payment for the development of this manuscript.

Joanna Asadoorian: I am currently working on contract with the Canadian Dental Hygienists Association and am involved in various volunteer positions with CDHA.

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Hand function evaluation for dental hygiene students

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ABSTRACT

Purpose: Dental hygiene students may struggle with hand function performance during their training. Currently, there is no universal aspect of dental hygiene programs that screens for hand function issues, nor is there a protocol in place to help students who lack needed hand function skills. The purpose of this study was to examine whether hand function could improve with specific hand function exercises and whether any improvement would be evident in higher instrumentation scores as a result of hand function exercises. **Methods:** A convenience sample of 20 dental hygiene students consented to participate in this 6-week pilot study. At the start of the study, an occupational therapist tested the hand function of the participants using 4 occupational therapy evaluations, which tested the students' dexterity, motor skills, and pinch and grip strength. The results were recorded, and the students began a focused, 6-week hand function exercise regimen. After 6 weeks the same 4 evaluations were performed and the pre- and post-test data were compared using both a dependent t-test and a simple ANOVA test. **Results:** Results revealed significant improvement in assessed hand function following the test exercises. Scores measuring the use of a periodontal probe and 11/12 explorer when compared to student scores from the previous 5 years showed no significant differences. Of the 20 students enrolled in the study, 3 students dropped out leaving 17 to complete the study. **Conclusions:** This study demonstrated that 6 weeks of specific hand exercises improved students' hand function scores. However, this raised level of hand function did not carry over to increased instrumentation proficiency.

RÉSUMÉ

Objectif : Au cours de leur formation, il arrive que les étudiants en hygiène dentaire aient des problèmes de fonction de la main. Dans les programmes d'hygiène dentaire existants, on ne trouve aucune approche reconnue pour évaluer les questions de fonction de la main, ni de protocole pour aider les étudiants qui n'ont pas les habiletés de fonction de la main requises dans le cadre de leur formation. La présente étude a pour objet de déterminer si la fonction de la main pouvait être améliorée par un programme d'exercices spéciaux et d'établir si ces exercices se traduiraient par une amélioration évidente des résultats sur le plan de la manipulation des instruments. **Méthode :** La population étudiée était composée d'un échantillon de commodité de 20 étudiants en hygiène dentaire qui ont accepté de participer à cette étude pilote de 6 semaines. Au début de l'étude, un ergothérapeute a évalué la fonction de la main des participants au moyen de 4 évaluations d'ergothérapie qui mesuraient la dextérité, les habiletés motrices et la force du pincement des doigts et de la préhension. Les résultats ont été consignés et les étudiants ont commencé un programme d'exercices de fonction de la main de 6 semaines. Par la suite, les mêmes évaluations ont été effectuées et les données des prétests et des post-tests ont été comparées en utilisant un test t dépendant et une simple analyse de la variance. **Résultats :** Les résultats ont montré que la fonction de la main a été grandement améliorée par les exercices de l'étude. Les résultats d'évaluation des étudiants sur l'utilisation de la sonde parodontale et sur l'explorateur 11/12 n'affichaient pas de différence significative avec ceux des 5 années précédentes. Parmi les 20 étudiants inscrits à l'étude, 3 ont abandonné et 17 ont complété l'étude. **Conclusion :** Cette étude a montré que l'application d'un programme de 6 semaines d'exercices spéciaux a amélioré le résultat de l'évaluation de la fonction de la main des étudiants. Par contre, cette amélioration de la fonction de la main n'a pas donné lieu à une meilleure compétence sur le plan de la manipulation des instruments.

Key words: dental hygiene education, dental hygiene instrumentation, evaluation, hand function, motor skills

INTRODUCTION

Dental hygiene students may possess sufficient affective and cognitive skills to be successful in the rigorous didactic portion of a dental hygiene program. However, any of those same students may be deficient in the hand function component of psychomotor skills needed to successfully complete a dental hygiene program and become a licensed professional. Schwartz wrote, "hand function includes range of motion, sensation, coordination, dexterity, fine motor skills, as well as grip."¹ Individuals who suffer from reduced hand function find it hard to use their hands for

everyday activities.² Hand function includes strength to move muscles, dexterity to perform precise movements, and eye-hand coordination when manipulating objects.³ Dong and colleagues concluded that the development of fine motor and manual dexterity skills early in dental hygiene programs could help students succeed and may facilitate student retention.⁴

In addition, good hand function is essential for the practising hygienist. Musculoskeletal disorders (MSD) occur at alarming rates, with the prevalence of work-related MSD

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Submitted 30 March 2015; revised 25 June, 14 August, and 2 September 2015; accepted 10 September 2015

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among dental professionals ranging from 64% to 93%.⁵ Further, Morse and colleagues concluded that MSD can occur while students are in dental hygiene school and that onset can be rapid.⁶ Therefore, assessing hand function and teaching techniques and exercises to reduce MSD in dental hygiene schools may help to increase job satisfaction, safety, and longevity for graduates.

Hand function tests are readily available and their reliability and validity have been confirmed. Occupational therapists across the United States have the tools and resources to test dental hygiene students' hand function.⁴⁻⁷ Various studies have shown the applicability of occupational and physical therapy assessments for dental hygienists particularly in regard to biomechanics and ergonomics, including working postures,⁸ hand/arm vibration,^{9,10} and hand load and pinch force in regard to finger rest positions.⁴ Occupational therapists used hand function tests similar to those selected for this study in a 6-week manual dexterity program to show increased fine motor skills in a group of dental hygiene students.¹¹

The purpose of improving hand function is to strengthen the small muscles in the hand and repair or develop the pinching and thumb motion to improve quality of life.¹² For the dental hygienist this could translate into the prevention of a potentially career-altering injury. Occupational therapists use a variety of resources and exercises to help improve hand function.¹³ Functional activities should be included for occupational hand function exercises because they provide excellent means of increasing strength, fine motor skills, and endurance.¹⁴

The purpose of this study was to evaluate whether hand function testing and follow-up exercises would be beneficial tools to improve dental hygiene students' use of equipment and enhance student success in the dental hygiene program. To quantify the evaluations, 2 research questions were proposed: (1) Did hand function of dental hygiene students improve after recommended hand function exercises were completed? (2) Did students who completed hand function exercises score higher on the periodontal probe and 11/12 explorer evaluations than students in the 5 previous years who were not similarly evaluated nor prescribed particular exercises?

METHODS

A longitudinal quantitative research design using a panel study was created to include 20 dental hygiene students admitted to a dental hygiene program for the 2013 fall semester. Prior to the start of the semester, program applicants were contacted by the primary researcher to ask for their voluntary participation in this research. Volunteers understood that their participation would not have any impact on their enrollment in the program. The study was approved by East Tennessee State University and Waukesha County Technical College's Institutional Review Board, and each participant was given a copy of the informed consent document. The consent form informed participants of the

objectives of the study, assured their anonymity, and noted that their participation/non-participation would have no effect on how their individual performance in the dental hygiene program was evaluated. All participants were females between the ages of 20 and 39.

Each study participant was assigned a confidential number generated from the random number generator in Excel so that student anonymity would be maintained when faculty at the dental hygiene program reviewed this study. During evaluation sessions, the study participant and the occupational therapist were the only persons in the room; the therapist recorded all information produced by the hand function evaluations.

All evaluations were performed in a classroom setting. The same occupational therapist certified in hand therapy completed all evaluations. As recommended by previous studies all evaluations used the 3-trial mean with the exception of the Box and Block Test (Patterson Medical, Ohio) where a 3-trial mean was found to be unnecessary. A literature review indicated that this test needs to be completed only once for each hand.¹⁵

Purdue Pegboard Test

This test, developed in 1948, measures fine finger dexterity.¹⁶ The 3-trial testing of the Purdue Pegboard Test (Lafayette Instrument, Indiana) had a reliability rating of "excellent."¹⁷ The Purdue Pegboard Test is composed of 4 evaluations. For each evaluation, the occupational therapist conducting the test first demonstrated to the student what to do. Then, the student was given a chance to practise and ask questions. Each student started with her dominant hand and had 30 seconds to place as many pegs as she could in the holes on her dominant side only, starting from the top of a row and taking pegs out of a cup on her dominant side only. Then, the same test was performed on her non-dominant side. Next, the student was asked to use both hands at the same time, picking up pegs from the right-side cup with her right hand and pegs from the left-side cup with her left hand. In a final test, the student placed pegs in holes in unison, starting on the top row and working down the vertical columns.

For each of the above tests, the number of rows that had pegs was counted and recorded in an Excel spreadsheet using only identification numbers. These 3 tests provided the first 3 scores. A fourth score was calculated by totaling the numbers of the first 3 tests.

The last part of the Purdue Pegboard Test has each student assemble units by picking up a peg with the dominant hand, placing the peg in the top hole in the column of their dominant hand, and then picking up a washer with their subordinate hand and placing it over the peg. Finally, the student picks up a collar with her dominant hand, places it over the washer, and then proceeds to pick up another washer with her subordinate hand and drop that washer over the collar. This process is counted as "one assembly."

Each student was given 60 seconds to complete as many assemblies as possible. The student received credit for the total parts that were on the board correctly. Because an “assembly” has 4 parts, the student received credit for 4 items per assembly. For each uncompleted assembly, parts placed within the given time were added to the assembly score.

The 4 tests listed above were performed 3 times each, and test scores were averaged to obtain the most reliable scores per category.¹⁸ After each test, the students’ scores were recorded in an Excel spreadsheet, again using only their identification numbers.

Box and Block Test

This test is manufactured by Patterson Medical and is used to evaluate manual dexterity. Yancosek and Howell have recommended the Box and Block Test as the assessment of choice to evaluate manual dexterity because 5 Level 2b studies established its reliability and validity.¹⁶

The goal in this test is to move as many blocks from one side to another side, with the participant’s fingers breaking the plane of a partition. The Box and Block Test board was placed lengthwise in front of the participant. In the study, the occupational therapist first demonstrated how the test should be done. Next, the student was given 15 seconds to practise with each hand, and was also given a chance to ask questions. The participant then had one minute to transfer as many blocks as possible, moving one block at a time from the side holding the blocks to the other, empty side of the box. Two one-minute tests were done. In the first test, the participant used her dominant hand; in the second test, her subordinate hand was used. Students were instructed to move only one block at a time. (If more than one block is moved simultaneously across the partition, it is counted as one block). Blocks dropped onto the table or floor were counted as long as the participant’s hand crossed the partition. Participants were instructed not to waste time picking up any blocks that fell onto the table or floor. At the end of each test, the number of blocks moved from one side to the other was counted. This test needs to be completed only once for each hand.¹⁵ All individual scores were recorded in the Excel spreadsheet using the student’s identification number.

