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**A national study of dental hygiene students' perceived value of baccalaureate education**

**Graduating dental hygiene students' attainment of the CDHA baccalaureate competencies**

**Understanding transgender identity and oral health care needs**

**Knowledge of malocclusion supports comprehensive dental hygiene care**

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**EDITORIAL**

**The oral microbiome and precision medicine**



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

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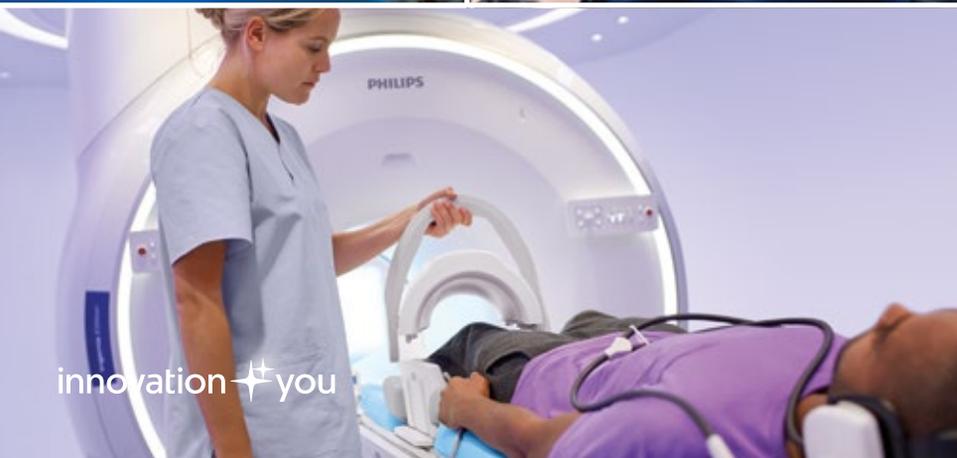
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# The oral microbiome and precision medicine: A peek into the future of periodontal diagnostics

Salme E Lavigne\*, PhD, RDH

Have you ever considered that we as humans comprise approximately 23,000 genes? Most of us may have also assumed that we are living alone in our bodies, yet scientists have recently identified over 3.3 million genes that make up the human gut microbiome.<sup>1</sup> In fact, microbes in our body outnumber our human cells by a ratio of 10 to 1. Thus, we are not alone, and at times we may even wonder who is really in charge!

In 2008, the US National Institutes of Health (NIH) began “The Human Microbiome Project,” a massive international initiative that has now entered phase 2, known as the “Integrative Human Microbiome Project.”<sup>2</sup> The Canadian Institutes of Health Research (CIHR) oversees Canada’s strong presence in this field, serving on the steering committee of the International Human Microbiome Consortium, which coordinates human microbiome research and the sharing of data around the world. These global efforts are helping scientists and clinicians better understand how the human microbiome and its interactions with the human immune system either protect or harm the host. This information presents a more realistic view of the microbiomes found in the human body and will one day allow clinicians to focus their efforts when treating their patients.

There are 2 components to the human microbiome: a “core” and a “variable” part. The core is shared among all humans, while the variable microbiome is exclusive to each individual based on their phenotype, genotype, and unique lifestyle. The differences in species and strains of this variable portion of the microbiome among individuals may be as unique as their fingerprint!

Microbes do not typically occur in nature as a pure culture of a single species, but rather exist in a community of microbes, which are referred to collectively as a microbiome. In the human host, a microbiome exists in several anatomical niches, each with its own exclusive metagenome, e.g., hair, skin, gastrointestinal tract, urogenital tract, vagina, nasal and paranasal sinuses, and the oral cavity. In ideal conditions, these microbiome



Salme E Lavigne

niches represent a species-balanced community that is important for the maintenance of human health. Each microbial inhabitant within the community maintains a unique ecosystem that is geared towards “symbiotic” interactions among the various microbes within that particular ecosystem, including the host. However, when conditions are not ideal and the niche becomes unbalanced, these communities are said to be in a state of “dysbiosis,” leading to disease.

If we translate this information to the oral cavity, this state of dysbiosis explains how oral diseases occur, particularly periodontitis. The oral cavity houses the second largest number of microbiota next to the gastrointestinal tract. Thus, the NIH-funded project has now developed organ-specific microbial databases for both the human intestinal tract and the human oral microbiome. You will find the Human Oral Microbiome Database (HOMD) online at <http://www.homd.org>. To date, almost 800 specific oral species have been added to the oral microbiome database but well over 1,000 are suspected to exist.

This knowledge has created a major paradigm shift in the etiology of periodontal diseases. What is now considered old knowledge is that specific “virulent” periodontal pathogens cause periodontal tissue breakdown (mainly Gram-negative anaerobic bacteria). The problem with this theory is that no specific bacteria have ever been shown to be solely causative of periodontal disease. Thus, the new theory is that disease severity is dependent upon the microbe–host environment. Periodontal breakdown in susceptible individuals creates an environment suitable for particular microbes, which then flourish. Highly associated microorganisms of the mouth appear sequentially and maintain homeostasis to keep the mouth healthy. However, interference with this symbiotic state leads to dysbiosis resulting in periodontal disease.

With this major shift in thinking, an emerging approach for disease treatment and prevention that takes into account the variability in genes, environment, and lifestyle for each person has been created, called “precision medicine.”

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Some of you may have heard of “personalized medicine,” which is an older term with a similar meaning. There was, however, concern that the word “personalized” could be misinterpreted to imply that treatments and preventions are being developed uniquely for each individual. In precision medicine, the focus is on identifying approaches that will be effective for groups of patients based on their common genetic, environmental, and lifestyle factors. This is in contrast to the “one size fits all” approach that has dominated medicine for decades. Thus, the preferred term today is precision medicine.

Commercialization of the human microbiome as a drug therapy has already begun. In 2013, patients infected with *C. difficile* were successfully treated by duodenal infusion of the fecal microbiota of a healthy individual.<sup>3</sup> The ability to use patients’ genetic and other molecular information as part of routine medical and perhaps dental care may soon be a reality! With these new discoveries in metagenomics and microbiomics, there will be improved ability to predict which treatments will work best for specific patients. Additionally, there will be better understanding of the underlying mechanisms by which various diseases occur leading to improved approaches to preventing, diagnosing, and treating a wide range of diseases.

Because each individual harbors a unique microbiome that plays a key role in the etiology of disease within the body, periodontal disease may manifest and progress differently in different individuals, making precision medicine imperative for optimal oral health care. Indeed,

the movement towards precision medicine within our own profession is well underway with the newly introduced classification system for periodontal and peri-implant diseases developed by the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP). The new classification system, which is based on the oncology system of staging and grading, individualizes the diagnosis and the case definition of a periodontitis client, aligning it with the principles of precision medicine. This approach takes into account the multifactorial etiology of the disease, the level of complexity of its management, as well as the risk for disease recurrence, all of which facilitate optimal care and improve disease prognosis. The future of periodontal diagnostics and treatment, thanks to the emergence of precision medicine, is promising!

*The only true wisdom is in knowing you know nothing*

—Socrates

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## ISSUE AT A GLANCE

We are pleased to feature 2 original research articles in this issue of the journal. **Paula Benbow** and **Zul Kanji** analyse and interpret the results of a national survey of dental hygiene students and their views of baccalaureate education as a potential entry-to-practice requirement (pp. 89–99). **Susanne Sunell**, **Denise Laronde**, and **Zul Kanji** examine graduating dental hygiene students' self-ratings of attainment of baccalaureate competencies as a means of supporting curriculum review and revision (pp. 100–109). In addition, **Diana Macri** and **Kate Wolfe** provide a narrative review of the literature on transgender identity and its implications for oral health (pp. 110–117).

We also share 2 short communications with you. First, **Iris Chu**, **David Kennedy**, and **Penny Hatzimanolakis** explore the benefits of adding an occlusion assessment to routine dental hygiene appointments (pp. 118–24). Second, **Anthony Santella**, **Petal Leuwaisee**, **Susan Davide**, **Hanna Horowitz**, and **Bhuma Krishnamachari** review the results of a study on the introduction of oral rapid HIV testing in 3 dental hygiene clinics (pp. 125–29). Finally, the issue includes a letter to the editor from **Lynda McKeown** on the need for “big ideas” to move the dental hygiene profession forward (p. 131).

## PLAIN LANGUAGE ABSTRACTS

**Benbow P, Kanji Z.** Dental hygiene baccalaureate education: A national study of students' perceived value and intentions. *Can J Dent Hyg.* 2019;53(2):89–99.

In March 2017, 1,738 Canadian dental hygiene students were surveyed on their views of entry-to-practice dental hygiene education and their future educational aspirations. Seventy-eight percent (78%) of respondents supported the vision of all future dental hygienists in Canada having a baccalaureate degree. Approximately 42% of respondents in diploma programs intended to obtain a baccalaureate following graduation. The majority of respondents recognized that baccalaureate dental hygiene education increases knowledge and the capacity to work with underserved groups, expands clinical abilities, and enhances critical thinking, research use, and interprofessional collaboration. These results support the growing call for more dental hygiene degree programs across the country.

**Sunell S, Laronde DM, Kanji Z.** Graduating dental hygiene students' attainment of the CDHA baccalaureate competencies: Students' self-ratings. *Can J Dent Hyg.* 2019;53(2):100–109.

As part of a 3-year study, graduating students from the University of British Columbia's dental hygiene degree program were asked to rate their confidence in their ability to demonstrate Canada's national baccalaureate competencies. These students expressed the greatest confidence in the domains of collaboration, clinical therapy, and oral health education. They were least confident in their advocacy and policy use abilities. While such self-assessments may have limited use from a regulatory perspective, they raise important questions about the expectations of dental hygiene baccalaureate education and the possibility that some subcompetencies may be more appropriate for master's level education programs.

**Macri D, Wolfe K.** My preferred pronoun is she: Understanding transgender identity and oral health care needs. *Can J Dent Hyg.* 2019;53(2):110–117.

This article reviews current research on transgender persons and their oral health. It shows that oral health care professionals need to develop a better understanding of the issues facing transgender clients in order to provide culturally competent care. These issues include discrimination, violence, substance use, anxiety, depression, and sexually transmitted diseases. Increased awareness of these potential barriers to care, coupled with knowledge of the basics of gender nonconformance and its impact on oral-systemic health, may improve oral health outcomes for this client population.

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# Dental hygiene baccalaureate education: A national study of students' perceived value and intentions

Paula Benbow\*, MPH, RDH; Zul Kanji<sup>§</sup>, EdD, RDH

## ABSTRACT

**Background:** While there continues to be dialogue on the level of education required for entry into the profession of dental hygiene, there is a scarcity of literature pertaining to students' views on the subject. The aim of this study was to explore Canadian dental hygiene students' views on entry-to-practice dental hygiene education and their future educational aspirations. **Methods:** In March 2017, an online survey comprising closed- and open-ended questions was conducted with Canadian Dental Hygienists Association student members enrolled in entry-to-practice Canadian dental hygiene programs. **Results:** Of the 1,738 students who received the survey invitation, 401 students responded (23% response rate). Ninety-one percent of respondents were enrolled in entry-to-practice diploma programs. The majority of respondents agreed that baccalaureate dental hygiene education provides increased knowledge (86%), increased capacity to work with underserved groups (86%), expanded clinical abilities (83%), and enhanced abilities in areas such as critical thinking, research use, and collaboration (85%). Most students (78%) support the vision of all future dental hygienists in Canada having a baccalaureate degree. Approximately 42% of respondents in diploma dental hygiene programs intend to complete baccalaureate education following graduation, 88% of whom intend to enrol in the next 3 years. Reasons for pursuing baccalaureate education include a desire to increase their knowledge base (83%), achieve personal satisfaction (78%), expand career opportunities (75%), increase recognition (75%), increase critical thinking abilities (69%), and access graduate education (58%). **Conclusion:** These findings provide a new understanding of dental hygiene students' views and their general support for and interest in baccalaureate dental hygiene education. Such results offer further impetus for discussions about creating additional opportunities for dental hygiene degree education and advancing the entry-to-practice requirements.