Three-point prehension pinch test

The B & L Pinch Gauge (B & L Engineering, California) was used to evaluate the participant’s pinch strength as this gauge was found to be the most accurate for pinch strength tests.¹⁹ In the study, the occupational therapist demonstrated the test to the student and then answered questions about it. Students were seated, with the shoulder of the hand being tested relaxed, and with the elbow bent at a 90-degree angle. Then, the student was instructed to squeeze the B & L Pinch Gauge as hard as she could for 3 seconds, using only her thumb, index finger, and long finger. There was a 10-second rest between squeezes. Each

hand was tested 3 times; the scores were averaged per hand. Both hands were tested using the same procedure. Again using only identification numbers, pinch strength scores were recorded in the Excel spreadsheet for each student.

Grip strength

Grip strength was tested using a JAMAR® Hand Dynamometer (Patterson Medical, Ohio), as it was determined to be the best measure for grip strength.¹⁹ As in the pinch test, the occupational therapist demonstrated the test to the student and then answered any questions. Students were seated with their elbow at a 90-degree angle to their body for the hand that was tested first. Similar to the pinch test, each student was instructed to squeeze the JAMAR® Dynamometer as hard as she could for 3 seconds with a 10-second rest between squeezes. Each hand was tested 3 times, scores were averaged per hand, and results for hand strength were recorded by identification number.

Exercises

At the conclusion of the 4 hand function evaluations, the occupational therapist demonstrated hand function exercises and provided each study participant with materials to complete the exercises on their own. Participants were asked to complete the exercises twice a day for a period of 6 weeks. At the 6-week mark, hand function was re-evaluated by the occupational therapist.

Exercises to improve grip and strength called for Norco™ Exercise Putty, which is a material recommended by occupational therapists to strengthen muscles and improve dexterity and coordination.²⁰ The occupational therapist in this study recommended medium-soft light (green) putty for all participants; putty was provided by the technical college. Each participant was given written directions on how to use the putty for each grip and pinch exercise. A copy of the Norco™ Exercise Putty Instructions was provided to the students, and the occupational therapist also demonstrated proper exercise technique.

To improve pinch strength, all participants were instructed to shape the putty into a ball and pinch the putty between their thumb, index, and middle fingertips until the fingers pressed through the putty. To strengthen grip, it was suggested that participants place the putty in their palm and press their fingers through the putty until their fingertips touched their palm. This action results in a clenched fist. These exercises are listed as 1) Finger Press and 10) Finger Pinch on the Norco™ Exercise Putty Instructions.²⁰ Participants were instructed to reshape the putty and continue the 2 exercises for 5 minutes each, 1 to 2 times each day with (only) their dominant hand.

To improve gross and fine motor skills and coordination, the occupational therapist recommended that the participants (1) thread various-sized beads on a string and (2) use tweezers to pick up and move uncooked rice kernels from one paper plate to another. All items were provided to the participants by the technical college. For both (1) and

(2), it was suggested that each exercise be performed for 5 minutes, 1 to 2 times a day with their dominant hand. All participants were shown how to do the exercises correctly by the occupational therapist.

After the 6-week exercise period, each student submitted her own exercise log sheet to the occupational therapist. Seven of the students recorded that they did the exercises most days. Six students did them about 50% of the time, and 4 of the students failed to exercise on more than half of the days. The 4 hand function tests were again conducted on the 17 remaining students to compare current hand function to that measured prior to the 6 weeks of assigned exercises. The same test methods and test equipment were used; testing was done by the original occupational therapist. Test data were entered into the Excel spreadsheet in the same way the first testing procedure was recorded.

Instrumentation scores

The second research question of this study focused on final scores of the periodontal probe and 11/12 explorer evaluations of the study participants versus students across the previous 5 years. All dental hygiene students at the technical college are evaluated on the periodontal probe and the 11/12 explorer utilizing a rubric for each instrument. Each student is asked to demonstrate proper use of the instrument on a typodont while an instructor observes and uses the rubric as a checklist. The grading rubric includes elements of proper instrumentation such as grasp, fulcrum, adapting the correct end of the instrument, keeping the tip in contact with the tooth, rolling instrument to maintain correct instrument adaptation, covering all surfaces systematically, using hand and wrist as one unit, using correct walking stroke, and effectively using mirror. The student's technique is graded as acceptable or unacceptable for each criterion. Instructors are calibrated prior to the exam. The grades for all 17 study participants for the periodontal probe and 11/12 explorer assessment were recorded in an Excel worksheet. Student scores from 2008–2012 were also recorded on the same type of form for comparison.

Statistical analysis

PASW Statistics Student Version 18 was used for final calculations. The first hypothesis of whether hand function scores would increase after completion of the test exercises was calculated using the t-test for dependent samples. To test the hypothesis that students who completed hand function exercises would have higher final scores on the periodontal probe and the 11/12 explorer evaluations than students from the 5 previous years, a simple ANOVA test was employed. Confidence levels of 95% ($\alpha = 0.05$) and p-values of 0.05 were used for all calculations.

RESULTS

At the 6-week (second hand function evaluation) mark, 17 of the 20 initial study participants remained in the study and completed the function re-evaluation. Three students dropped out of the study because they had decided not to continue in the dental hygiene program: 1 student left to pursue a master's degree in a different field, and 2 dropped out after struggling in didactic and clinical classes. These last 2 students scored the lowest in dexterity testing in the first hand function evaluations. Fifteen of the students who completed the study were right-hand dominant and 2 were left-hand dominant.

Six-week hand function re-evaluation

The null hypothesis failed to be rejected as no statistically significant differences were found between the pre-test and post-test results of hand function evaluations for the Purdue Pegboard Both Hands Three Trial Mean (Table 1) and Hand Strength Test Right Hand Three Trial Mean.

Significant differences were found between the pre-test and post-test results of the hand function evaluations for the Purdue Pegboard Right Hand Three Trial Mean, ($p=0.0001$), Purdue Pegboard Left Hand Three Trial Mean, ($p=0.009$) Purdue Pegboard Sum of Right Hand, Left Hand and Both Hands, ($p=0.0001$) Purdue Pegboard Assembly Three Trial Mean ($p=0.027$), Box and Block Test Right Hand ($p=0.002$), Box and Block Test Left Hand ($p=0.0001$), Pinch Strength Test Right Hand Three Trial Mean ($p=0.019$), Pinch Strength Test Left Hand Three Trial Mean ($p=0.013$), and Hand Strength Test Left Hand Three Trial Mean ($p=0.002$).

Table 1. Pre-test and post-test results of hand function evaluations

Variable name	P	Effect size ^b	Observed power	Mean (CI)
Purdue Pegboard Both Hands Three Trial Mean	0.500	0.167	0.039	95%
Purdue Pegboard Assembly Three Trial Mean	0.027 ^a	0.059	0.598	95%
Box and Block Test Right Hand	0.002 ^a	0.881 (large effect)	0.910	95%
Pinch Strength Test Right Hand Three Trial Mean	0.019 ^a	0.631 (moderate effect)	0.659	95%
Hand Strength Test Left Hand Three Trial Mean	0.002 ^a	0.886 (large effect)	0.914	95%

^aStatistically significant

^bEffect size: 0.2 = small effect; 0.5 = moderate effect; 0.8 = large effect

Comparison of instrumentation scores

The null hypothesis failed to be rejected for the instrumentation scores for the periodontal probe ($p=0.865$) (Table 2) and the 11/12 explorer ($p=0.080$) as no significant differences in scores compared to the 5 previous years were found.

DISCUSSION

In this study, hand function significantly improved on 9 of the 11 components of hand function after 6 weeks of directed exercises. In evaluating whether the hand function exercises had a positive impact on the students' instrumentation proficiency, scores for the periodontal probe and 11/12 explorer were compared to the scores of students over the past 5 years. No significant differences were seen. Because dental hygienists do a great deal of their work below the gum line, they must learn to "visualize" with their sense of feel. Learning how to use the periodontal probe and 11/12 explorer successfully involves knowledge of tooth anatomy and the ability to identify different parts of that anatomy through a sense of touch. First semester students are still learning the anatomy of teeth and may not possess the knowledge needed to improve significantly enough on these instruments in the first 6 weeks of the semester.

A study conducted by Evans et al. with 14 participants found similar results to this study.¹¹ Fine motor skills and strength of the participants were evaluated using the Crawford Small Parts Manual Dexterity Test, the JAMAR® Dynamometer and the JAMAR® Hydraulic Pinch Gauge. Hand exercises were completed over a 6-week period by participating students. The study concluded that a manual dexterity program improved dental hygiene students' grip strength and general hand-eye coordination. No other similar studies could be found in the literature, thus reinforcing the need for further research in this area.

In this study, the Purdue Pegboard Test was found to be very effective as an evaluation tool, and thus should be considered as an essential part of any future research on this topic. The Box and Block Test was not supportive in any of the identifying conclusions; future studies could omit the Box and Block Test. The strength test information was valuable, especially if future studies follow participants over a longer period of time. It would also be helpful if all participants were at the same level of compliance in doing hand function exercises.

It is recommended that any studies following this pilot study include hand function evaluations as well as exercises initiated prior to the first week of program classes. The purpose, here, would be to evaluate whether weak students could improve enough to be successful beyond the second week of the program. As this study found hand function to improve over a 6-week period, it is recommended that a follow-up study begin 6 weeks prior to the first day of the dental hygiene semester. It may be helpful to conduct weekly hand function tests after to determine if, in fact, a full 6 weeks of hand function exercises are necessary, or if improvements could be made with fewer weeks of exercises. If fewer weeks of exercises are called for, exercise compliance may also improve.

Four of the initial 20 study students tested were particularly weak, with the 2 weakest students ultimately not completing the semester. Anecdotally, an instructor observed that hand function weakness was especially evident in the second week of clinic, when students were asked to sit in a dental provider chair and use a cotton tip applicator to point to various teeth and tooth surfaces with their dominant hand, as directed by the instructor, while the subordinate hand retracted the cheek of the dental typodont. The key functions that students had difficulty performing were mainly tasks that required concurrent use of both hands, as well as tasks that involved simultaneous manipulations different for each hand (H. Schlei, personal communication, December 26, 2013). This observation could provide insight into the development of further research. Ultimately, one measure of projected student success in a dental hygiene program might be directly tied to an initial hand function evaluation.^{4,11}

Special emphasis should be given to the assembly portion of the Purdue Pegboard Test because this test most resembles actual dental hygiene work since dental hygienists use their subordinate and dominant hands simultaneously, but in different motions. Across all hand function evaluations included in this study, it was on the Purdue Pegboard Test that the dental hygiene students had their best results; the majority of students tested well above the norm. All study students testing at the 40th percentile and higher of this test successfully completed the first semester of their dental hygiene curriculum, while the 2 weakest students, who scored at the 4th and 19th percentiles respectively, did not complete the semester.

Table 2. Periodontal probe grades, 2008–2013

ANOVA					
	Sum of squares	df	Mean square	F	Sig.
Between groups	162.694	5	32.539	0.375	0.865
Within groups	8771.573	101	86.847		
Total	8934.267	106			

Based on this study, we can hypothesize that the 40th percentile may be the floor or cutoff point for students to successfully complete the first semester of a dental hygiene program, subject, of course, to further review.