## RÉSUMÉ

**Contexte :** Bien que le dialogue continue sur le niveau de formation requis pour l'entrée dans la profession d'hygiéniste dentaire, il existe peu de documentation publiée sur l'opinion des étudiants en cette matière. Cette étude visait à explorer les opinions des étudiants canadiens en hygiène dentaire sur la formation d'entrée en pratique en hygiène dentaire et sur leurs aspirations pédagogiques futures. **Méthodologie :** En mars 2017, un sondage en ligne comprenant des questions fermées et ouvertes a été mené auprès des membres étudiants de l'Association canadienne des hygiénistes dentaires inscrits à des programmes canadiens d'entrée en pratique en hygiène dentaire. **Résultats :** Parmi les 1 738 étudiants qui ont reçu l'invitation à participation au sondage, 401 étudiants ont répondu (taux de réponse de 23 %). Quarante-et-un pour cent des répondants étaient inscrits aux programmes de diplômes menant à l'entrée en pratique. La majorité des répondants était d'accord que la formation en hygiène dentaire menant au baccalauréat fournit des connaissances accrues (86 %), une meilleure capacité de travailler avec des groupes mal desservis (86 %), des habiletés cliniques élargies (83 %) et des habiletés améliorées dans des domaines tels que la pensée critique, l'utilisation de la recherche et la collaboration (85 %). La plupart des étudiants (78 %) appuient la vision que tous les hygiénistes dentaires de l'avenir au Canada soient titulaires d'un baccalauréat. Environ 42 % des répondants inscrits aux programmes d'hygiène dentaire menant au diplôme collégial ont l'intention de terminer des études menant au baccalauréat après l'obtention de leur diplôme et 88 % parmi eux comptent s'y inscrire dans les 3 prochaines années. Les raisons de poursuivre une formation menant au baccalauréat comprennent le désir d'augmenter la base de connaissances (83 %), l'atteinte d'une satisfaction personnelle (78 %), l'augmentation des occasions d'emplois (75 %), l'obtention d'une plus grande reconnaissance (75 %), l'augmentation des habiletés de pensée critique (69 %) et la possibilité d'accéder aux études supérieures (58 %). **Conclusion :** Ces résultats fournissent un nouvel éclairage sur l'opinion des étudiants en hygiène dentaire, et leur appui général et leur intérêt envers la formation en hygiène dentaire menant au baccalauréat. De tels résultats offrent un élan supplémentaire aux discussions sur la création de possibilités supplémentaires en matière de formation en hygiène dentaire menant au baccalauréat et de progression des exigences d'entrée en pratique.

**Keywords:** baccalaureate degree, dental hygiene degree, dental hygiene education, dental hygiene students, dental hygienists, motivation, professional advancement

**CDHA Research Agenda category:** capacity building of the profession

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At the time of data analysis and manuscript preparation, Ms Benbow was senior manager—policy, research, and government relations at the Canadian Dental Hygienists Association.

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## WHY THIS ARTICLE IS IMPORTANT TO DENTAL HYGIENISTS

- Research examining Canadian dental hygiene students' perspectives on baccalaureate education is limited.
- The views of dental hygiene students on their ability to address the evolving needs of the public are critical to advancing the profession.
- While 91% of students surveyed were enrolled in diploma programs, most (78%) supported the vision of all future dental hygienists in Canada having a baccalaureate education.
- This research demonstrates a clear need for additional dental hygiene baccalaureate programs in Canada.

## BACKGROUND

Throughout the history of dental hygiene, there has been debate globally about the educational preparation required for entry into the profession. With education often being described as the cornerstone of a profession, it is important that dental hygienists continue to engage in this dialogue and reflect on the entry-level requirements to ensure that graduates acquire the abilities to address not only the increasing levels of responsibility in varied practice environments, but also the evolving needs of the public. While research on students' perspectives on the advancement of dental hygiene is limited, their views are critical to this dialogue.

Dental hygiene is a unique profession in Canada, in that it has multiple educational pathways that lead to registration and entry into the profession. An eclectic range of educational models currently exist for dental hygiene in Canada, including programs delivered in community and private colleges, polytechnics, and universities. Programs range from 2-year and 3-year diploma programs to 4-year bachelor's degree programs for entry into practice and are offered in either English or French. Currently, there are 34 dental hygiene programs across Canada accredited by the Commission on Dental Accreditation of Canada, only 2 of which offer a bachelor's degree for entry into practice: the University of British Columbia and the University of Alberta.<sup>1</sup> While there are national standards that these educational programs must meet and/or exceed, the current entry-level requirement for the profession remains a diploma.

Research exploring baccalaureate dental hygiene education has been increasing in recent years. Evidence suggests that baccalaureate dental hygiene graduates have greater depth and breadth of knowledge, improved cognitive abilities related to research use and critical thinking, increased confidence to take action in their practice resulting in greater contributions in interprofessional contexts, and more career opportunities outside of private clinical practice.<sup>2-5</sup> Studies have also demonstrated that baccalaureate dental hygiene graduates are more likely to practise in alternative settings, such as public health authorities and other community agencies, hospitals, educational institutions, professional associations and regulatory bodies, research laboratories, industry, and independent practice.<sup>6-9</sup>

There have been significant changes to the abilities needed to practise dental hygiene in Canada. For example, in most provinces, dental hygienists are now permitted to self-initiate dental hygiene care without an order or supervision from a dentist and they can administer local anesthesia.<sup>10</sup> There has also been a greater focus on interprofessional education and collaboration from a client safety perspective,<sup>11-15</sup> and dental hygiene programs must now provide interprofessional collaboration experiences for students.<sup>16</sup> In addition, for the first time in Canadian

history, seniors outnumber those under 15 years of age, and seniors are more likely to have chronic conditions, especially comorbidities that can be complex and difficult to manage.<sup>17,18</sup> These additional abilities likely place pressures on existing entry-to-practice program curricula given that the accreditation requirement for dental hygiene programs has remained at a 2-year minimum.<sup>16</sup>

The increasingly complex challenges in health care today parallel the experiences of other health professions, such as nursing, physical and occupational therapy, and pharmacy, which have advanced their entry-to-practice requirements from a diploma to a baccalaureate degree for nursing, from a diploma to a master's degree for physical and occupational therapy, and, most recently, from a bachelor's degree to a doctorate for pharmacy. The European Union and the European Economic Area have also seen a significant shift over the years from dental hygiene diploma education to bachelor's degree programs<sup>19</sup>; however, the education required for entry into dental hygiene practice has remained relatively stagnant. While a baccalaureate education is not yet the entry-level requirement to practise dental hygiene in Canada, many other countries have advanced to the baccalaureate degree for entry to practice, including Denmark, Finland, Italy, Netherlands, Norway, Portugal, and Sweden.<sup>20</sup>

In 2012, British Columbia's Ministry of Health approved a new registration category for dental hygienists aimed at increasing access to dental hygiene care.<sup>21</sup> The associated College of Dental Hygienists of British Columbia (CDHBC) bylaw identifies 4 abilities that registrants are required to meet at the fourth-year baccalaureate level to seek registration in this new category. These abilities include a focus on managing clients with complex needs and disabling conditions, interprofessional collaboration, and applying safe standards of care in diverse settings.<sup>3</sup> CDHBC's 2018-19 strategic plan includes the objective to establish the dental hygiene degree as the educational standard for entry into practice,<sup>21</sup> which has prompted dental hygiene diploma programs in that province to propose new delivery models for degree education.

Research examining Canadian dental hygiene students' perspectives on baccalaureate education is limited. Therefore, the Canadian Dental Hygienists Association (CDHA) conducted its first CDHA Student Members' Survey to explore dental hygiene students' perceptions of entry-to-practice education for the profession and their future educational aspirations and intentions.<sup>22</sup> This article presents the results of the survey and discusses important practice implications. The knowledge gained from this study may stimulate further discussions on advancing the profession through changes to the entry-to-practice requirement.

## METHODS

The study consisted of a voluntary online questionnaire to collect views from dental hygiene students across

Canada on entry-level education for the profession. The study's ethical framework was informed by the Tri-Council Policy Statement II: Ethical Conduct for Research Involving Humans (<http://ethics.gc.ca/eng/index/>). Questionnaire development relied on an iterative process involving educational experts from 2 CDHA volunteer committees (the Education Advisory Committee and the Leadership Alliance for Baccalaureate Education). The survey consisted of both open- and closed-ended questions and explored students' demographics, student and program profile, views on national educational directions, interest in and intention to pursue baccalaureate dental hygiene education, and learning preferences. The survey used 5-point Likert scales to measure levels of agreement, interest, and importance for various factors.

The online questionnaire, offered bilingually (English and French), was delivered through SurveyMonkey™ and took students approximately 20 minutes to complete. Prior to survey distribution, the English and French versions were pretested with a small convenience sample of diploma and degree dental hygiene students ( $n = 12$ ) to assess readability and clarity of questions and timing. There were 2,280 CDHA student members when the survey launched, representing 38% of all dental hygiene students in Canada. Of the 2,280 CDHA student members, 23.6% ( $n = 539$ ) had opted out of email communications. A purposive sample of the remaining 1,741 CDHA student members were sent an invitation to participate in this voluntary web-based survey using the email address associated with their membership file. Three emails bounced back, resulting in 1,738 individuals who received the invitation. The invitation included statements about the voluntary nature of the survey, the possible benefits of participating, how the results could be accessed, confidentiality and anonymity, consent procedures, and contact information. Two reminder notices were emailed to students after the initial invitation. These email notices were translated for CDHA student members whose preferred language of communication was French ( $n = 141$ ). A message was also sent to program directors/coordinators of accredited dental hygiene programs in Canada to inform them of this survey and to request that they encourage their students to participate. The survey link was active between March 7 and March 31, 2017. Respondents who completed the survey had an opportunity to be entered in a draw for 1 of 3 powered toothbrushes.

Data were collected with SurveyMonkey™ and then imported into the Statistical Package for the Social Sciences (SPSS) Version 24.0 to analyse the quantitative data.

## *78% of student respondents supported the vision of all future dental hygienists in Canada having a baccalaureate education*

Descriptive statistics were computed to show frequency distributions, and the Independent-Samples Kruskal-Wallis test was used to compare differences between the respondents based on demographic and education variables and program. A  $p$  value of  $<0.05$  was used to determine statistical significance.

Qualitative data emerging from the open-ended questions were coded and analysed for recurring themes. All data collected were used in calculations, even if students did not complete the survey in full. Confidentiality was maintained at all times as no identifying information was recorded in the survey results.

### RESULTS

Of the 1,738 CDHA student members who received the survey invitation, 401 students responded (23% response rate), with 366 entry-to-practice dental hygiene students eligible to participate. Three hundred and ten (310) respondents completed the survey in full (85% completion rate). The majority of participants submitted responses to the English version (94.3%).

#### Demographics and program information

The majority of survey respondents were 20–24 years of age (54.5%) and female (94.5%) (Table 1). Most survey respondents were enrolled in entry-to-practice dental hygiene diploma programs (91%) (Table 2), and respondents represented all provinces with a dental hygiene program, with a majority of respondents enrolled in programs in Ontario (58.2%), followed by British Columbia (14.8%) and Alberta (9.6%) (Table 1).

#### Views on dental hygiene education

Students were asked to indicate the extent to which they agreed or disagreed with statements pertaining to their perceptions of abilities and knowledge acquired during baccalaureate dental hygiene education using a 5-point Likert scale. Overall, the majority of students agreed or strongly agreed that baccalaureate dental hygiene education provides increased knowledge (86%), increased capacity to work with underserved groups (86%), expanded clinical and prescription-writing abilities (83%), and enhanced abilities in areas such as critical thinking, research use, and interprofessional collaboration (84%) (Table 3).

When asked about their views on access to baccalaureate dental hygiene programs in Canada, the majority of respondents (84%) believed that baccalaureate dental hygiene programs should be available in all provinces in Canada. Additionally, 78% of student respondents supported the vision of all future dental hygienists in

Table 1. Demographic profile

Characteristic	Number of participants n (%)
<b>Age (n = 310)</b>	
≤19 years	32 (10)
20–24 years	169 (55)
25–29 years	61 (20)
30–34 years	15 (5)
35–39 years	18 (6)
≥40 years	11 (4)
Prefer not to say	4 (1)
<b>Gender (n = 310)</b>	
Female	293 (95)
Male	15 (5)
Prefer not to say	2 (1)
<b>Province (n = 366)</b>	
Alberta	35 (10)
British Columbia	54 (15)
Manitoba	6 (2)
New Brunswick	10 (3)
Nova Scotia	5 (1)
Ontario	213 (58)
Québec	28 (8)
Saskatchewan	15 (4)

Note: Percentages may not total 100% because of rounding.

Canada having a baccalaureate education (Table 4).

When stratified by program type, a greater proportion of diploma students agreed or strongly agreed with access to baccalaureate dental hygiene education in all provinces in Canada compared to their degree counterparts ( $p = 0.025$ ). When beliefs about the vision of all dental hygienists having a baccalaureate degree were examined, no statistically significant differences were found between age categories ( $p = 0.509$ ), province ( $p = 0.609$ ), program type ( $p = 0.798$ ) or prior education ( $p = 0.602$ ) (Table 5).

When students were asked to elaborate on their responses, a theme that emerged from students enrolled in diploma programs was the need for a program of longer duration to incorporate the required theory and practice of a curriculum of greater depth and breadth. This sentiment was captured in the following excerpts:

*...dental hygiene should be a baccalaureate program simply because a fourth year of schooling should be necessary...much of my education was rushed through because the profs had too much to teach in a short amount of time.*

Table 2. Student and program profile

Characteristic	Number of participants n (%)
<b>Type of educational institution (n = 310)</b>	
Community college	150 (41)
Private college	99 (27)
Technical institute	21 (6)
University	74 (20)
Don't know	22 (6)
<b>Type of dental hygiene program (n = 316)</b>	
Diploma	287 (91)
Degree	29 (9)
<b>Expected year of graduation (n = 366)</b>	
2017	190 (52)
2018	136 (37)
2019	30 (8)
2020	9 (3)
2021	1 (<1)
<b>Prior education (n = 310)</b>	
High school diploma/senior matriculation	70 (23)
Some college transfer credits	35 (11)
Diploma from a postsecondary organization	43 (14)
1st year university transfer credits	35 (11)
2nd year or higher university transfer credits	48 (16)
3-year bachelor's degree	13 (4)
4-year bachelor's degree in another area	56 (18)
Master's degree	6 (2)
Doctoral degree	4 (1)

Note: Percentages may not total 100% because of rounding.

*I strongly believe that students feel unprepared when it comes to serving underserved populations. An extended degree may offer the chance for students to gain more experience.*

While most students expressed their support for baccalaureate education, some opposing views were noted. Support for diploma education as the entry-level requirement was captured in the following comments:

*I think that all dental hygiene programs should be 2 years like they used to be and if you wanted a bachelors or masters in dental hygiene you could go to university for that.*

*Enough information is learned in 3 years to feel confident and work efficiently as a dental hygienist... In my opinion, a bachelor's degree shouldn't be a necessity to work as a dental hygienist.*

Survey respondents were asked for their perceptions of the impact that changes to entry-level educational requirements for the dental hygiene profession would have on their career using a 4-point Likert scale. Most

Table 3. Level of agreement with statements of perceptions on abilities related to baccalaureate education (n = 347)

Baccalaureate dental hygiene education is important to gain...	Strongly agree/agree (%)	Neither agree nor disagree (%)	Disagree/strongly disagree (%)	Do not know (%)
• Increased knowledge in areas such as oral medicine, immunology, and microbiology	299 (86.2)	20 (5.8)	23 (6.6)	5 (1.4)
• Increased capacity to work with underserved groups to provide increased access for oral health services	299 (86.2)	20 (5.8)	23 (6.6)	5 (1.4)
• Different abilities such as prescription of medications and minimally invasive restorative interventions	288 (83)	28 (8.1)	21 (6.0)	10 (2.9)
• Enhanced abilities in areas such as critical thinking, research use, and working collaboratively with other professionals	293 (84.5)	19 (5.5)	30 (8.6)	5 (1.4)

respondents (67%) feel that changes to the existing requirements would have some or substantial impact on their career as dental hygienists, with greater impact perceived by diploma students ( $p < 0.001$ ). One quarter (25.5%) of students had earned an undergraduate or graduate degree in fields other than dental hygiene prior to entry into their dental hygiene program, many of whom expressed concerns about recognition of their previous education. For example, one student inquired about being “able to practice if you had a bachelor’s degree in something besides dental hygiene but had the dental hygiene diploma.” Another student noted: “there should be a bridging program too in future for the dental hygienist to bridge to [baccalaureate] program if [there] is any impact on their job.”

Data analysis revealed a predominant sentiment that such a change to the entry-level requirements for the dental hygiene profession was needed and would be a process, but that it would lead to positive outcomes. This sentiment is captured by the following comments:

*I understand this process may take time, and there has to be transition period where current dental hygiene diploma holders are given the opportunities to complete their degree, if they choose to. Nevertheless, this is going to improve our profession’s presence in the public’s eyes, as well as in the health care system.*

*42.3% of respondents in diploma dental hygiene programs intend to complete baccalaureate education following graduation*

*If dental hygiene practice were to change to a baccalaureate degree in the future, I feel that that would give our profession a higher regard than it already does.*

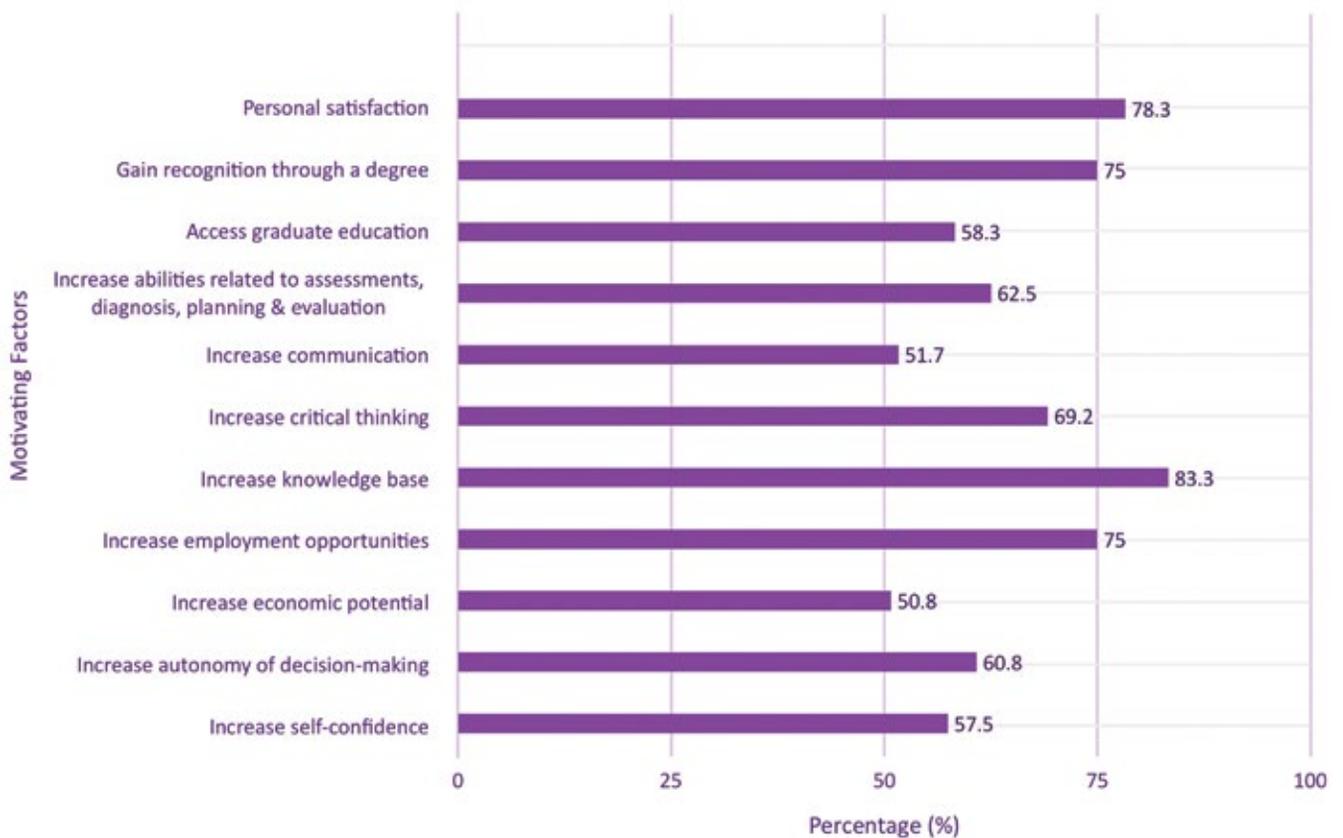
#### Interest in and intention to pursue baccalaureate education

Only 9% of student respondents were enrolled in a baccalaureate dental hygiene program. However, 42.3% of respondents in diploma dental hygiene programs intend to complete baccalaureate education following graduation. Of these respondents,

approximately 88% intend to enroll in a baccalaureate program in the next 3 years, and 76% intend to enroll in a baccalaureate degree program specific to dental hygiene. Only 19.5% of students expressed that they were not interested in pursuing degree education at the time of the survey, while 38.2% were unsure.

Baccalaureate degree students and diploma students who expressed intentions to pursue baccalaureate dental hygiene education were asked about the motivators that influenced their intentions. Respondents selected factors from a closed-ended multiple-select list. These motivators included an interest in increasing their knowledge base (83%), achieving personal satisfaction (78%), increasing employment opportunities (75%), having greater recognition (75%), increasing critical thinking abilities (69%), and accessing graduate education (58%). Other motivators were improving autonomy of decision making, self-confidence, communication abilities, and economic potential (51% to 61%) (Figure 1).

Figure 1. Motivating factors for pursuing baccalaureate degree education



Although there was support for baccalaureate education, some diploma students described barriers hindering access to such programs. When given the opportunity to elaborate on their views through open-ended questions, 12 students described barriers related to their geographic location and/or program availability. “Although I will graduate soon, I would be interested in taking the [bachelor’s degree] in dental hygiene if ever it were available.” Another noted: “Having degree level education access for dental hygiene in Ontario would be amazing. Not every[one] is well-equipped to travel far for education and having closer options would release some stress for students.”