To assess if pinch or hand strength relates directly to student performance and ultimately vocational success, future studies could follow students through a 2-year dental hygiene curriculum to evaluate at various points of their instruction how proficient they are in removing tenacious calculus. At least one study has shown positive results of a dexterity skills program on clinical performance related to handling of scaling instruments.¹¹ It may also be beneficial to complete individual student hand function evaluations at the end of each semester to determine if his or her particular hand function has changed in that semester.

This study suggests that, as evidenced by the 2 very weak students who decided not to continue after the second week of the program, testing of complex motor skills as a pre-admission screening tool for prospective dental hygiene students may be beneficial. If this testing identified students lacking in necessary hand function skills, it could very well reduce overall attrition in dental hygiene programs.

A recommendation for future research is to increase the sample size and to include male participants in the sample. This study's small sample size (due to the small class size of the dental hygiene program) and the absence of male students in the fall 2013 semester limit the generalizability of the results of this pilot study.

The research conducted in this study was intended to assess dental hygiene students' performance of one key

curriculum criterion vis-à-vis the successful completion of their entire first semester of the program. Future researchers may want to include testing for carpal tunnel syndrome and other MSDs as part of the evaluation of this hand function criterion. It is hoped that any subsequent research in this area will prove beneficial to all students in their efforts to become licensed dental hygienists.

CONCLUSION

After 6 weeks of hand function exercises, the study subjects increased all hand function scores with the exception of the Purdue Pegboard Both Hands and Right Hand Strength tests. These results indicate that the hand function exercises were valuable for students to increase their hand function.

In evaluating whether the hand function exercises had a positive impact on a student's instrumentation proficiency, the researcher concluded that there was not a significant positive impact, i.e., the scores on the periodontal probe and the 11/12 explorer were not higher than those of students in the 5 previous classes. This finding suggests that hand function exercises will not have a positive impact on students who are trying to increase their instrumentation scores (at least not on these 2 basic instruments used for oral assessments) by performing hand function exercises. This result is in contrast to the findings of Evans and colleagues who determined that preclinical performance related to the handling of scaling instruments did improve as a result of exercises to build manual dexterity.¹¹ Further studies should consider evaluating students on both assessment and scaling instruments.

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The role of the dental hygienist in reducing oral health disparities

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ABSTRACT

Objectives: Reducing oral health disparities has been an ongoing challenge in Canada, with those exhibiting the greatest need for treatment also having the poorest access to oral health care. Marginalized populations, including Aboriginal people, those residing in rural regions, immigrants and refugees, share the largest burden of oral disease in Canada. Dental hygienists are a unique set of health care professionals who work with and within these communities and have the potential to act as key change agents for improving the oral health of the Canadian population. The purpose of this qualitative study was to explore, from the dental hygiene perspective, the role of dental hygienists in reducing oral health disparities in Canada. **Methods:** Dental hygienists and key informants in dental hygiene were recruited, using purposeful and theoretical sampling, to participate in a non-directed, semi-structured one-on-one in-depth telephone interview. Corbin and Strauss's grounded theory methodology was employed with open, axial, and selective coding used for analysis. Skype, Call Recorder, and N-Vivo Qualitative analysis software were utilized for this research. **Results:** The resulting theoretical framework outlines strategies proposed by interview participants to address oral health disparities. Approaches included alternate delivery models, interprofessional collaboration, and increased scope of practice. Participants identified that the variation in dental care across Canada, public perceptions of oral health and dental hygiene practice, and lack of applied research on effective oral health interventions were challenges to implementing these strategies. **Conclusion:** The research confirmed the important role played by dental hygienists in reducing oral health disparities in Canada. However, because of the fragmentation of dental hygiene practice across Canada, a unified voice and cohesive action plan are needed in order for the profession to fully embrace its role as a key change agent.

RÉSUMÉ

Objectif : Au Canada, la réduction des disparités en matière de santé buccodentaire est un défi constant, étant donné que les personnes qui ont le plus besoin de traitements sont aussi celles qui ont le moins accès aux soins de santé dentaire. Les populations marginalisées, y compris les Autochtones, les personnes résidant dans les régions rurales, les immigrants et les réfugiés sont ceux qui présentent le plus de maladies buccodentaires au Canada. Les hygiénistes dentaires, un ensemble unique de professionnels de soins de santé, travaillent avec et parmi ces communautés dans le besoin, et peuvent devenir des agents clés de changement en vue d'améliorer la santé buccodentaire de la population canadienne. La présente étude qualitative visait à explorer, du point de vue de l'hygiène dentaire, le rôle de l'hygiéniste dentaire dans la réduction des disparités en matière de santé buccodentaire au Canada. **Méthode :** Au moyen d'échantillonnages non aléatoires et théoriques, des hygiénistes dentaires et des spécialistes clés du domaine de l'hygiène dentaire ont été appelés à participer à l'étude au moyen d'un entretien téléphonique individuel, semi-structuré et non dirigé. On a fait appel à la méthode basée sur la théorisation ancrée de Corbin et Strauss et l'analyse a été effectuée au moyen du codage ouvert, axial et sélectif. Cette étude a été effectuée à l'aide de Skype, de Call Recorder et du logiciel d'analyse N-Vivo Qualitative. **Résultats :** Le cadre théorique obtenu énonce les stratégies proposées par les participants qui ont pris part à l'entretien pour traiter de la question des disparités en matière de santé buccodentaire. Les stratégies proposées comprenaient d'autres modèles de prestation, de la collaboration interprofessionnelle et un champ de pratique plus vaste. Les participants ont signalé que la variation des soins buccaux à travers le Canada, la perception du public en matière de santé buccodentaire et de pratique d'hygiène dentaire, et le manque de recherche appliquée sur les interventions efficaces étaient des obstacles à la mise en œuvre de ces stratégies. **Conclusion :** L'étude a confirmé le rôle important que jouent les hygiénistes dentaires dans la réduction des disparités en matière de santé buccodentaire au Canada. Cependant, en raison de la fragmentation de la pratique de l'hygiène dentaire au Canada, un front commun et un plan d'action cohérent sont nécessaires afin que la profession puisse pleinement adopter son rôle d'agent de changement clé.

Locally administered minocycline hydrochloride and HIV-positive, periodontally involved adults

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ABSTRACT

Objectives: Locally administered minocycline hydrochloride (LA-MHCl) has been effective in improving clinical parameters when used as an adjunct to scaling and root planing (SRP). The purpose of this study was to determine if LA-MHCl would support greater mean reduction in probing depth (PD), when used as an adjunct to SRP in HIV-positive, periodontally involved adults. **Methods:** Sixteen HIV-positive, periodontally involved adults (9 male, 7 female), ages 30 to 70 years, with a minimum of 2 periodontal sites equal to or greater than 5 mm, were recruited to participate in this double-blind, randomized clinical study. Qualifying periodontal sites for each subject were randomly assigned to either treatment or control: the treatment group received LA-MHCl in conjunction with SRP; the control group received no treatment beyond SRP. LA-MHCl placement was simulated to keep participants blind. The same examiner obtained baseline and follow-up measurements and was unaware of the treatment allocation. The same clinician performed SRP and LA-MHCl placement. Follow-up measurements were obtained at 3, 6, and 9 months. The change from baseline within each group was evaluated using the Paired-samples t-test with 95% level of confidence. The change in PD between the groups was evaluated using the Independent-samples t-test with 95% level of confidence. **Results:** Both treatment and control groups had a statistically significant decrease in PD from baseline at 3, 6, and 9 months. When a comparison was made between the groups, the average reduction in PD was statistically significant in the treatment group as compared to control at 3 months (1.27 mm +/-0.30 and 0.50 mm +/-0.20, respectively) and 9 months (1.94 mm +/-0.27 and 1.27 mm +/-0.22, respectively). Although the average clinical reduction in PD was greater in the treatment group as compared to control at 6 months (1.27 mm +/-0.19 and 0.94 mm +/-0.22, respectively), this decrease was not statistically significant. **Conclusion:** LA-MHCl used in conjunction with SRP produce a statistically significant reduction in PD in HIV-positive, periodontally involved adults when compared to SRP used alone.

RÉSUMÉ

Objectif : Le chlorhydrate de minocycline (LA-MHCl) administré localement s'est avéré efficace dans l'amélioration des paramètres cliniques lorsqu'il est utilisé en complément au détartrage et au surfaçage radiculaire (DSR). La présente étude avait pour objet de déterminer si le LA-MHCl favoriserait la réduction moyenne supérieure de la profondeur au sondage (PS), lorsqu'utilisé en complément au DSR chez les adultes séropositifs au VIH ayant une maladie parodontale. **Méthode :** Seize adultes séropositifs, ayant une maladie parodontale (9 hommes, 7 femmes), âgés de 30 à 70 ans, qui ont au moins 2 sites parodontaux où la profondeur des poches parodontales est égale à 5 mm ou plus profonde, ont été recrutés pour participer à la présente étude clinique effectuée en double-aveugle et sur échantillon aléatoire. Les sites parodontaux admissibles de chaque sujet ont été sélectionnés au hasard pour recevoir un traitement ou être un site témoin : le groupe expérimental a reçu le LA-MHCl en conjonction avec le DSR; le groupe témoin n'a reçu aucun autre traitement que le DSR. La mise en place du LA-MHCl a été simulée afin de maintenir l'essai à l'aveugle des participants. Le même examinateur prenait des mesures de référence et de suivi, et il n'était pas au courant de l'attribution du traitement. Le même clinicien a effectué le DSR et la mise en place du LA-MHCl. Les mesures de suivi ont été prises à 3, 6 et 9 mois. Les changements de la PS de chaque groupe ont été évalués au moyen de test t d'échantillons appariés avec un coefficient de confiance de 95 %. **Résultats :** Le groupe expérimental et le groupe témoin ont tous deux eu une réduction statistiquement significative de la PS par rapport aux mesures de référence prises à 3, 6 et 9 mois. Lorsqu'une comparaison a été faite entre les groupes, la réduction moyenne de la PS était statistiquement significative chez le groupe expérimental par rapport au groupe témoin à 3 mois (1,27 mm +/-0,30 et 0,50 mm +/-0,20, respectivement) et à 9 mois (1,94 mm +/-0,27 et 1,27 mm +/-0,22, respectivement). Bien que la réduction clinique moyenne de la PS était plus importante chez le groupe expérimental par rapport au groupe témoin à 6 mois (1,27 mm +/-0,19 et 0,94 mm +/-0,22, respectivement), cette réduction n'était pas statistiquement significative. **Conclusion :** Le LA-MHCl utilisé conjointement avec le DSR cause une réduction statistiquement significative de la PS chez les adultes séropositifs au VIH ayant une maladie parodontale par rapport au DSR effectué sans complément.

International dental hygiene development: Forging a path in Pakistan

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ABSTRACT

Background: The high incidence of oral diseases and oral cancer in Pakistan, combined with a lack of timely access to care, the cost of dental treatment, a low perceived need for prevention, and an insufficient supply of qualified dental professionals, prompted the creation of a 2-year diploma in dental hygiene (DDH) program at Aga Khan University. Curriculum design began in 2013 led by a core team of Canadian dental hygienists, with contributions from other North American dental hygienists. DDH faculty were recruited in 2014; January 2015 marked the date for the first intake of students to the program. **Objectives:** The DDH curriculum prepares graduates to serve the urgent oral health needs of the population, particularly in marginalized rural regions, by providing educational, preventive, and therapeutic services, primarily for vulnerable populations which often do not have access to oral health care professionals. **Approach:** The program includes courses in dental hygiene theory and practice, oral health sciences, and an emphasis on community health, leadership, and interdisciplinary practice. The majority of the DDH program is delivered by international volunteer dental hygiene educators. DDH students are introduced to interdisciplinary education, with shared courses within the School of Nursing. **Evaluation:** Short- and medium-term program success will be evaluated by student and employer feedback, graduate employment data (e.g., urban versus rural, private versus public sector), curriculum evaluation processes, clinical oral health outcomes, and utilization rates. Long-term success of building local capacity will be measured by the development of an autonomous dental hygiene profession which will build its own dental hygiene capacity both in education and practice. The eventual success of the program will be demonstrated by a philosophical shift in the population from disease-oriented pain management to one of primary prevention.

RÉSUMÉ

Contexte : L'incidence élevée de maladies buccodentaires et de cancer buccal au Pakistan, jumelée à l'absence d'accès opportun aux soins, au coût des traitements dentaires, au faible besoin perçu sur le plan de la prévention et à une pénurie de professionnels en soins dentaires qualifiés a entraîné la mise sur pied d'un programme d'hygiène dentaire de 2 ans menant au diplôme (DHD) à l'Aga Khan University. La conception du programme d'études a commencé en 2013 sous la direction principale d'une équipe d'hygiénistes dentaires canadiennes et la contribution d'autres hygiénistes dentaires en Amérique du Nord. Le corps professoral du DHD a été recruté en 2014. Les premiers étudiants au programme ont été admis en janvier 2015. **Objectif :** Le curriculum du DHD prépare les diplômés à répondre aux besoins urgents en santé buccodentaire de la population, en particulier à ceux des régions rurales marginalisées, en fournissant des services éducationnels, préventifs et thérapeutiques, principalement aux populations qui souvent n'ont pas accès aux professionnels de la santé buccale. **Démarche :** Le programme comprend des cours théoriques et pratiques en hygiène dentaire, en sciences de la santé buccale et met l'accent sur la santé communautaire, le leadership et la pratique interdisciplinaire. La plus grande partie du programme du DHD est offert bénévolement par des éducateurs internationaux en hygiène dentaire. Les étudiants du DHD sont initiés à une formation interdisciplinaire et partagent des cours avec la School of Nursing. **Évaluation :** Le succès du programme à court et à long terme sera évalué à l'aide des commentaires des étudiants et des employeurs, des données d'emploi des diplômés (p. ex. régions urbaines et rurales, secteurs public et privé), des processus d'évaluation du curriculum, des résultats cliniques de santé buccale et des taux d'utilisation. Le succès à long terme en matière de développement des services sur le plan local sera évalué en fonction de l'essor de la profession d'hygiéniste dentaire autonome, grâce au renforcement de son propre potentiel sur le plan de l'éducation et de la pratique. La réussite du programme se manifestera par un changement de perception dans la population qui ira du soulagement de la douleur axé sur la maladie à la prévention primaire.

Functional fitness and dental hygiene practice

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ABSTRACT

Background: As ergonomics is to workplace (environment and tools in relation to the person), so functional fitness is to workplace wellness (person in relation to the work). For over 10 years, a dental hygiene program in Manitoba has included a weekly "fit to sit" laboratory within its pre-licensure curriculum. However, little attention has been given to functional fitness and the practising dental hygienist. The pre-licensure curriculum has 2 learning outcomes: to be functionally fit for practice with respect to ergonomics and to employ behaviour and motivation theories and strategies. It was this curriculum that was of interest to practising alumni who participated in a professional development session focused on self-care with respect to functional fitness, ergonomics, and the ability to provide quality client care. Following this session the educators who delivered the curriculum recognized a need to examine the concept of functional fitness and its value to dental hygiene practice. **Objective:** This project aims to 1) reflect on the meaning of functional fitness and its relationship to ergonomics and practice; 2) explore functional fitness as a requirement for practice; and 3) inform pre-licensure curricula and continuing competency programming. **Approach:** This case study focuses on the lived experience of 4 educators who have been involved in the planning and delivery of the curriculum. Knowing ergonomics has a long history of being integrated into the curriculum and practice standards, the key query was "What elements of functional fitness should the pre-licensure curriculum be accountable for and how are functional fitness and ergonomics related to continuing competency?" **Evaluation:** Three preliminary themes help to address both the praxis query and the objectives of the project: 1) evidence of functional fitness in dental hygiene practice is emerging; 2) practice standards promote health and wellness of the dental hygienist; and 3) pre-licensure curriculum and continuing competency programs that promote functional fitness in relation to ergonomics are beneficial to dental hygienists' self-care and ability to provide quality care for clients.

RÉSUMÉ

Contexte : L'ergonomie est au lieu de travail (environnement et outils relativement à la personne) ce que capacité physique fonctionnelle est au bien-être en milieu de travail (personne relativement au travail). Depuis plus de 10 ans, un programme d'hygiène dentaire au Manitoba a intégré un laboratoire hebdomadaire dans son curriculum de précertification intitulé « Fit to sit ». Cependant, peu d'attention a été accordée à la capacité physique fonctionnelle des hygiénistes dentaires en exercice. Le curriculum de précertification a 2 objectifs d'apprentissage : avoir une bonne capacité fonctionnelle pour la pratique en matière d'ergonomie et utiliser la théorie et les stratégies du comportement et de la motivation. C'était ce curriculum qui avait intéressé les diplômés en exercice qui ont participé au cours de formation continue axée sur les soins personnels en matière de capacité physique fonctionnelle et ergonomie relativement à la capacité de fournir des soins de qualité aux clients. À la suite de ce cours, les éducateurs qui ont mis en œuvre le curriculum ont reconnu la nécessité d'évaluer le concept de la capacité physique fonctionnelle et de son importance dans le cadre de la pratique de l'hygiène dentaire. **Objectif :** Ce projet a pour but de 1) réfléchir à ce que représente la capacité physique fonctionnelle sur le plan de l'ergonomie et de la pratique; 2) considérer la capacité physique fonctionnelle comme prérequis à la pratique; et 3) mettre à jour le curriculum de précertification et le programme continu de compétences. **Démarche :** Cette étude de cas est axée sur l'expérience vécue de 4 éducateurs qui ont pris part à la planification et à la mise en œuvre du curriculum. Sachant que l'ergonomie a été intégrée au curriculum et aux normes de pratique depuis longtemps, la question principale était : « De quels éléments de la capacité physique fonctionnelle le curriculum de précertification devrait-il tenir compte et comment l'ergonomie et la capacité physique fonctionnelle sont-elles liées à la compétence continue? » **Évaluation :** Trois sujets préliminaires aident à répondre à la question de la praxie et aux objectifs du projet : 1) des signes de la capacité physique fonctionnelle dans la pratique de l'hygiène dentaire se manifestent; 2) les normes de pratique favorisent la santé et le mieux-être des hygiénistes dentaires; et 3) le curriculum de précertification et les programmes continus de compétences qui encouragent la capacité physique fonctionnelle en lien avec l'ergonomie aident les hygiénistes dentaires sur le plan des soins personnels et de la capacité à fournir des soins de qualité à leurs clients.

Incidence of oral cancer among South Asians in British Columbia

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ABSTRACT

Background: Oral cancer is the sixth most common malignancy worldwide, with two-thirds of cases arising in developing countries. In many South Asian countries, the incidence of oral cancer is nearly twice that found in Canada. Currently in British Columbia, nearly 10% of the population is of South Asian ethnicity. As a significant subgroup of the population, and considering their varied risk habits, it is crucial to understand the incidence of oral cancer in British Columbia's South Asian population. **Objectives:** This retrospective study explores differences in oral cancer incidence among South Asians living in British Columbia compared to the general population. **Methods:** Data from the British Columbia Oral Biopsy Service (BC OBS) database in conjunction with the BC Cancer Registry are being examined to identify oral cancer cases. The inclusion criteria are patients diagnosed with squamous cell carcinoma (SCC) or carcinoma in situ (CIS) in the oral cavity. All data are cross-referenced for ethnicity using name recognition software. **Results:** In 2013, more than 300 cases of dysplasia and cancer were identified in British Columbia. Further analysis of the databases is ongoing. Preliminary results indicate that South Asians have a significantly higher number of lesions at sites considered low-risk in Western countries, including gingiva and buccal mucosa, than non-South Asians in British Columbia ($p < 0.001$, OR=5.9, CI 2.5–13.7). **Conclusion:** Results from this study will increase awareness of oral cancer in BC and identify population trends that reflect the ethnic diversity of our province. This study will also provide a basis for outreach programs to promote oral cancer awareness, as well as tailored screening and education among high-risk populations.

RÉSUMÉ

Contexte : Le cancer de la bouche est le sixième cancer le plus fréquent à travers le monde et deux tiers des cas proviennent des pays en développement. Dans de nombreux pays d'Asie du Sud, l'incidence des cancers de la bouche est presque deux fois plus élevée qu'au Canada. En Colombie-Britannique, près de 10 % de la population actuelle est d'origine sud-asiatique. En tant que sous-groupe important de la population et compte tenu de la variété de leurs habitudes sur le plan du risque, il est primordial de comprendre l'incidence du cancer de la bouche chez la population sud-asiatique de la Colombie-Britannique. **Objectif :** La présente étude rétrospective évalue si l'incidence du cancer de la bouche chez les Sud-Asiatiques de la Colombie-Britannique diffère de celle de la population générale. **Méthode :** Les données provenant de la base de données du British Columbia Oral Biopsy Service (BC OBS) et en collaboration avec le BC Cancer Registry sont en cours d'analyse afin de repérer les cas. Les critères d'inclusion comprennent les patients diagnostiqués d'un carcinome squameux (CS) ou d'un carcinome in situ (CIS) de la cavité buccale. Pour confirmer l'ethnicité, toutes les données sont vérifiées par renvoi au moyen d'un logiciel d'identificateur de nom. **Résultats :** En 2013, plus de 300 cas de dysplasie et de cancer ont été diagnostiqués en Colombie-Britannique. Une analyse plus approfondie des bases de données est en cours. Les résultats préliminaires révèlent que les personnes sud-asiatiques, par rapport aux habitants de la Colombie-Britannique qui ne sont pas d'origine sud-asiatique, ont un nombre significativement plus élevé de lésions situées dans des sites considérés être à faible risque dans les pays occidentaux, comprenant la gencive et la muqueuse buccale ($p < 0,001$; OR=5,9; CI 2,5–13,7). **Conclusion :** Les résultats de l'étude permettront d'augmenter les connaissances en matière de cancer de la bouche en C.-B. et de déterminer les tendances des populations qui reflètent la diversité ethnique de notre province. La présente étude pourra aussi être le fondement de programmes de sensibilisation du public qui permettront de le renseigner sur le cancer de la bouche et de faire du dépistage et de l'éducation ciblés envers les populations à haut risque.