While 22.6% of respondents indicated that their

highest academic credential prior to entry into the dental hygiene program was a high-school diploma, the majority of the survey participants had additional postsecondary education, which was identified as a reason for not pursuing further baccalaureate education. For example, one student commented, “I entered my program with a bachelor’s degree in biochemistry and I don’t feel an additional baccalaureate in dental hygiene is necessary.” Some survey participants also lacked knowledge about baccalaureate education in Canada. “I honestly don’t know what the difference would be and why it would benefit me. I don’t know how to pursue this option either.” Another commented, “For a student getting a diploma in

Table 4. Level of agreement with statements on access to baccalaureate education (n = 347)

To what extent do you agree or disagree with the following statements?	Strongly agree/ agree (%)	Neither agree nor disagree (%)	Disagree/strongly disagree (%)	Do not know (%)
• Baccalaureate dental hygiene degree programs should be available in all provinces currently offering dental hygiene education	296 (85.3)	32 (9.2)	16 (4.6)	3 (0.9)
• Access to baccalaureate dental hygiene degree programs should be available in all provinces in Canada	292 (84.1)	36 (10.4)	16 (4.6)	3 (0.9)
• I support the vision of all future dental hygienists in Canada having baccalaureate education	270 (77.8)	46 (13.3)	30 (8.7)	1 (0.3)

the end of my hygiene education I am only starting to know what other options a dental hygienist can do and it usually requires a degree." One student noted that they were "unaware that this was an option."

Others expressed that they lacked interest in pursuing baccalaureate education or had other competing priorities. "I want to start my life and pay off my debts." "I don't feel a baccalaureate is necessary. I will perfect my skills by working in the field and if I want to perfect something in particular like orthodontics or restorative, extra courses should be sufficient."

Students were asked to indicate their level of interest in working in various practice settings upon graduation using a 5-point Likert scale (Table 6). The vast majority (80.5%) were either very or extremely interested in working in private dental practices while moderate interest was expressed for independent dental hygiene practice, public health, and teaching. A greater proportion of students in degree programs expressed interest in working in independent dental hygiene practice compared to their diploma counterparts ( $p = 0.010$ ) (Table 7). Students were not asked to elaborate on their responses.

Students' learning preferences were also queried in the survey but the results have not been included in this article due to editorial limitations.

## DISCUSSION

This study contributes in a novel way to the literature on dental hygiene baccalaureate education.<sup>2-9,19,23-26</sup>

Previous research has explored motivating influences on pursuing baccalaureate education, abilities gained after such education and their impact on dental hygiene practice, and career outcomes after earning a dental hygiene degree.<sup>2-9</sup> This research, largely Canadian, has explored these aforementioned areas from the perspectives of practising dental hygienists, most of whom first earned a dental hygiene diploma and later returned to university to earn their degree. There is a scarcity of research on current entry-to-practice dental hygiene students' views of baccalaureate education for the profession and their intentions to pursue further education.

### Baccalaureate vision

The results of this study demonstrate that entry-to-practice dental hygiene students in Canada strongly support baccalaureate dental hygiene education. The majority of students, regardless of age, prior education, program type, and province, support the vision that all dental hygienists in Canada should have a baccalaureate degree, and most students believe that baccalaureate programs should be

available in all provinces. These results align with recent findings from a study of graduates of the University of British Columbia's (UBC) entry-to-practice dental hygiene degree and degree completion pathways, 93% of whom desire to see the baccalaureate degree as the entry-to-practice credential for the profession because they believe such education enhances critical thinking and prepares dental hygienists for varied roles with more diverse populations.<sup>5</sup> In addition, according to CDHA's 2016 *Educators' Survey Report*, 69% of dental hygiene educators across Canada believe that the baccalaureate degree should be the entry-to-practice credential for dental hygiene.<sup>27</sup>

Of the 34 accredited entry-level programs in Canada, only 2 are entry-to-practice baccalaureate dental hygiene programs. For dental hygienists with a diploma who want to further their education in dental hygiene, Canada offers only 4 degree-completion programs through UBC, the University of Alberta, Dalhousie University (Nova Scotia), and the University of Manitoba.<sup>28</sup> Of note, 80.5% of student respondents from Ontario diploma programs support the vision of all future dental hygienists in Canada having baccalaureate education. When compared to some other provinces, a greater proportion of students from Ontario support this vision yet Ontario has neither a dental hygiene entry-to-practice baccalaureate program nor a dental hygiene degree-completion program. An increasing number of articulation agreements also exist between colleges and universities should a student wish to enroll in a degree program outside of the dental hygiene field.<sup>29</sup>

Of the 6,315 respondents to the 2017 CDHA Job Market and Employment Survey, 1,322 dental hygienists (21%) indicated they have a baccalaureate degree as their highest degree, only 404 (6%) of whom had earned a degree specifically in dental hygiene.<sup>30</sup> This survey also reported that 160 dental hygienists (2.5%) have a master's degree, and 59 (0.9%) have earned a doctoral degree as their highest credential. The number of currently practising baccalaureate dental hygienists in Canada is relatively low, as is the number of available baccalaureate dental hygiene programs. Considering the number of student respondents who expressed an intention to pursue baccalaureate education (42.3%), there is a clear need for additional dental hygiene baccalaureate programs in Canada.

### Impact on practice

With regard to enhanced abilities, the majority of student respondents believed that a dental hygiene degree would provide greater depth of knowledge, increased capacity to work with underserved populations, and enhanced

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education*

Table 5. Level of agreement with the baccalaureate vision by demographic and education variables

Variable	Agree/strongly agree (%)	Neither agree nor disagree (%)	Disagree/strongly disagree (%)	p value <sup>a</sup>	
Age (n = 310)	≤19 years	24 (75.0)	5 (15.6)	3 (9.4)	0.509
	20–24 years	134 (79.3)	22 (13.0)	13 (7.7)	
	25–29 years	42 (68.9)	12 (19.7)	6 (9.8)	
	30–34 years	12 (80.0)	2 (13.3)	1 (6.7)	
	35–39 years	16 (89.9)	0 (0)	2 (11.2)	
	≥40 years	8 (72.8)	2 (18.2)	1 (9.1)	
	Prefer not to answer	2 (50.0)	0 (0)	2 (50.0)	
	<b>Total<sup>b</sup></b>	<b>238 (76.8%)</b>	<b>43 (13.9%)</b>	<b>28 (9.0%)</b>	
Prior education (n = 310)	Direct entry from high school	55 (78.6)	9 (12.9)	6 (8.6)	0.578
	College education	59 (75.6)	14 (17.9)	5 (6.4)	
	Some university credits	69 (83.1)	8 (9.6)	6 (7.2)	
	Undergraduate degree	48 (69.6)	11 (15.9)	9 (13.0)	
	Graduate degree	7 (70.0)	1 (10.0)	2 (20.0)	
	<b>Total<sup>b</sup></b>	<b>238 (76.8%)</b>	<b>43 (13.9%)</b>	<b>28 (9.0%)</b>	
Program type (n = 316)	Diploma	220 (76.7)	42 (14.6)	24 (8.4)	0.798
	Degree	23 (79.3)	2 (6.9)	4 (13.8)	
	<b>Total<sup>b</sup></b>	<b>243 (76.9%)</b>	<b>44 (13.9%)</b>	<b>28 (8.9%)</b>	
Province (n = 347)	Alberta	31 (91.2)	3 (8.8)	0 (0)	0.609
	British Columbia	40 (76.9)	5 (9.6)	7 (13.5)	
	Manitoba	4 (66.7)	2 (33.3)	0 (0)	
	New Brunswick	5 (55.6)	1 (11.1)	3 (33.3)	
	Nova Scotia	4 (80.0)	1 (20.0)	0 (0)	
	Ontario	161 (80.5)	21 (10.5)	17 (8.5)	
	Québec	16 (61.5)	8 (30.8)	2 (7.7)	
	Saskatchewan	9 (60.0)	5 (33.3)	1 (6.7)	
	<b>Total<sup>b</sup></b>	<b>270 (77.8%)</b>	<b>46 (13.3)</b>	<b>30 (8.6%)</b>	

<sup>a</sup>Statistical tests run on 5-point Likert scale, not grouped data

<sup>b</sup>Do not know response column missing from table and excluded from statistical calculation

abilities to critically think, use research, and collaborate interprofessionally. These findings strongly align with recent research on dental hygienists in Canada who earned a dental hygiene diploma before completing their dental hygiene degree. Using both quantitative and qualitative methods, Sunell et al. and Kanji et al. reported that earning a dental hygiene degree enhances cognitive abilities rather than clinical or technical elements.<sup>2-5</sup> Their research found that dental hygienists attribute enhanced critical thinking skills, increased abilities to read, appraise, and translate research into practice, and increased self-confidence to their baccalaureate education. These abilities had a positive impact on dental hygiene practice as noted by enhanced evidence-based decision making and increased interprofessional collaboration.<sup>2-5,9</sup>

In 2007, the Council of Ministers of Education, Canada (CMEC) published a document that articulates the purpose of baccalaureate education and expectations for learners.<sup>31</sup>

According to CMEC, baccalaureate degree graduates are expected to demonstrate the following abilities:

- “depth and breadth of knowledge;
- knowledge of methodologies and research;
- application of knowledge;
- communication skills;
- awareness of limits of knowledge; and
- professional capacity/autonomy.”<sup>31 p5</sup>

Having these outcomes underpin all dental hygiene education in Canada through a baccalaureate model would help to ensure that all dental hygienists acquire the abilities needed to manage the increasing complexity of individuals and populations in the 21st century.

In 2015, CDHA published the *Canadian Competencies for Baccalaureate Dental Hygiene Programs* which stemmed from a 3-round Delphi study conducted between 2012 and 2014.<sup>23,24</sup> The aim of this study was to identify

Table 6. Interest in various practice settings upon graduation (n = 318)

Practice setting	Extremely/very interested (%)	Moderately/slightly interested (%)	Not at all interested (%)	Do not know <sup>a</sup> (%)	Mean <sup>b</sup>
Private dental practice	256 (80.5)	54 (17.0)	5 (1.6)	3 (0.9)	4.1278
Independent dental hygiene practice	140 (44)	136 (42.8)	31 (9.7)	11 (3.5)	3.2426
Public health/community health practice	167 (52.5)	126 (39.6)	22 (6.9)	3 (0.9)	3.5080
Teaching in postsecondary education	119 (37.4)	129 (40.6)	63 (19.8)	7 (2.2)	2.9773
Research and/or enrolling in graduate studies	85 (26.7)	138 (43.3)	86 (27.0)	9 (2.8)	2.6091

<sup>a</sup>Do not know excluded from mean calculation.