Can clinicopathological features of low-grade oral dysplasia with high-risk molecular patterns predict malignant progression?

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ABSTRACT

Background: Oral potentially malignant lesions (OPML) with evidence of dysplasia are at a higher risk of progressing to oral cancer. However, not all will progress, and predicting which low-grade dysplasia (LGD; mild/moderate dysplasia) are at risk of progression is challenging. Finding markers to predict which LGD will progress has the potential to guide the management of these lesions and improve patient outcomes. **Objectives:** This study aimed to 1) identify the clinicopathological changes in toluidine blue (TB) uptake, over time, in lesions with identified molecular risk patterns; and 2) determine if these changes predict malignant progression. **Methods:** A total of 231 subjects met the study's inclusion criteria, including a histologically confirmed LGD, no previous history of head and neck cancer, and a minimum of one year of follow-up. Molecular data (loss of heterozygosity [LOH] at key chromosomal loci) were obtained using baseline biopsies. Comparative biopsies were collected approximately every 24 months. Demographic and clinical data, including TB positivity (TB+), were collected every 6 months. Outcome was considered to be progression to severe dysplasia, carcinoma *in situ* or squamous cell carcinoma. **Results:** Thirty subjects (13%) progressed to endpoint. Temporal analysis indicated that TB positivity within the first 2 years of follow-up was statistically significant for progression ($p < 0.001$). Survival analysis of temporal TB+ patterns showed that subjects who were either intermittently TB+ or always TB+ had a higher likelihood of progression, as compared to those who were never TB+. LOH at 9p was significantly associated with progression ($p = 0.001$). Controlling for all other variables in the model, the combination of LOH at 9p and temporal TB+ was associated with malignant progression. **Conclusions:** The persistence or appearance of TB positivity in LGD during follow-up may signal a change in risk and may predict progression. LGD with high molecular risk (LOH at 9p) and a history of TB positivity are more likely to progress and should be biopsied at regular intervals.

RÉSUMÉ

Contexte : Des lésions buccales potentiellement malignes (LBPM) couplées des signes de dysplasie ont un plus grand risque de se transformer en cancer buccal. Cependant, elles ne se transformeront pas toutes, et il est difficile de prédire quelles dysplasies de bas grade (DBG; dysplasie légère ou moyenne) sont à risque. Trouver des marqueurs pour prédire quelles DBG évolueront vers le cancer pourrait aider à la gestion de ces lésions et améliorer l'état de santé des patients. **Objectif :** La présente étude visait 1) à déterminer les changements clinicopathologiques d'absorption de bleu de toluidine (BT), au fil du temps, des lésions qui présentent un profil moléculaire à risque; et 2) à déterminer si ces changements sont précurseurs d'une évolution maligne. **Méthode :** Un total de 231 sujets répondaient aux critères d'inclusion de l'étude, y compris une DBG confirmée par examen histologique, aucun antécédent de cancer de la tête ou du cou, et au moins une année de suivi. Les données moléculaires (perte d'hétérozygotie [loss of heterozygosity ou LOH en anglais] aux loci chromosomiques clés) ont été obtenues au moyen de biopsies de référence. Des biopsies comparatives ont été recueillies environ tous les 24 mois. Les données démographiques et cliniques, comprenant les résultats positifs au BT (BT+), ont été recueillies tous les 6 mois. L'évolution vers la dysplasie sévère, le carcinome *in situ* ou le carcinome squameux figuraient parmi les résultats escomptés. **Résultats :** Trente sujets (13 %) se sont rendu jusqu'aux essais cliniques. L'analyse temporelle a démontré que les résultats positifs aux tests du BT (ou du BT+) dans les deux premières années du suivi étaient statistiquement significatifs sur le plan de la progression ($p < 0,001$). L'analyse de survie du profil temporel du BT+ a montré que les sujets qui étaient soit BT+ par intermittence ou toujours BT+ avaient plus de chances d'évoluer, par rapport à ceux qui n'avaient jamais été BT+. La LOH à 9p était associée de façon significative à l'évolution ($p = 0,001$). Toutes les autres variables du modèle étant sous contrôle, la combinaison de la LOH à 9p et le BT+ temporelle était associée à l'évolution maligne. **Conclusion :** La persistance ou l'apparence de résultats positifs aux tests du BT des DBG lors des suivis peut signaler un changement de risque et peut être précurseur de l'évolution vers le cancer buccal. Les DBG à risque moléculaire élevé (la LOH à 9p) et un antécédent de BT+ sont plus susceptibles à évoluer et des biopsies devraient être effectuées à des intervalles réguliers.

Exploring integration of a dental hygienist into a long-term care interprofessional care team: A Manitoba pilot study

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ABSTRACT

Background: Older adults residing in long-term care (LTC) are at high risk for compromised oral health due to frailty and dependence on others for oral care. Several studies have cited significant barriers to the provision of oral care for older adults, including lack of knowledge among nursing staff, competing care needs taking greater priority, residents with care-resistant behaviours, assessments that do not identify oral problems, limited oral care supplies, and limited access to oral care services. Following substantial advocacy and professional relationship building between dental hygiene and LTC nursing in Manitoba, Revera Retirement Living took the initiative to pilot a new oral health promotion model in Beacon Hill Lodge, one of their LTC facilities in Winnipeg. **Objective:** To explore an innovative and collaborative strategy that integrates a part-time salaried dental hygienist into a LTC health care team to advance care approaches and improve the oral care of residents. **Approach:** The presentation will share the events that sparked the initiative, planning details, implementation strategies, and the findings from piloting a new interprofessional oral health promotion model over 12 months in a 175-bed LTC home. The project received ethics approval from the University of Manitoba and the Winnipeg Regional Health Authority. Funding for the pilot project was provided by Revera Long Term Care. **Evaluation:** Baseline data, oral health assessment tools, and nursing education and mentorship strategies were developed, implemented, and evaluated. Results of their use will be shared, along with a rich account of lessons learned. This innovative and collaborative project that brings together nursing and dental hygiene provides numerous lessons on quality improvement to advance the oral care of older adults in LTC.

RÉSUMÉ

Contexte : Les personnes âgées qui vivent dans des établissements de soins de longue durée (SLD) ont un risque élevé d'avoir des problèmes de santé buccale en raison de leur fragilité et de leur dépendance envers autrui à l'égard de leurs soins buccaux. Plusieurs études font mention d'obstacles importants à la prestation de soins buccaux chez les personnes âgées, y compris le manque de connaissances du personnel infirmier, les besoins concurrents à priorité plus élevée, les résidents qui ont des comportements défavorables aux soins, les évaluations qui ne dépeignent pas les problèmes buccaux, la pénurie de fournitures de soins buccaux et un accès limité aux soins buccodentaires. À la suite de revendications substantielles et de l'établissement de relations entre les professionnels en hygiène dentaire et en soins infirmiers de longue durée au Manitoba, Revera Retirement Living a pris l'initiative de mettre à l'essai une nouvelle approche pour promouvoir la santé buccodentaire au Beacon Hill Lodge, un de leurs établissements de SLD à Winnipeg. **Objectif :** Explorer une stratégie novatrice et collaborative qui comprend l'intégration d'un hygiéniste dentaire salarié à temps partiel dans une équipe de soins de santé en établissement de SLD pour faire progresser les modèles de soins et améliorer les soins buccodentaires des résidents. **Démarche :** La présentation soulignera les événements à l'origine de l'initiative, les détails de la planification, les stratégies de mise en place et les résultats de la mise en essai de ce nouveau modèle interprofessionnel de promotion de la santé buccodentaire sur une période de 12 mois dans un établissement de SLD comprenant 175 lits. L'Université du Manitoba et le Winnipeg Regional Health Authority ont fourni l'approbation déontologique pour le projet. Le financement du projet pilote provenait de Revera Long Term Care. **Évaluation :** Les données de base, les outils d'évaluation de santé buccodentaire et les stratégies d'éducation et de mentorat des infirmiers ont été élaborés, mis en œuvre et évalués. Les résultats de leur utilisation seront partagés et les leçons apprises seront communiquées en détail. Ce projet novateur et collaboratif qui réunit les sciences infirmières et l'hygiène dentaire fournit de nombreuses leçons sur l'amélioration de la qualité pour optimiser les soins buccodentaires des personnes âgées vivant en établissements de SLD.

Exploring the influence of oral health literacy and oral health chronic disease knowledge on older adults' oral care behaviours

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ABSTRACT

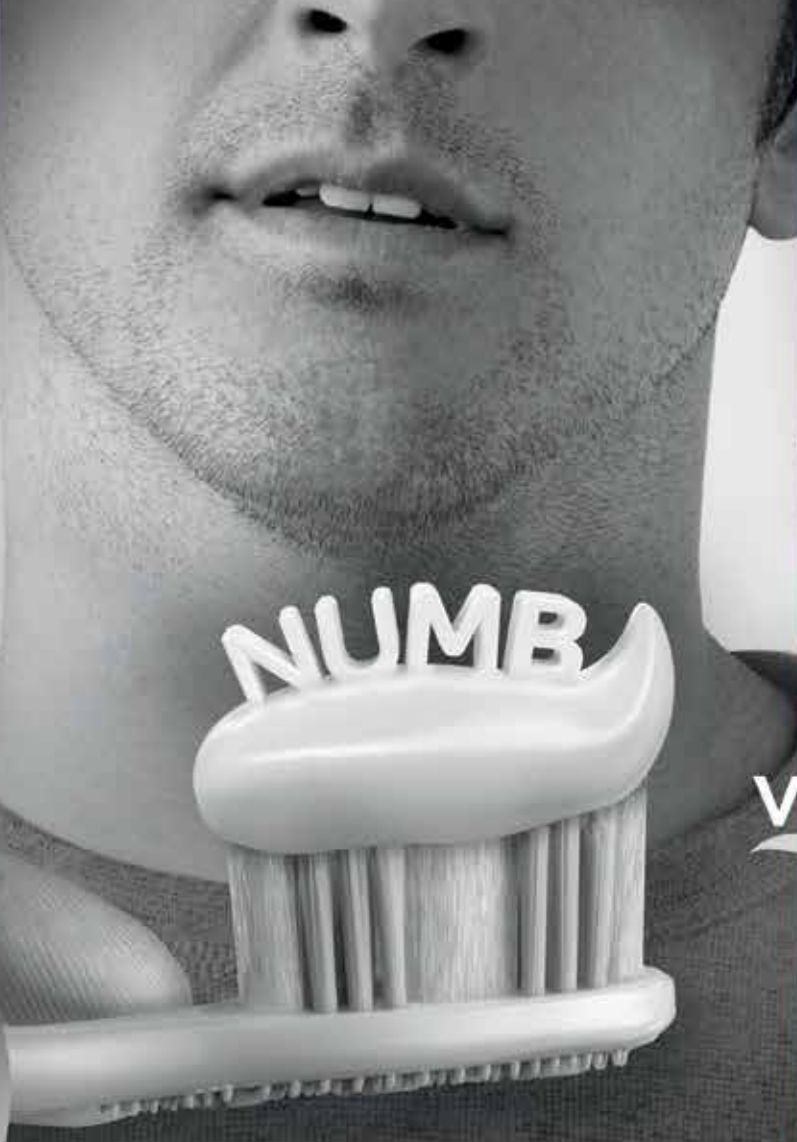
Background: This study explored the influence of oral health literacy and oral health chronic disease knowledge on older adults' oral care behaviours. **Methods:** A total of 73 community-dwelling adults, ages 50 or older, participated in an anonymous online study. The study utilized the Oral Health Literacy – Adult Questionnaire; the Oral Health Chronic Disease Knowledge Questionnaire; an oral care behaviours questionnaire; a background tool questionnaire; and 9 open-ended questions exploring dental care regime, dental visit frequency, perceived importance of oral health in relation to overall health, and search frequency, comprehension of, and main sources for oral health information. **Results:** Approximately 95% of study participants scored at the adequate level of oral health literacy. In contrast, only 38% of participants scored at the adequate level of oral health chronic disease knowledge. About 52% of participants reported brushing 2 or more times per day, 25% reported using no type of interdental aid, and 33% reported flossing less than daily. Preliminary Chi-square analysis revealed a significant relationship between frequency of dental visits and adequate levels of oral health literacy and oral health chronic disease knowledge. Qualitative results showed that, while older adults believe that a healthy mouth is part of a healthy body, many do not actively search for oral health information, preferring instead to rely on dental professionals to supply this information. **Conclusions:** This sample of community-dwelling adults in midlife and older exhibited higher levels of oral health literacy than oral health chronic disease knowledge. Oral health literacy and oral health chronic disease knowledge were not significantly related to all oral care behaviours. **Practice Implications:** Oral health professionals need to provide older adults with information about the association between oral health and chronic disease.

RÉSUMÉ

Contexte : La présente étude a exploré l'influence de la littéracie en santé buccale et des connaissances en matière d'affections chroniques de la bouche sur le comportement des personnes âgées à l'égard de leurs soins buccaux personnels. **Méthode :** Un total de 73 adultes âgés de 50 ans ou plus qui résident dans la communauté ont participé à une étude anonyme en ligne. L'étude a été effectuée à l'aide du Questionnaire pour adultes – Littéracie en santé buccale; du Questionnaire sur les connaissances en matière d'affections chroniques de la bouche; d'un questionnaire sur les comportements à l'égard des soins buccaux personnels; d'un questionnaire sur les antécédents; et 9 questions ouvertes sur le rituel des soins dentaires personnels, la fréquence des visites chez le dentiste, l'importance perçue de la santé buccale relativement à la santé globale, ainsi que la fréquence des recherches sur la santé buccodentaire, le niveau de compréhension du sujet et les principales sources de soins buccaux.

Résultats : Environ 95 % des participants de l'étude ont obtenu des résultats se classant à un niveau adéquat en matière de littéracie en santé buccale. En revanche, seulement 38 % des participants ont obtenu des résultats à un niveau adéquat concernant les connaissances en matière d'affections chroniques de la bouche. Environ 52 % des participants ont signalé qu'ils se brossaient les dents deux fois ou plus par jour, 25 % ont déclaré qu'ils n'utilisaient aucun type d'outil de nettoyage interdentaire et 33 % ont affirmé qu'ils passaient la soie dentaire moins souvent que tous les jours. Une analyse préliminaire du khi-carré a révélé une relation significative entre la fréquence des visites chez le dentiste et le niveau adéquat de littéracie en santé buccale et de connaissances en matière d'affections chroniques de la bouche. Les résultats qualitatifs ont montré que même si les adultes plus âgés croient que la santé de la bouche est liée à la santé du corps, plusieurs d'entre eux ne font pas de recherches actives sur la santé buccodentaire et préfèrent plutôt avoir recours aux professionnels dentaires pour qu'ils leur fournissent ces renseignements.

Conclusion : L'échantillon d'adultes d'âge mûr ou plus vieux qui résident dans la communauté a démontré un niveau supérieur de littéracie en santé buccale par rapport aux connaissances en matière d'affections chroniques de la bouche. La littéracie en santé buccale et les connaissances en matière d'affections chroniques de la bouche n'étaient pas significativement liées à tous les comportements de soins buccodentaires. **Répercussions sur la pratique :** Les professionnels de la santé buccodentaire doivent fournir de l'information aux adultes plus âgés sur le lien entre la santé buccodentaire et les affections chroniques.



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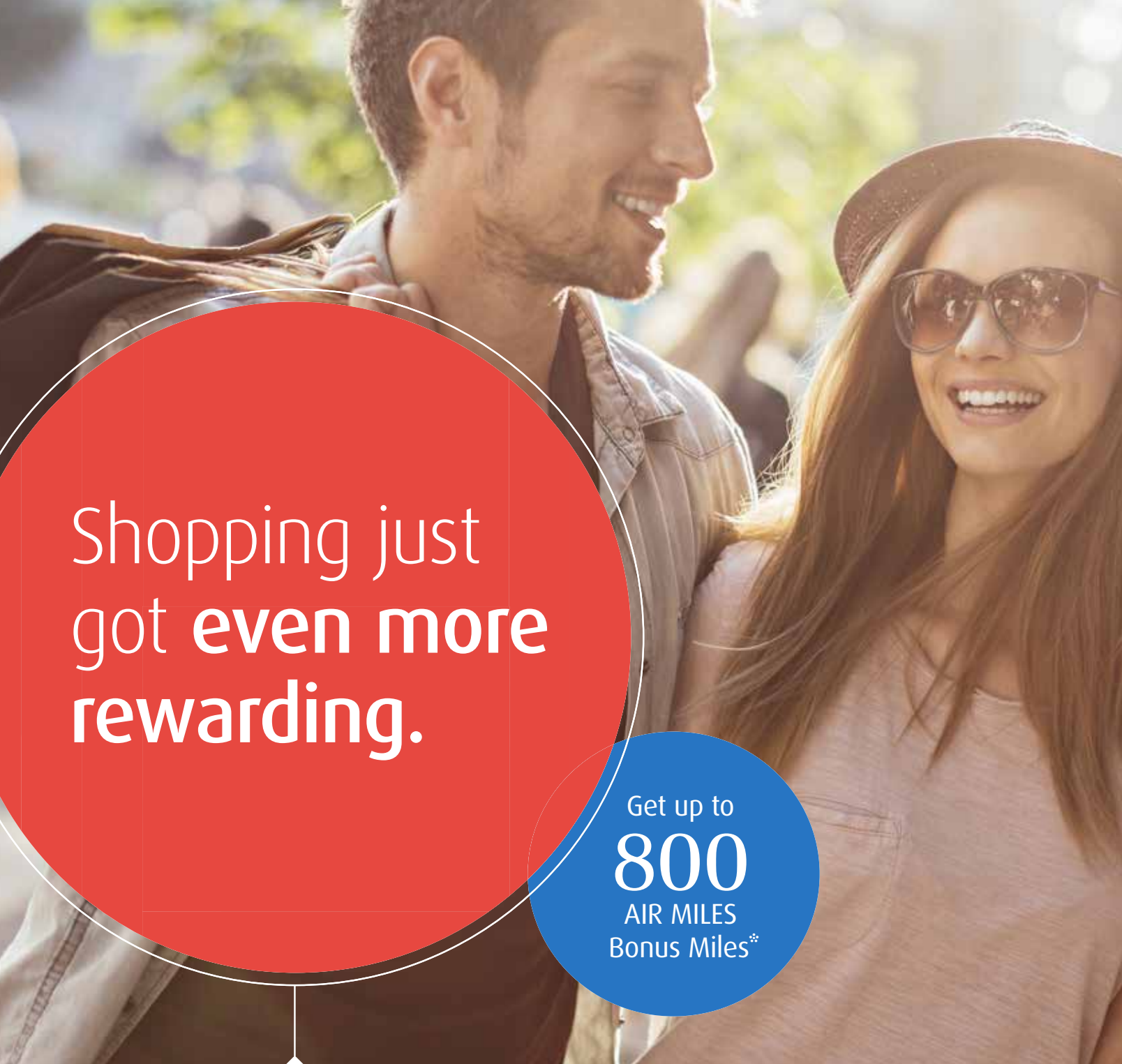
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CDHA 2015 NATIONAL CONFERENCE

The scientific program abstract review committee also selected the following poster presentations for display at this year's national conference in Victoria, British Columbia. Poster presentations will be available to view from Thursday, October 29, at 5:00 pm until Friday, October 30, at 2:00 pm.

Best practices in local anesthesia teaching methodology for dental hygiene education

Presenter: Laura J Webb, MS, CDA, RDH
LJW Education Services, Fallon, Nevada

Exploring best practices related to senior care: An interprofessional learning experience focusing on oral care and mobility

Presenter: Lisa Frisch, BSc, RDH
Additional authors: Deborah Schuh, BN, RN; Marie McEwan, BEd, RN (Simulationist)
Durham College, Oshawa, Ontario

Avatar-mediated practice scenarios to evaluate cross-cultural knowledge and understanding

Presenters: Tara Newcomb, MS, RDH¹; Joyce Flores, MS, RDH¹
Additional authors: Amy Adcock, PhD²; Brett Cook, MEd³; Laurie Craigen, LPC, PhD⁴
¹School of Dental Hygiene, Old Dominion University, Norfolk, Virginia; ²Department of STEM Education and Professional Studies, Darden College of Education, Old Dominion University, Norfolk, Virginia; ³Darden College of Education, Old Dominion University, Norfolk, Virginia; ⁴Department of Counseling and Human Services, Darden College of Education, Old Dominion University, Norfolk, Virginia

The effectiveness of cheese consumption on reducing caries: a systematic review

Presenters: Michael Rothfus, BSc, RDH; Arlynn Brodie, BPE, MHS, RDH
University of Alberta, Edmonton, Alberta

Fluorescence visualization and oral cancer recurrence

Presenters: Marco (King Yin) Wu, BSc, RDH¹; Denise Laronde, PhD, RDH^{1,2}
Additional authors: Miriam Rosin, BSc, PhD^{2,3}; Lewei Zhang, Dip Oral Path, BDS, PhD, FRCD(C)^{1,2}
¹Faculty of Dentistry, The University of British Columbia, Vancouver, British Columbia; ²British Columbia Oral Cancer Prevention Program, Cancer Control Research, British Columbia Cancer Research Centre, Vancouver, British Columbia; ³Department of Biomedical Physiology and Physical Kinesiology, Simon Fraser University, Burnaby, British Columbia