<sup>b</sup>Mean calculated using the 5-point Likert scale (extremely interested=5; very interested=4; moderately interested=3; slightly interested=2; not at all interested=1).

the competencies that Canadian dental hygienists need at the baccalaureate level to promote and support the health of the public.<sup>23</sup> Many of these competencies are similar to the competencies for diploma education but expressed to a higher level involving the management of groups, communities, and populations. Other newly developed competencies extend beyond the abilities articulated for the dental hygiene diploma graduate and include discipline knowledge, research use, policy use, and leadership.<sup>23,24</sup>

In the student member survey, baccalaureate degree students expressed greater interest in working in independent dental hygiene practice upon graduation compared to their diploma counterparts. This finding may be attributed to an increase in confidence and decision-making abilities associated with baccalaureate dental hygiene degree education.<sup>4</sup> In a recent study by Kanji and Laronde (2018), degree-completion students were asked for their opinions regarding abilities gained or strengthened as a result of earning the BSc degree.<sup>9</sup> Most respondents (64%) felt more prepared to work independently and autonomously.<sup>9</sup> Luciak-Donsberger and Eaton suggest that practising independently "...would help to facilitate the provision of dental hygiene services in remote areas, in public health services, in a variety of residential care facilities and in mobile dental units."<sup>19</sup>

### Motivating factors

Student members articulated many motivating reasons for their intention to pursue baccalaureate education, including

expanding their knowledge base, seeking personal satisfaction, increasing employment opportunities, greater recognition, self-confidence, increasing critical thinking abilities, access to graduate education, and increasing economic potential. These findings are consistent with the literature in dental hygiene that has investigated motivating influences for furthering one's education beyond the diploma.

One of the first studies to explore motivating influences was Waring's 1991 study on 189 dental hygienists in the United States who had first earned an associate degree then returned to university to complete their dental hygiene baccalaureate degree for reasons related to personal satisfaction (98%), increasing knowledge and skills (95%), career advancement (81%), and the status of a degree (76%).<sup>25</sup> Similarly, a more recent qualitative study on a national sample of Canadian dental hygienists demonstrated that primary motivating reasons for pursuing dental hygiene degree-completion education were expanding career options, personal development and a desire for more knowledge, status and recognition, and access to graduate education.<sup>26</sup> Most recently, Kanji and Laronde's 2018 survey of 116 graduates of UBC's dental hygiene degree program (entry-to-practice and degree-completion) also found that personal satisfaction (82%), increasing employment opportunities (78%), status and recognition (76%), accessing graduate education (68%), and improving critical thinking abilities (61%) were primary motivators for pursuing a dental hygiene degree.<sup>5</sup>

Table 7. Comparison of diploma and degree students' interest in various practice settings upon graduation

Practice setting	Diploma	Degree	p value
	Mean	Mean	
Private dental practice	4.1338	4.0690	0.324
Independent dental hygiene practice	3.1841	3.8214	0.010
Public health/community health practice	3.4683	3.8966	0.099
Teaching in postsecondary education	2.9357	3.3793	0.105
Research and/or enrolling in graduate studies	2.5914	2.7857	0.440

The interest in expanding career pathways outside of the clinical practice setting surfaced as a prevalent theme across this past research in which participants expressed a desire to seek employment namely in education, community or public health, and research.<sup>5,25,26</sup> Several studies that have investigated career outcomes after earning a dental hygiene degree have clearly demonstrated that baccalaureate-educated dental hygienists have been more successful in securing employment in alternative settings, such as educational institutions, government health authorities, professional associations and regulatory bodies, and industry, as well as in pursuing graduate studies.<sup>2-4,6-9</sup> When primary and secondary practice areas were considered, 45% of graduates of UBC's dental hygiene degree program were employed in education, administration, public or community health, and research.<sup>9</sup> In addition, 35% of survey respondents indicated that the degree was required for employment, and 86% stated the degree was considered an asset.<sup>9</sup> Over 25% of those who graduated with a dental hygiene degree from UBC have completed a master's degree providing for additional career opportunities.<sup>9</sup> This study also found that UBC degree graduates who worked full time had higher annual incomes and a greater number of employment benefits compared with dental hygiene respondents from CDHA's 2015 Job Market and Employment Survey.<sup>9</sup>

#### Study limitations

A limitation of this study was the low response rate. While this study's sample size was adequate for statistical power for the statistical tests used, a low response rate does present challenges in generalizing these findings to the entire student population in Canada. This low response could be related to time constraints of students given their course workload at the time of survey, and/or their lack of interest in the topic. Québec has the second largest proportion of dental hygiene students in Canada, yet only 8% of the respondents to the CDHA student survey were from Québec. This underrepresentation may be attributed to the low proportion of Québec students registered as CDHA student members. In addition, the sample may not be representative of all dental hygiene students in Canada if the views of dental hygiene students who did not join CDHA or CDHA student members who opted out of email communications were different from those who joined.

#### CONCLUSION

The results of this survey strengthen our understanding of dental hygiene education in Canada and reveal important insights into students' views on national educational directions, as well as their interest in baccalaureate dental hygiene education. The results may also provide the stimulus for the creation of additional educational pathways for baccalaureate education in Canada and further dialogue on entry-to-practice requirements for entry into the

profession. Advancing dental hygiene education may provide graduates with the necessary skills and abilities to respond to the changing demands of an evolving health care system while meeting the increasingly complex needs of the public. While dental hygiene students expressed strong support for baccalaureate education, further research is needed to explore barriers to pursuing baccalaureate dental hygiene education.

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#### CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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# Graduating dental hygiene students' attainment of the CDHA baccalaureate competencies: Students' self-ratings

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## ABSTRACT

**Problem statement:** In 2015 the Canadian Dental Hygienists Association published the first *Canadian Competencies for Baccalaureate Dental Hygiene Programs*. To date there is no scientific evidence to support that graduates from baccalaureate programs have gained these abilities. **Purpose:** To explore the confidence levels of graduating dental hygiene baccalaureate students in their ability to demonstrate the national baccalaureate competencies. **Methods:** This article examines the preliminary frequency data from the first year of a 3-year longitudinal study involving the graduating students within the University of British Columbia dental hygiene baccalaureate program. An online, anonymous survey was conducted with these students to rate their confidence level based on a 5-point scale ranging from not confident to confident in the national competencies that include 13 domains with 110 associated subcompetencies. **Results:** Seventeen of the twenty-two graduating students responded to the survey for a 77% response rate. The competency areas in which they expressed the highest confidence were collaboration (100%), clinical therapy (100%), oral health education (90%), disease prevention (86%), professionalism (82%), and integration of knowledge (80%). The areas in which they expressed the least confidence were policy use (20%) and advocacy (11%) where some respondents were not confident, somewhat confident or unsure. **Conclusion:** These data provide the faculty with important insights to support curriculum revisions, particularly in the policy use and advocacy domains. The data also contribute to a broader national discussion about the baccalaureate competencies and an exploration of the subcompetencies that may be beyond the scope of baccalaureate education.

## RÉSUMÉ

**Énoncé du problème :** En 2015, l'Association canadienne des hygiénistes dentaires a publié la première édition des *Compétences canadiennes à l'égard des programmes de baccalauréat en hygiène dentaire*. Jusqu'à maintenant, aucune preuve scientifique ne confirme que les diplômés de programmes de baccalauréat ont acquis ces habiletés. **Objectif :** Explorer le niveau de confiance des finissants du programme de baccalauréat en hygiène dentaire dans leur capacité à démontrer qu'ils ont les compétences nationales du baccalauréat. **Méthodologie :** Cet article examine la fréquence de données préliminaires de la première année d'une étude longitudinale de 3 ans impliquant les finissants du programme de baccalauréat en hygiène dentaire de l'Université de la Colombie-Britannique. Un sondage anonyme a été mené en ligne auprès de ces étudiants afin d'évaluer leur niveau de confiance d'après une échelle de 5 points allant de « non confiant » à « confiant » dans les compétences nationales qui comprennent 13 domaines et 110 sous-compétences associées. **Résultats :** Dix-sept des vingt-deux finissants ont répondu au sondage, pour un taux de réponse de 77 %. Les domaines de compétence dans lesquels ils ont exprimé le plus de confiance étaient la collaboration (100 %), la thérapie clinique (100 %), l'éducation en matière de santé buccodentaire (90 %), la prévention des maladies (86 %), le professionnalisme (82 %), et l'intégration des connaissances (80 %). Les domaines dans lesquels ils ont exprimé le moins de confiance étaient l'utilisation des politiques (20 %) et la défense des intérêts (11 %), alors que certains répondants n'étaient pas confiants, étaient légèrement confiants ou incertains. **Conclusion :** Ces données fournissent de l'information importante au corps professoral pour appuyer les révisions aux programmes, particulièrement dans les domaines de l'utilisation des politiques et de la défense des intérêts. Les données contribuent aussi à une vaste discussion nationale sur les compétences de baccalauréat et une exploration des sous-compétences qui peuvent être au-delà du champ d'activités de la formation menant au baccalauréat.

**Keywords:** baccalaureate education, competencies, competency-based education, dental hygiene, dental hygiene education, professionalism, self-confidence

**CDHA Research Agenda category:** capacity building of the profession

## WHY THIS ARTICLE IS IMPORTANT TO DENTAL HYGIENISTS

- Self-confidence has been described in health care studies as an important indicator of competence.
- Graduating baccalaureate dental hygiene students expressed most confidence in the domains of collaboration, clinical therapy, and oral health education, and least confidence in the domains of advocacy and policy use.
- These findings may be used to support curriculum revisions and contribute to a broader national discussion about baccalaureate competencies for dental hygiene education.

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## INTRODUCTION

In 2015 the Canadian Dental Hygienists Association (CDHA) published the *Canadian Competencies for Baccalaureate Dental Hygiene Programs*.<sup>1</sup> This document represented a new national standard in dental hygiene education that was built upon the national entry-to-practice competencies and practice standards.<sup>2</sup> It was generated through a Delphi study<sup>3,4</sup> involving experts in the profession and supported by the input of an advisory committee of Canadian regulators and an accreditation representative as well as national and international program directors from baccalaureate and master's degree programs. It is important and timely to explore how this national standard compares to the outcomes of baccalaureate dental hygiene education.

The development of national ability statements has been an ongoing project for many years in the Canadian dental hygiene profession. The first competencies developed in the 1980s were specific to the clinical scope of dental hygiene practice with a focus on its technical aspects.<sup>5</sup> Over the years the ability statements were broadened to include competencies in the areas of health promotion, disease and injury prevention, education, and advocacy.<sup>2,5</sup> General professional abilities common to all health professions were also more explicitly stated,<sup>6,7</sup> such as professionalism, collaboration, communication, coordination, and evidence-based decision making. Several national organizations were engaged in articulating dental hygiene abilities, including the Association of Canadian Faculties of Dentistry, the Canadian Dental Hygienists Association, the Commission on Dental Accreditation of Canada, Dental Hygiene Educators Canada, and the Federation of Dental Hygiene Regulators of Canada.<sup>5</sup>

During the years when national baccalaureate competencies were not available, the faculty at the University of British Columbia (UBC) generated baccalaureate program competencies that were integrated into the program in 2009.<sup>8</sup> In 2016 the UBC faculty and students then shifted to the new CDHA competencies; the 2 documents shared many similarities. As is common in postsecondary programs, students are evaluated to competence by both faculty members and peers through course work in a variety of learning environments on campus and in community settings; self-assessment is also integral to clinical and community assessments. Exploring the learners' views from the perspective of their self-confidence was considered an important way of gaining additional insight into the outcomes of their education.

The exploration of dental hygiene students' self-confidence is an important aspect of professional education given its relationship to professional competence.<sup>9-11</sup> The concept of "confidence" is described as being the "quality or state of being certain," with self-confidence defined as "confidence in oneself and in one's powers and abilities" (<https://www.merriam-webster.com/dictionary/self-confidence>). It is common to find terms such as confidence,

self-confidence, and self-efficacy used as surrogate terms for professional confidence.<sup>12,13</sup> The term self-confidence is more commonly found in professional educational literature whereas self-efficacy is more common to psychological literature.<sup>14</sup> The 2 terms are often used interchangeably thus making their differentiation difficult.<sup>13,14</sup>

The concept of "self-confidence" is used in this study as a measurement of competence as it has in other professional health care studies.<sup>10,15-17</sup> It is recognized that there are mixed findings related to the congruence between "self-confidence" and the assessment of competence by qualified assessors.<sup>18,19</sup> While it may not be appropriate for regulatory purposes, self-confidence appears to be a reasonable measure to gain aggregated student input for curriculum revisions<sup>9-11,15,16,20</sup> given the caveat that it has limitations, as do all measures involving self-reporting. Self-confidence has also been described as an important indicator of competence,<sup>9,10,12-15</sup> so it would be useful to explore the self-confidence of students. Dental hygiene students' self-confidence should receive greater attention as a concept worthy of investigation as few such studies currently exist in dental hygiene literature.<sup>21</sup>

The authors of CDHA's baccalaureate competencies<sup>1</sup> urged the profession to further investigate the competencies through the input of students, educators, and other practitioners. The experts in the associated Delphi study<sup>3,4</sup> articulated the competencies and viewed them as relevant and realistic. However, beyond the Delphi study there are no other studies to suggest that the national competencies reflect the outcomes of baccalaureate dental hygiene education in Canada. With this in mind, the UBC faculty initiated a longitudinal study to explore the confidence levels of graduating baccalaureate students in their abilities to demonstrate CDHA's baccalaureate competencies. Such data were viewed as critical to the ongoing curriculum review and revision process so important within postsecondary education. This study was designed to initiate a discussion about professional self-confidence and competence within the context of CDHA's baccalaureate competency profile.

## METHODOLOGY

This article examines the preliminary frequency data from the first year of a 3-year longitudinal study involving the graduating students from 2017 to 2019. The study was based on the following research question:

How confident are the graduating dental hygiene baccalaureate students in their ability to demonstrate the national baccalaureate competencies?

The survey instrument approved by the UBC Behavioural Research Ethics Board (H17-00109) was organized into the 13 domains of the CDHA document<sup>1</sup> with their 110 associated subcompetency statements ([http://www.cdha.ca/pdfs/profession/CCBDHP\\_report.pdf](http://www.cdha.ca/pdfs/profession/CCBDHP_report.pdf)). The domains include shared competencies with other professions

**Table 1.** Range of the “mostly confident” and “confident ratings” and mode in each domain

Domains	Number of subcompetencies	Range of mostly confident and confident ratings (%)	Range of mostly confident and confident ratings excluding outliers <sup>a</sup> (%)	Range of mode <sup>b</sup> ratings
<b>Knowledge of the discipline competency</b>				
Integration of knowledge of the discipline	5	30–94	76–94 (1 outlier)	Not sure–mostly confident
<b>Core competencies</b>				
Professionalism	11	70–100		Mostly confident–confident
Communication	9	35–100	65–100 (1 outlier)	Somewhat confident–confident
Collaboration	6	76–100		Mostly confident–confident
Coordination	9	30–100	77–100 (2 outliers)	Somewhat confident–mostly confident
Research use	11	53–94	71–94 (1 outlier)	Mostly confident–confident
Leadership	9	65–100		Mostly confident–confident
<b>Dental hygiene service competencies</b>				
Health promotion activities, initiatives & programs	10	41–100	65–100 (1 outlier)	Not sure–confident
Disease prevention activities, initiatives & programs	7	65–100		Mostly confident
Oral health education	10	53–100	83–100 (1 outlier)	Somewhat confident–mostly confident
Advocacy	9	24–71	47–71 (1 outlier)	Somewhat confident–mostly confident
Policy use	5	47–77		Somewhat confident–mostly confident
Clinical therapy	9	82–100		Mostly confident–confident

<sup>a</sup>Outliers were defined as any subcompetency with a 20% or greater rating difference from the other ratings.

<sup>b</sup>Most frequent rating by study respondents. The ratings for individual subcompetencies are found in Appendix A online.

such as professionalism, communication, collaboration, coordination, research use and leadership, and specific dental hygiene competencies such as health promotion, disease prevention, oral health education, advocacy, policy use, and clinical therapy. Respondents were asked to rate their confidence in each of the domain subcompetencies using a 5-point rating scale ranging from not confident to confident. The scale included a “not sure” option to determine the number of students who were not comfortable with the other options.<sup>22,23</sup> Optional open-ended questions were included so respondents could clarify their ratings.

The concept of self-confidence has provided useful results in the health professions including nursing,<sup>15,16</sup> midwifery,<sup>10</sup> medicine,<sup>17</sup> dental hygiene,<sup>21</sup> and dentistry.<sup>11,20</sup> However, the findings about self-confidence ratings and self-ratings in general are nuanced and the results are mixed.<sup>19,22,25</sup> For example, there is evidence that self-ratings are more calibrated among those with more experience.<sup>24</sup> The ratings are also more calibrated for cognitive abilities than other abilities.<sup>25</sup> Prior to 2006, the majority of studies in medicine found that those with less competence tend to have more confidence than warranted

by their abilities<sup>19</sup> and those with the least amount of competence tended to have the most inflated ratings.<sup>25</sup> Using self-assessments may, therefore, not be helpful from a regulatory perspective with its focus on assessing individuals for protection of the public.

However, more recent studies found congruence between student ratings and faculty ratings.<sup>23,25</sup> These findings may be related to the growing evidence that self-assessment abilities can be learned,<sup>24,26</sup> particularly if people are guided by criteria associated with the ability.<sup>24-26</sup> A study by Metz et al.<sup>24</sup> found that self-assessment was influenced by experience to the point that there were no statistically significant differences between the ratings of fourth-year dental students in operative dentistry and those of faculty members. The Commission on Dental Accreditation of Canada standards ([https://www.cda-adc.ca/cdacweb/en/accreditation\\_requirements/dental\\_hygiene/](https://www.cda-adc.ca/cdacweb/en/accreditation_requirements/dental_hygiene/)) also reflect this perspective given that the ability of students to self-assess must be demonstrated. The students in our study were several weeks away from entry into the profession and had been working with such competencies<sup>8</sup> and their related assessment criteria

Table 2. Frequency data related to modes for subcompetencies in each domain

Domains	Frequency of modes for confidence ratings					Total <sup>b</sup>
	Not sure	Somewhat confident	Mostly confident	Mostly confident/ confident <sup>a</sup>	Confident	
<b>Knowledge of the discipline competency</b>						
Integration of knowledge of the discipline	1		4			5
<b>Core competencies</b>						
Professionalism			6	1	4	11
Communication		1	7		1	9
Collaboration			4		2	6
Coordination		2	5	1	1	9
Research use			9	1	1	11
Leadership			7		2	9
<b>Dental hygiene service competencies</b>						
Health promotion	1		8		1	10
Disease prevention			7			7
Oral health education		1	6		3	10
Advocacy		2	7			9
Policy use		1	4			5
Clinical therapy			6		3	9
<b>Total</b>	<b>2</b>	<b>7</b>	<b>80</b>	<b>3</b>	<b>18</b>	<b>110</b>

<sup>a</sup>Bimodal<sup>b</sup>Total number of subcompetencies per domain

for close to 4 academic years; hence they were in a good position to provide input on the national competencies for curriculum review and revision purposes.

The concept of “self-confidence” was also used given that it would be risky for students to divulge that they were not competent in the national competencies at their time of entry into the profession. Ethical guidelines suggest researchers should not ask respondents to incriminate themselves. Asking respondents to rate their self-confidence in the competencies through an online survey was regarded as being a safe way for learners to share their views—so critical to the assessment of these competencies—given that data were only reported as group data. The concept of self-confidence was used to support the truthfulness of the data.

While there are limitations to all self-reported data, this study focussed on the use of the group data to support curriculum review and development efforts. The methodology allowed the researchers to obtain important student perspectives with minimal resources<sup>20</sup> given that observer-driven study designs are expensive.<sup>17</sup>

A third-party recruiter delivered an electronic invitation that included a link to the survey on the UBC CourseEval platform. Students were invited to participate as close to program completion as possible while still providing them with 2 weeks to complete the survey. Participation was incentivized

through the option to enter a draw for several gift cards.

Quantitative data were analyzed by means of descriptive statistics using the SPSS Statistics for Windows, Version 25.0 software. Given the ordinal data the results were presented as percentages, ranges, modes, and quartiles. Future analysis will include inferential, non-parametric statistical tests once the 3-year study has been completed with the attendant increase in participant numbers. Thematic analysis was used to explore the written comments from the open-ended questions. This article reviews the preliminary frequency data from the March 2017 survey. Despite the small class size, the data provide an important starting point for a broader discussion about baccalaureate dental hygiene education and its outcomes.

A pilot phase was considered. However, there was no other comparable group to the UBC senior students as there were no other 4-year entry-to-practice dental hygiene baccalaureate programs in Canada at the time of the study. Using an international group would have been problematic given that they would not have been familiar with the competencies. The survey included 2 common rating scales as well as commonly used demographic questions. The competency statements (n = 110) formed the major part of the survey and they could not be altered. The cost-benefit analysis did not support the inclusion of a pilot phase.

Table 3. Quartile analysis based on subcompetencies per domain

Domains	Number of subcompetencies in each range based on sum of mostly confident & confident ratings				Summary	
	≤25%	Between 26% and 50%	Between 51% and 75%	>75%	% in upper quartile	Total number of subcompetencies
<b>Knowledge of the discipline competency</b>						
Integration of knowledge of the discipline		1		4	80	5
<b>Core competencies</b>						
Collaboration				6	100	6
Professionalism			2	9	82	11
Coordination		2		7	78	9
Leadership			2	7	78	9
Research use			4	7	64	11
Communication		1	3	5	56	9
<b>Dental hygiene service competencies</b>						
Clinical therapy				9	100	9
Oral health education			1	9	90	10
Disease prevention activities, initiatives & programs			1	6	86	7
Health promotion activities, initiatives & programs		1	2	7	70	10
Policy use		1	3	1	20	5
Advocacy	1	2	5	1	11	9

## RESULTS

Responses were received from 17 of the 22 graduating students (77% response rate). Sixteen (94%) of the respondents identified themselves as female and 1 (6%) respondent as male. With regard to their highest educational background upon entry into the program, 13 (76%) held a high school diploma, 1 (6%) held a diploma in another field, 1 (6%) had completed first-year university courses, 1 (6%) had completed second-year university courses, and 1 (6%) respondent entered with 6 years of university transfer courses in arts and sciences.

The majority of respondents (88%;  $n = 15$ ) had lived in British Columbia prior to entering the program; 2 (12%) had lived in Alberta. The great majority of these graduating students were between 21 and 25 years of age (94%;  $n = 16$ ) with one being between 26 and 30 years old.

The frequency data related to respondents' ratings for the 110 subcompetencies are found in Appendix A ([https://files.cdha.ca/profession/Journal/Sunell\\_AppendixA\\_v53n2.pdf](https://files.cdha.ca/profession/Journal/Sunell_AppendixA_v53n2.pdf)). To gain deeper insight into the respondents' views, the mostly confident and confident ratings were combined for each of the 110 subcompetencies in Appendix B ([https://files.cdha.ca/profession/Journal/Sunell\\_AppendixB\\_v53n2.pdf](https://files.cdha.ca/profession/Journal/Sunell_AppendixB_v53n2.pdf)). The raw and percentage data in these appendices may be of interest to educators

given that they provide specific information at the subcompetency level ( $n = 110$ ).