Learning together to reduce ergonomic risks

Presenters: Leslie Johnson, BHSc(OT), MS; Erica Hunzinger, MOT
Additional authors: Kateryna Kovalchuk, MOT; Laura MacDonald, MEd, RDH
University of Manitoba, Winnipeg, Manitoba

Oral health in community dwelling older adults

Presenter: Kimi Khabra, BSc(DH), RDH
Additional authors: Sharon M Compton, PhD, RDH; Louanne Keenan, PhD, RDH
University of Alberta, Edmonton, Alberta

Back to basics: Improving reading in dental hygiene courses

Presenter: Anna Matthews, MS, RDH

Additional authors: Maria-Elena Bilello, MSPH, RDH; Davida S Smyth, PhD; Juanita But, PhD
New York City College of Technology/CUNY, Brooklyn, New York

The Alex Dental Health Bus: Bridging the gap

Presenter: Denise M Kokaram, RDH

The Alex Community Health Centre, Calgary, Alberta

Lay health advisor model for sustainable oral health promotion in elementary schools: A pilot feasibility study

Presenter: Rachel Hei In Pang, BDSc(DH), RDH

Additional authors: Jolanta Aleksejuniene, DDS, PhD; Anita Vallee, MH, RDH
University of British Columbia, Vancouver, British Columbia

Strengthening community action in Victoria, British Columbia

Presenters: Melissa Schaefer, DipDT, DipDH, MEd; Danielle Ayotte, DipDH; Maria Degethoff, DipDH
Camosun College, Victoria, British Columbia

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

Presenters: Marilyn Goulding, BSc, MOS, RDH¹; Dani Botbyl, RDH²

¹Niagara College, Welland, Ontario; ²Dentsply Canada

Oral health in long-term care: A critical review of oral health interventions

Presenter: Arlynn Brodie, BPE, MHS, RDH

Additional authors: Tammy Hopper, PhD, R-SLP; Sharon Compton, PhD, RDH; Minn Yoon, PhD
University of Alberta, Edmonton, Alberta

Latro-compliance: An unintended consequence of excessive autonomy in long-term care facilities

Presenter: Melanie V Taverna, MS(DH), RDH

Additional authors: Carol Nguyen, MS, RDH; Rebecca Wright, MS, RDH; James W Tysinger, PhD; Helen M Sorenson, MA, RT
University of Texas Health Science Center, San Antonio, Texas

Brush up! Promoting oral hygiene behaviours with a game

Presenter: Joyce M Flores, MS, RDH¹

Additional authors: Traci Leong, PhD²; Stella Lourenco, PhD²; Dov Jacobson³; Jesse Jacobson³; Stephanie Chergi³; RL Jacobson, DDS³

¹Old Dominion University, Norfolk, Virginia; ²Emory University, Atlanta, Georgia; ³Games that Work®, USA



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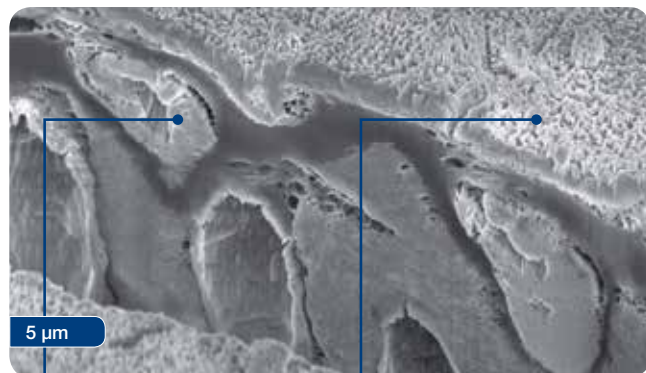
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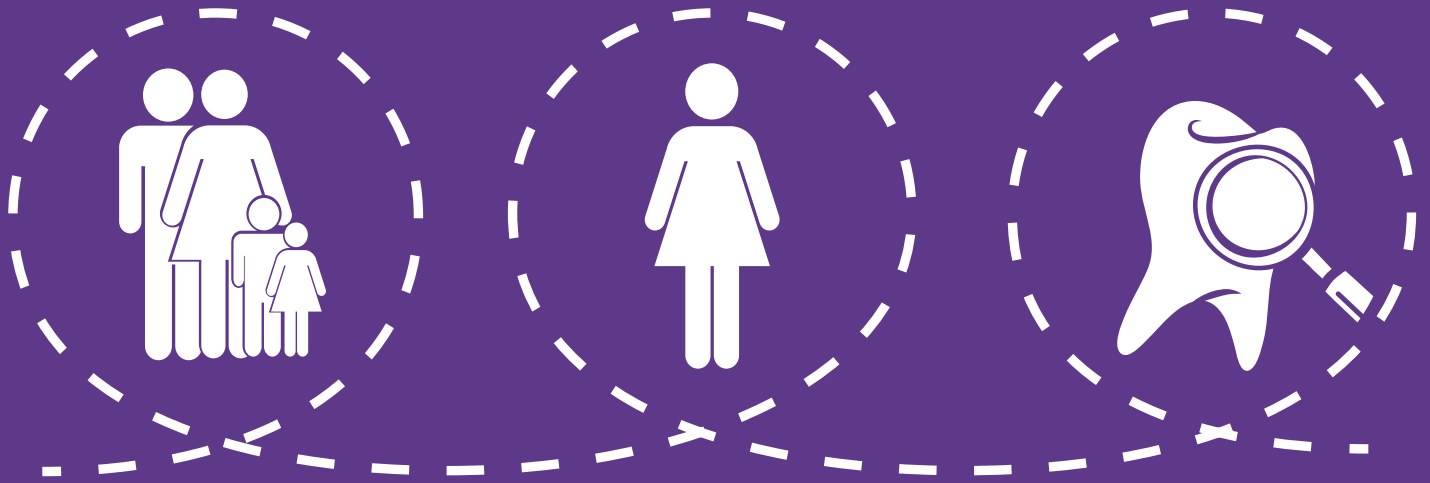
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- Resistant to chemical challenges, such as consuming acidic food and drinks^{1,8,12,17}



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THE CANADIAN DENTAL
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The oral–systemic health connection: A guide to patient care

Edited by Michael Glick

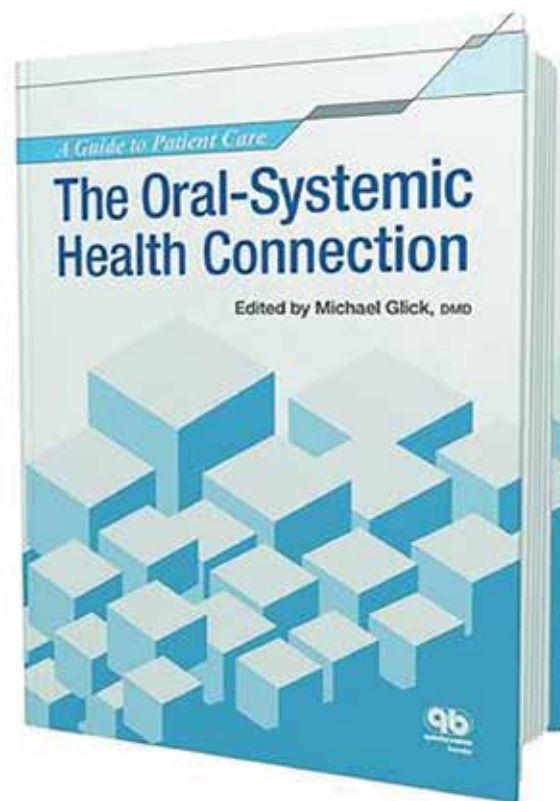
Chicago: Quintessence Publishing Co, Inc; 2014. 312 pp.
ISBN 978-0-86715-650-8 (soft cover)

INTRODUCTION

The oral–systemic link has been a topic of much interest to oral health professionals for quite some time. Over the last three decades, a plethora of research has been generated on the connections between oral and general health, including associations between oral infections, such as periodontal disease, and systemic diseases and conditions, such as cardiovascular disease, respiratory diseases, diabetes, and adverse pregnancy outcomes. This research has been dynamic and has shifted its focus from causality to that of inflammation, making it often difficult for practitioners not only to stay current with the most recent findings, but also to interpret them.

Numerous popular periodontal textbooks now have entire chapters dedicated to these linkages. However, due to the ever-changing research findings and the length of time it takes to revise these comprehensive textbooks, the information they contain is often quickly outdated.

This soft-cover book is different from most traditional textbooks, as it has been specifically designed to be a “guide for clinicians” in the care of their patients with oral–systemic disease connections. Edited by Michael Glick, DMD, Professor of Oral Diagnostic Sciences and Dean of the School of Dental Medicine, State University of New York at Buffalo (2009–2015), this textbook includes contributions from experts in the fields of oral medicine, periodontology, epidemiology, and microbiology. The majority of the 19 authors hold DDS/DMD doctorates in addition to either an MD or DDS/DMD degree and are



world-renowned researchers in their specific areas of expertise. The incorporation and translation of the latest research findings on the connections between oral and general health add to the uniqueness of this text.

CONTENT OVERVIEW

Before getting into the actual oral–systemic connections, this text employs the first 5 chapters to introduce several new concepts that aid the reader tremendously in the understanding of how these linkages actually work. For example, the first chapter discusses the importance of incorporating screenings into dental offices, such as HbA1c for diabetes and other tests for cardiovascular disease and HIV. This captures the reader’s attention right from the beginning as it suggests

a changing role for oral health professionals in partnering with medical professionals. The remaining 4 introductory chapters are “Causation, Association, and Oral Health–Systemic Disease Connections”; “Mechanism-Based Salivary Diagnostics”; “The Travelling Oral Microbiome”; and “The Mechanisms Behind Oral–Systemic Interactions.”

Once the stage has been set by these introductory chapters the subsequent chapters each focus on one specific oral–systemic condition. Robert Genco’s chapter on “Oral Health and Diabetes” leads the way, followed by chapters on “The Cardiovascular System and Oral Infections”; “Obesity: The Oral–Systemic Connection”; “Pneumonia and Oral Pathogens”; and “Periodontal Infections and Adverse Pregnancy Outcomes.” Finally, Glick includes three chapters of particular interest to clinicians: “Oral

Complications in Immunocompromised Patients: The Oncology Prototype”; “Osteoporosis: Its Controversies, Treatment, and Complications”; and “Oral Manifestations of Systemic Diseases.”

Overall, each chapter is very well referenced, with between 58 and 220 current citations to support their hypotheses. Additionally, with the exception of the introductory chapters and the last chapter on oral manifestations of systemic diseases, there is a page at the beginning of each chapter that summarizes the clinical considerations of the topic (i.e., what you can take back to your practice). This is a very strong component of the book as it can serve as a quick go-to reference in the office.