For readers seeking a summary of the data from a domain level, Table 1 provides the range of the mostly confident and confident ratings as well as the mode (most frequent response) for the subcompetencies in each domain with and without outliers. Outliers were defined as any subcompetency with a 20% or greater rating difference from other ratings in the domain.

Table 2 provides a summary of the modes and highlights the domains in which the mode of some subcompetencies was in the somewhat confident or unsure category. There were no subcompetencies with a mode in the not confident category. In fact, the not confident category was rarely used; this rating was only applied 20 times (1%) in the overall data set of 1870 responses.

Each domain was then analysed to determine the number of subcompetencies per domain in the following percentage areas: ≤25%, 26% to 50%, 51% to 75%, and >75%. These quartile ranges were then used in the ranking of the domains. The domains with 75% or more of the subcompetencies in the upper range (4th quartile) were as follows (Table 3):

- Clinical therapy (100%)

- Collaboration (100%)
- Oral health education (90%)
- Disease prevention (86%)
- Professionalism (82%)
- Integration of knowledge (80%)
- Coordination (78%)
- Leadership (78%)

Having 75% or more of the subcompetencies in each domain rated mostly confident and confident was used as an indicator that respondents felt confident in the domain. This was the case for 8 of the 13 domains (62%).

The fourth-year students did not express as much confidence in the following 5 domains (38%):

- Health promotion (70%)
- Research use (64%)
- Communication (56%)
- Policy use (20%)
- Advocacy (11%)

These domains and their associated subcompetencies were explored to determine their nature.

While the domain of health promotion was not within the 4th quartile, it included an item related to the management of “incidents, outbreaks and emergencies,” and another item related to “system thinking.” The other subcompetencies in this domain were more highly rated (Table 1).

The subcompetencies in the communication domain (in which respondents expressed less confidence) included working with people of diverse backgrounds, health literacy skills, and working with information and communication technologies including those associated with business operations.

With regard to the research use domain, respondents expressed less confidence in abilities related to statistical tests, assumptions and biases, theoretical frameworks and processes, and oral health strategies.

The subcompetencies in policy use and advocacy, many of which involved political and policy items, were rated the lowest. Many respondents indicated that they were not confident, somewhat confident or unsure of these subcompetencies.

A further examination was conducted to explore the similarity in content of subcompetencies that were rated 75% across the various domains. The following themes emerged:

- Political action
- Measurement and monitoring
- Analysis and use of evidence

The specific subcompetencies associated with each theme are identified in Appendix C ([https://files.cdha.ca/profession/Journal/Sunell\\_AppendixC\\_v53n2.pdf](https://files.cdha.ca/profession/Journal/Sunell_AppendixC_v53n2.pdf)). Subcompetencies that included a political context were rated below 75% in terms of the learners' confidence level. The measuring and monitoring theme included

subcompetencies involving quality assurance protocols and the use of cost-benefit and cost utility data. With regard to the analysis and use of evidence, the subcompetencies related to the interpretation and presentation of statistical data, the use of theoretical frameworks, and the incorporation of system thinking.

While the ratings provided important insights into the subcompetencies within the domains, these data were also enriched by the comments from the respondents. For example, students commented on the areas in which they felt confident:

*I feel that we develop strong foundational knowledge of the science and mechanisms behind disease, health, and behaviour, and how to use this knowledge when making clinical decisions.*

*The degree program made me confident that I can do more than be a clinical therapist and use my knowledge in health promotion in all aspects of health care.*

They also wrote about the areas they found more challenging. For example, there was a recognition of advocacy for individuals as reflected in the following quote.

*Advocacy is important. I recognize that I can be an advocate for my clients through referrals and research.*

However, cause advocacy was described as more challenging to grasp.

*Advocacy is something I have struggled with; it is difficult to...change a policy and understand how the political process works.*

*I have come across most of the points [Advocacy subcompetencies] while studying but I am not sure how I may see myself apply them in practice.*

Respondents also provided insights into areas in which they felt less confident as reflected in the following quotes.

*I do not feel very confident critiquing statistical tests and methodologies.*

*We present leadership qualities almost every day with clients in different settings. I am not sure how I/someone else may have applied this to global and political issues.*

*Policy use seems more specific if you're trying to change something in the government; I feel I don't fully understand this still.*

The respondents' written comments helped to clarify their ratings and provide insights into their understanding of CDHA's baccalaureate competencies.

## DISCUSSION

This study explored the self-confidence level of graduating students in a 4-year baccalaureate program to support ongoing curriculum revisions. The confidence level of the graduating students was likely influenced by the fact that they were familiar with the structure and language of competency documents.

The graduating learners appeared to have a strong knowledge of dental hygiene practice with the exception of their understanding of its political aspects. This finding likely reflects the fact that the political arena is complex, as evidenced by the often-tumultuous events noted in the media. This area warrants further exploration during curriculum review initiatives to determine if it reflects a realistic baccalaureate outcome or would be more appropriately positioned within a graduate degree program.

The respondents indicated confidence in many of the core domains such as collaboration, professionalism, coordination, and leadership as well as the dental hygiene services domains including clinical therapy, disease prevention, and oral health education thus affirming the current focus of baccalaureate dental hygiene education. The strong ratings in these dental hygiene services domains were anticipated given that such domains have been integral to dental hygiene education for many years. The solid confidence level of learners in these domains suggest that there may be opportunities to shift some curriculum hours to domains in which the learners expressed less confidence. However, such shifts will need to be carefully monitored to ensure that current confidence levels are maintained.

The domains discussed above are similar to those found in American literature articulating important workforce abilities.<sup>27-31</sup> In a 2013 pilot group study<sup>27</sup> of workforce needs, the American Dental Hygienists' Association recommended the following domains:

- foundation knowledge
- patient-centred care
- management of health care systems
- interprofessional communication
- critical thinking
- professionalism

The supporting discussions focused on the emerging oral and systemic health links that emphasize the need to frame health services from a "whole-person care"<sup>28</sup> perspective.

A concurrent symposium report<sup>29</sup> explored competency domains from the perspective of oral-systemic health competencies and reinforced similar themes including increased depth and breadth of knowledge, and increased professional capacity in communication, coordination,

and research use. These competencies reflect a shift to a population approach including the integration of oral health care into general health across national health care systems.<sup>28-31</sup>

In the health professional literature collaboration and coordination are discussed from the perspective of increased client safety and better health outcomes.<sup>32,33</sup> The Canadian safety competencies<sup>33</sup> developed for all health professions highlight their importance through the following domains: 1) contribute to a culture of patient safety; 2) work in teams for patient safety; and 3) communicate effectively for patient safety.

Respondents expressed the highest confidence in collaboration, which is supported by Kanji and Laronde<sup>34</sup> who found a higher level of collaboration with non-dental health professionals ( $p < 0.001$ ) among UBC baccalaureate graduates when compared to the Canadian respondents in CDHA's 2015 Job Market and Employment Survey. Interprofessional education (IPE) with its emphasis on collaboration has been described as central to health care reform for many years.<sup>28,35-37</sup> It encourages the creation of multilevel and intersectoral approaches to health care. IPE creates T-shaped graduates,<sup>38</sup> who possess a depth of knowledge of their own profession yet are capable of and disposed to explore other fields that may influence the services they provide. The need to work collaboratively has also been highlighted by increased attention to collective competence<sup>38,39</sup> with its focus on interactions among professionals as they share their knowledge, experience, and perceptions to enhance care. It recognizes the need in health care for both competent individuals and competent teams. Bridging the gap between oral health and general health is essential, and dental hygienists have been described as playing an integral role in this regard.<sup>40</sup> The UBC graduates expressed confidence in working with other health professionals.

Other key competencies related to client safety include the subcompetencies within the domains of research use, communication, and advocacy.<sup>41,42</sup> While the ratings for research use and communication were in the 3rd quartile, the policy use and advocacy domains were in the 1st quartile (Table 3). The low ratings for the policy use domain focused on issues of policies, regulations, and legislation including their monitoring and evaluation. The low confidence ratings in the advocacy domain reflect the respondents' low ratings across the domains of the subcompetencies related to political issues and actions. American dental hygiene studies have highlighted the importance of undergraduate advocacy experiences.<sup>43-45</sup> However, alumni continue to need mentorship support to develop these abilities.<sup>43,44</sup> These 4 domains are now central to the UBC dental hygiene program review and revision process.

Leadership abilities are described as being related to the development of advocacy abilities as well as

increasing professional capacity.<sup>46</sup> There has been a growing discussion about the need for fundamental leadership abilities within oral health education.<sup>3,4,10,30,46-48</sup> The importance of leadership in the health professions was emphasized in the Canadian public health competencies<sup>42</sup> and later also reflected in the dental public health competencies<sup>42</sup> given that they are linked to capacity building of the health professions. Smith et al.<sup>46</sup> found that leadership abilities were included in many but not all dental hygiene degree completion programs, with 13 respondents (27%) indicating that their program did not include leadership-infused curriculum. The ratings of the UBC graduating students in this domain were in the 4th quartile (78%). Respondents' written comments identified the complex nature of the domain and its value suggesting that they appear to recognize the importance of such abilities.

Many of the discussions during the Delphi study<sup>3,4</sup> revolved around the boundary in the health promotion, advocacy, and policy use domains between baccalaureate and master's level education. In the case of health promotion, the discussions focused on working with individual clients versus groups and communities with the former being viewed as an outcome of diploma and the latter of baccalaureate education. Similarly, advocacy for individuals was viewed as a diploma outcome, with case advocacy being an additional baccalaureate outcome. The lower ratings in these domains raise questions about the curriculum dedicated to these areas as well as the degree of difficulty of the baccalaureate subcompetencies.

This is also true of the research use domain. Across the domains, respondents expressed less confidence in subcompetencies associated with the analysis and interpretation of evidence. While educators in the United States have developed dental hygiene master's competencies,<sup>49</sup> they have not articulated baccalaureate competencies. Conversely, Canadian educators have baccalaureate competencies but no national competencies for master's education. Are some of the subcompetencies perhaps more reflective of master's education? It would be timely to develop master's level competencies to support a better understanding of the boundaries between baccalaureate and master's education.

The data from this study raise questions about the realistic nature of some of the subcompetencies and suggest that some may reflect intentions rather than outcomes of baccalaureate education. Chambers and Gerrow<sup>50</sup> distinguished between exposure to, experience with, and assessment of competencies in their study. Based on the data from the UBC graduating students it appears that some subcompetencies, particularly those within the advocacy and policy use domains, may fall within the realm of "exposure to and experience with" rather than "assessment of." This finding again highlights the importance of articulating the boundary between

Canadian master's and baccalaureate competencies to ensure that the expectations of dental hygiene baccalaureate education are realistic and align with those of other health professions.

### Limitations

It is challenging to determine the level of confidence ratings realistic for program outcomes given that the measurement of confidence includes some sources of error associated with overconfident and underconfident ratings.<sup>19,25</sup> While there are mixed findings related to the congruence between self-ratings and faculty-assessed competence,<sup>18,19</sup> more recent dental studies<sup>23,25</sup> have found congruence between students' self-ratings and those of educators particularly for graduating students with experience in self-assessment. The findings presented in this study were based on one class of graduating students; other baccalaureate graduates may provide divergent ratings. Despite these limitations, this study provides initial data from which to explore student confidence and competence at graduation. This is the first year of a 3-year study; it is anticipated that the data from 2018 and 2019 graduates, and perhaps data from other Canadian baccalaureate programs will provide additional insights.