SPECIFIC COMMENTARIES

In my opinion, the second and fifth chapters are 2 of the most important in the book. Chapter 2 very thoroughly informs the reader about the various levels of evidence found in the literature and, in particular, discusses the concept of causality, which is rarely found in non-epidemiological textbooks. This information is extremely important in the interpretation of this evolving body of science. As a bonus for most CJDH readers, this chapter was written by a Canadian: Don Brunette, PhD, from the University of British Columbia. Chapter 5 is an essential read for those seeking to understand the underlying mechanisms of oral-systemic interactions. This chapter focuses on the integral role of inflammation in the relationship between oral and systemic diseases and helps the reader to understand this connection from a basic science level. The fact that it is co-authored by one of the leading periodontal researchers in the area of inflammation, Dr. Tom Van Dyke, gives the chapter even more credibility. The third chapter on salivary diagnostics, however, although it presents interesting new knowledge on a variety of salivary biomarkers, is quite advanced for the average reader and does not hold one's attention. In contrast, the fourth chapter, entitled “The Travelling Oral Microbiome,” presents a very recent concept that replaces what we typically describe as the oral microflora or the oral microbiota. This fascinating chapter brings us up to date on the concept that each human can be considered a collective “microbiome” and refers to the human body as a “superorganism” as microbes outnumber our roughly 100 trillion human cells by a ratio of 10:1. If you calculate that further, this suggests that only 10% of the cells in this superorganism are human—a scary thought indeed and a fascinating read! The author suggests the beginning of a new era of “personalized medicine” based on individual body microbe composition.

The chapters dealing with the specific oral-systemic linkages on the whole have been very well done, as can be expected from the leading authorities and major researchers in these areas. What is evident with all of these authors is their strong passion for their individual areas of scientific expertise. One of the chapters that stands out is

the chapter on obesity, which contains a comprehensive, in-depth discussion of the physiology of the inflammatory process in relation to obesity. The authors very nicely summarize the most current evidence at the end of the chapter and conclude that there is no “cause and effect” relationship between obesity and periodontal disease. However, their clinical considerations at the beginning of the chapter contradict this conclusion by stating: “obesity has been shown to be a risk factor for periodontal disease.” One of the basic principles of causality is that one cannot truly call something a risk factor unless “cause and effect” has been determined. Since clinicians often use summaries such as these as the basis of their clinical decisions, this statement may lead to incorrect assumptions and, more alarmingly, to the communication of inaccurate information to the public.

The other chapter that I would like to highlight is Chapter 10, which discusses the proposed linkage between periodontal infections and adverse pregnancy outcomes. I was pleased to read this chapter and commend the authors for delivering their very accurate message that, although it is recognized that there is some sort of association between poor maternal periodontal health and adverse pregnancy outcomes, a plethora of well-conducted randomized controlled trials and systematic reviews of these trials providing periodontal therapy during the second trimester have shown no accompanying improvements in adverse pregnancy outcomes. Clinician communications with patients about this proposed oral-systemic connection is probably the most inaccurately disseminated piece of information and is a prime example of how not keeping up with the most current literature can result in misinformation which, unfortunately, does not reflect well on the profession.

The inclusion of a chapter on the oral complications that occur with immunocompromised patients, more specifically, the oncology patient, is a definite strength of this book as clinicians are often unsure about what to recommend to cancer patients who are experiencing chemotherapy-related lesions. The final chapter also offers a very nice review of oral lesions associated with systemic diseases and is accompanied by numerous excellent colour illustrations as well as some nice summary tables. This chapter could definitely serve as a quick-reference oral pathology atlas although limited only to lesions associated with systemic conditions.

Although this book is comprehensive and accurate in its interpretation of the most recent literature on oral-systemic linkages, it lacks a brief chapter dedicated to future research directions on other oral-systemic linkages that are currently being investigated. These newly proposed linkages include end-stage renal disease, Alzheimer's disease, rheumatoid arthritis, influenza, and some inflammatory forms of cancer.

VALUE TO THE READER

Overall, I was very impressed with this book and recommend it enthusiastically to dental hygiene clinicians in particular. I believe it provides all oral health practitioners, including dental hygienists, with very recent knowledge through the translation of the most current literature on the topic of oral-systemic health. It is well illustrated and easy to read with its larger type and numerous summary tables throughout. The concise tips appearing at the beginning of most chapters are a definite strength to help guide dental hygienists with their patient care. I believe this book would be an excellent addition to any dental hygienist's library and could serve as a useful in-office resource. The only thing I would caution against is to recognize that research

on these topics is on-going and ever-changing. The longevity of this information therefore is limited. Keeping up with new findings in the literature regarding these oral-systemic connections will be of utmost importance.

Salme E Lavigne, PhD, RDH, is senior scholar in the School of Dental Hygiene, Faculty of Health Sciences, University of Manitoba. She will begin her term as scientific editor of the Canadian Journal of Dental Hygiene in December 2015.

All entries must be received by December 31, 2015

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Questioning the boundaries of research

Dear editor,

This is a response to the letter by Corinne Story regarding dental hygiene research (*Can J Dent Hyg.* 2015;49[2]:85–86). My interpretation of her letter is that Ms Story believes that there could be a conflict between “pure” dental hygiene research as carried out by dental hygienists and collaborative research as carried out by dental hygienists with other professionals. She asks if collaboration with individuals without dental hygiene credentials could potentially weaken dental hygiene research because these individuals lack dental hygiene training and experience. Ms Story further asks whether it would be ethical for a collaborator who is not a dental hygienist to receive credit for collaborative research with dental hygienists and, finally, whether collaborative research advances the profession. I would like to respond to these issues and hope that my response will allay some of Ms Storey’s concerns.

First, professionals from different disciplines have different areas of expertise. For a project related to dental hygiene, the hygienist brings a unique skill and knowledge set to the topic. The addition of a professional from another discipline, either clinical or nonclinical, can open up other avenues of thought and other ways of approaching a problem. This is especially true for individuals with PhDs who are taught how to carry out research and how to analyse and interpret the results. Such collaborations can greatly strengthen the research.

In fact there are many shining examples of research that has crossed professional boundaries; because of this, great advances have been made. An excellent example is that of insulin. The discovery, isolation, and use of insulin

injections for diabetes culminated in the “Edmonton Protocol” where the insulin-producing cells are injected into a recipient. Work on insulin, which has gone on for decades, saves lives. It has involved collaborations among physicians, basic scientists, and physician/basic scientists, and probably would not have progressed as quickly if these different groups of people had worked in isolation from one another.

The second point relates to the term “dental hygiene research.” Oral health/hygiene research is undertaken by a number of professions in addition to dental hygiene. Dentistry and medicine come to mind, with the latter including specialties such as infectious diseases, oncology, and ear, nose and throat. Work in these areas and collaborations between these professions and dental hygienists will enhance and expand the body of knowledge pertaining to oral health.

The final point relates to the area of credit. One of the foundational rules of research is that all of the individuals who contribute to a study should be recognized; if a publication or presentation results, they become contributing authors. To not credit all collaborators would be contrary to what is considered to be ethical behaviour in research.

I hope that these thoughts are helpful.

Yours sincerely,

Nadine Milos, BSc, PhD
*Professor, Department of Dentistry, University of Alberta
 Edmonton, Alberta*

Re: Professionalism in dental hygiene

Dear editor,

Rae McFarlane’s editorial on “Preventive professionalism” in the June issue of the journal (*Can J Dent Hyg.* 2015;49[2]:47–50) was a friendly reminder that dental hygienists are looked to as professionals at all times. The message was interesting and informative in more ways than one. McFarlane is right that the “breaches in professionalism” that she cites are entirely preventable. It doesn’t take great effort to check the status of our membership or to review our provincial benefits and responsibilities. We have technology that allows unlimited access to that information with the touch of a button. And what happened to the common sense of treating clients and colleagues fairly, taking ownership of personal licensing responsibilities, and maintaining valid credentials? These are skills displayed by adults, regardless of their career path. It seems that no matter what rules and

regulations we have in place, whether in a professional setting or society in general, there will always be someone who looks for the loophole in the system or just doesn’t care because someone else will fix it. I would not have believed it possible of dental hygienists if I hadn’t read the motivation behind McFarlane’s editorial. I thank her for bringing this to our attention. It seems that professionals, as human beings, need to be constantly reminded to behave professionally and ethically. McFarlane says it well in the closing of her editorial: “Professionalism is a state of mind; it takes thought and awareness.” How true is that of life!

Donna Taylor, RDH
Medicine Hat, Alberta

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CJDH Call for Papers

The *Canadian Journal of Dental Hygiene* (CJDH) is a peer-reviewed journal that publishes research on topics of relevance to dental hygiene practice, education, theory, and policy.

CJDH is currently seeking high-quality manuscripts of the following types:

- **Original research:** These manuscripts (maximum 6000 words) report on the findings of quantitative or qualitative research studies that explore a specific research question.
- **Literature reviews:** These manuscripts (maximum 4000 words) are informative and critical syntheses of existing research on a particular topic. They summarize current knowledge and identify gaps for further study.
- **Short communications:** These manuscripts (maximum 2000 words) should be on a clinical or theoretical topic of interest to oral health professionals.

We also invite readers to submit **Letters to the Editor**, discussing issues raised in CJDH articles published in the previous two issues.

Submission guidelines

Manuscripts may be submitted electronically to the editorial office at journal@cdha.ca, and should include a covering letter declaring the originality of the work, any conflicts of interests of the author(s), and contact information for the corresponding author. Technical details on the formatting and structure of manuscript submissions may be found in our *Guidelines for Authors* at www.cdha.ca/cjdh.

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The editorial board of the *Canadian Journal of Dental Hygiene* is delighted to announce the winners of the 2015 CJDH Research Awards, sponsored by Crest Oral-B.

Best Original Research Article

Looking back to move forward: Understanding service provider, parent, and caregiver views on early childhood oral health promotion in Manitoba, Canada. *Can J Dent Hyg.* 2014;48(3):99-108.

Authors: RJ Schroth, A Wilson, S Prowse, JM Edwards, J Gojda, J Sarson, L Harms, K Hai-Santiago, MEK Moffatt

Best Literature Review

Waterpipe smoking: A “healthy” alternative to cigarettes or a health hazard in disguise? *Can J Dent Hyg.* 2014;48(1):27-33.

Authors: A Khan and DM Laronde



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1. GSK data on file, 2013. 2. Lussi A. Erosive tooth wear – a multifactorial condition. In: Lussi A, editor. Dental Erosion – from Diagnosis to Therapy. Karger, Basel, 2006. 3. Lussi A. *Eur J Oral Sci.* 1996;104:191–198. 4. Hara AT, et al. *Caries Research.* 2009;43:57–63. 5. Lussi A, et al. *Caries Research.* 2004;38(suppl 1):34–44.

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The *Canadian Journal of Dental Hygiene* is indexed according to the medical subject headings established by the National Library of Medicine, US National Institutes of Health, as well as by author name. The title of each article is followed by a code that designates the article's category. The categories used in this volume are listed below.

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