### CONCLUSION

The competency areas in which the graduating learners expressed the highest confidence included collaboration, clinical therapy, oral health education, disease prevention, professionalism and integration of knowledge. The areas in which they expressed the least confidence included policy use and advocacy where some respondents were not confident, somewhat confident or unsure.

While supporting program curriculum revisions, the findings also contribute to a broader national discussion about the baccalaureate competencies to explore subcompetencies that may be beyond the scope of baccalaureate education.

The domains in which respondents expressed less confidence reflect the boundary between baccalaureate and master's education. This is a boundary that has yet to be defined in the Canadian context. Graduate outcomes need to be explored from multiple perspectives including undergraduate and postgraduate levels so that dental hygienists can promote and support the oral health of the public in the 21st century.

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**CONFLICTS OF INTEREST**

The authors have declared no conflicts of interest.

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# My preferred pronoun is she: Understanding transgender identity and oral health care needs

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## ABSTRACT

**Objective:** This literature review summarizes current research and evidence regarding transgender persons and oral health. **Methods:** A search of the literature was conducted in the following databases: PubMed, Google Scholar, EBSCO Host, Science Direct, and Wiley Online Library using the keywords "transgender identity, gender non-conforming, discrimination, transition, binary systems, transgender oral cavity, transgender, transgender oral health, transgender dental health." Articles published from 2000 to 2017 in both peer-reviewed and non-peer reviewed journals, which reported information regarding the oral health status of transgender populations, were selected for review. **Results:** The search revealed 18 articles, only 7 of which pertained to the oral health status of transgender client populations. Five other articles were eliminated due to either poor quality or irrelevance. **Discussion:** The 13 articles included in the review revealed a need for oral health care professionals to be aware that gender is not binary, nor is it a mental health disorder. Transgender people face heightened risk of discrimination, violence, anxiety, depression, suicidality, substance abuse, and sexually transmitted diseases, as well as significant barriers to health care of which oral health professionals should be made aware. **Conclusions:** Transgender people have the same rights as everyone else to oral health care. Oral health care providers are responsible for ensuring that transgender clients receive care that aligns with their needs and for providing that care in a culturally competent manner. This requires an understanding of the basics of gender nonconformance and its impact on oral-systemic health. Additional research is needed to increase the scientific knowledge base to facilitate improved health outcomes for this client population.

## RÉSUMÉ

**Objectif :** Cette analyse documentaire résume la recherche actuelle et les données probantes à l'égard des personnes transgenres et la santé buccodentaire. **Méthodologie :** Une recherche documentaire a été menée dans les bases de données suivantes : PubMed, Google Scholar, EBSCO Host, Science Direct et Wiley Online Library au moyen des mots clés anglais « *transgender identity* (identité transgenre), *gender non-conforming* (genre non conforme), *discrimination* (discrimination), *transition* (transition), *binary systems* (systèmes binaires), *transgender oral cavity* (cavité buccale du transgenre), *transgender* (transgenre), *transgender oral health* (santé buccodentaire du transgenre), *transgender dental health* (santé dentaire du transgenre) ». Des articles de journaux, publiés de 2000 à 2017 dans des journaux évalués par les pairs et non évalués par les pairs, qui ont fourni de l'information sur l'état de santé buccodentaire des populations transgenres, ont été sélectionnés pour être évalués. **Résultats :** La recherche a montré que sur les 18 articles retenus, seulement 7 se rapportaient à l'état de santé buccodentaire des populations de clients transgenres. Cinq autres articles ont été éliminés en raison de leur mauvaise qualité ou de leur manque de pertinence. **Discussion :** Les 13 articles qui ont fait partie de l'évaluation ont révélé le besoin de sensibiliser les professionnels de la santé buccodentaire au fait que le genre n'est ni binaire ni un trouble de la santé mentale. Les transgenres font face à un risque plus élevé de discrimination, de violence, d'anxiété, de dépression, de tendances suicidaires, d'abus de substances et de maladies transmises sexuellement, ainsi qu'à d'importantes barrières aux soins de santé, pour lesquels les professionnels de la santé buccodentaire devraient être sensibilisés. **Conclusions :** Les personnes transgenres ont les mêmes droits aux soins de santé buccodentaire que les autres. Les prestataires de soins de santé buccodentaire sont responsables de veiller à ce que les clients transgenres reçoivent des soins qui s'alignent avec leurs besoins et de fournir ces soins d'une façon culturellement compétente. Cela exige une compréhension des notions fondamentales sur la non-conformité du genre et de ses effets sur la santé buccodentaire et physique. De la recherche supplémentaire est nécessaire afin d'augmenter la base de connaissances scientifiques et de favoriser l'amélioration des résultats de santé de cette population de clients.

**Keywords:** binary systems, discrimination, gender nonconforming, transgender, transgender dental health, transgender identity, transgender oral cavity, transgender oral health, transition

**CDHA Research Agenda category:** access to care and unmet needs

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## WHY THIS ARTICLE IS IMPORTANT TO DENTAL HYGIENISTS

- Oral health care providers are responsible for ensuring that all clients receive care that aligns with their needs.
- The oral health of transgender clients may be negatively affected by stress, discrimination, substance use, STDs, and hormone therapy.
- Knowledge of the experiences and health challenges of transgender persons will encourage the delivery of culturally competent care.

## INTRODUCTION

There are approximately 1.4 million transgender adults in the United States, representing 0.6% of the population. They are a very diverse group, with 55% identifying as Caucasian, 16% as African-American or Black, 21% as Latino or Hispanic, and 8% as another race or ethnicity.<sup>1,2</sup> This diversity reflects that of the general population as reported by the US Census: 60% identify as white, 13% as African-American or Black, 18% as Hispanic, and 2% as another race or ethnicity.<sup>3</sup> Conversations about civil rights often fail to include people who identify as transgender or gender nonconforming. Binary systems are often used when thinking about categories like sex, gender, and sexual orientation, meaning that there are 2 dichotomous categories for each. Transgender people fall into a third category; their “gender identity and/or gender role [does] not conform to what is typically associated with their sex assigned at birth.”<sup>4</sup>

Although most oral health professionals have probably met a transgender person, they may remain oblivious to understanding who these people are, what issues they face, and how oral health care providers can support or deliver much needed health services in a respectful and intelligent manner. Oral health professionals have a responsibility to render nonbiased, nonprejudicial care to all of their clients and must therefore have a thorough understanding of the needs and concerns of all population groups including transgender individuals. The purpose of this narrative review is to examine the most current evidence on the care of transgender individuals along with their general and oral health needs.

## METHODS

A search of the literature was conducted in the following databases: PubMed, Google Scholar, EBSCO Host, Science Direct, and Wiley Online Library using the keywords “transgender identity, gender non-conforming, discrimination, transition, binary systems, transgender oral cavity, transgender, transgender oral health, transgender dental health.” Articles published from 2000 to 2017 in both peer-reviewed and non-peer reviewed journals, which reported information regarding the oral health status of transgender populations, were selected for review.

## RESULTS

The search produced a total of 18 articles, 7 of which pertained to the oral health of transgender client populations. Of these 7 articles, two were related to transgender oral health status/treatment and were published in peer-reviewed journals.<sup>1,5</sup> An article related to transgender oral health status/treatment was also found in a non-peer reviewed dental hygiene publication.<sup>6</sup> Additionally, 5 manuscripts were related to the education (or, more accurately, lack of education) of students in dental and dental hygiene programs on the topic of transgender clients. However, only 3 provided information

pertinent to this review.<sup>7-9</sup> One manuscript discussed the education being offered to students at medical schools regarding transgender health, while another discussed the experience of dental fear in transgender populations.<sup>10,11</sup> Two articles on eunuchs in India were found but were not included in this review because of poor study design. Data and information pertaining to the effects of stress on the periodontium, prevalence and treatment of sexually transmitted diseases, and disparities in health care availability for this population group were extrapolated from numerous peer-reviewed journals, US government publications, and the World Health Organization website in order to paint a picture of the health (including oral health) challenges that transgender populations face.

The literature revealed that oral health care professionals need to be aware that: 1) gender is not binary; 2) identifying oneself as transgender is not a mental health disorder; and 3) transgender people face heightened risk of discrimination, violence, anxiety, depression, suicidality, substance abuse, and sexually transmitted diseases. In addition, transgender people face significant barriers to health care, including oral health care, because of their gender nonconformance. Among those barriers are the biases of health care providers. Stigmatizing these individuals could create undue stress that may affect the oral cavity. Oral health care providers should also learn about the basics of hormone therapy, which can be feminizing or masculinizing, in order to better understand the experiences of their transgender clients.

## DISCUSSION

Defining transgender often necessitates reviewing the meaning of the terms sex and gender.<sup>12</sup> Binary systems tend to be used when thinking about categories like sex, gender, and sexual orientation, meaning that there are 2 dichotomous categories for each. Sex is anatomical and biological, based on internal and external sex organs, chromosomes, and sex hormones.<sup>4</sup> The binary categories for sex are male and female. Individuals born with mixed sex organism hormones and chromosomes are referred to as intersexual.<sup>4</sup> These individuals represent a third category of sex that is not always recognized in North America. Gender is both psychological and social. It is a social construct; the population creates the psychological and social categories that align with genders.<sup>4</sup>

Gender identity is psychological and refers to a person's inherent sense of being a man or woman.<sup>4</sup> The binary categories for gender identity are man or woman. A third category would be genderqueer or transgender.<sup>4</sup> According to the American Psychological Association, people in this third gender identity category “may think of themselves as both man and woman (bigender, pangender, androgyne); neither man nor woman (genderless, gender neutral, neutrois, agender); moving between genders (genderfluid); or embodying a third gender.”<sup>4</sup>

There is a difference between transgender people and

Table 1. Lesbian, gay, bisexual, transgender, and queer terminology and definitions

Term	Definition
Sex	Anatomical and biological, based on internal and external sex organs, chromosomes, and sex hormones
Intersexual individuals	Born with mixed sex organism hormones and chromosomes
Gender	Psychological and social; it is a social construction
Gender identity	Psychological; refers to a person's inherent sense of being a man or woman
Transsexual	One who has changed their physical body or wants to change their physical body to conform with a gender identity that does not match their sex
Gender nonconforming (GNC)	One whose gender expression or gender identity differs from norms corresponding to their assigned birth sex
TGNC	One who is transgender or gender nonconforming
Genderqueer or transgender	A third category of gender identity
Intersexual	A third category of sex that is not recognized in the United States
Gender dysphoria	An underlying and incessant anxiety created when an individual's expressed or experienced gender is different from the one that was assigned to the person at birth

transsexual people. Transsexual people have changed their physical body or want to change their physical body to conform with a gender identity that does not match their sex. Transsexuals may have surgery and/or use hormones to effect these physical changes.<sup>4</sup> Psychologists now understand that gender is not a binary construct. Because it is non-binary, there may be a range of gender identities and gender identity may not correspond to the sex of a person.<sup>4</sup> Someone who does not fit into the typical binary systems may present with anger or confusion.

The American Psychological Association uses the term gender nonconforming (GNC) to denote people whose gender expression or gender identity differs from norms corresponding to their assigned birth sex.<sup>4</sup> In addition, the abbreviation TGNC is used to refer to people who are transgender or gender nonconforming.<sup>4</sup> Psychologists have recognized that stigma, prejudice, discrimination and, often, violence affect the health and well-being of TGNC people.<sup>4</sup> Prejudicial attitudes may lead to the devaluing, dislike, and hatred of people whose gender identity and/or gender expression do not conform to their sex assigned at birth. Negative attitudes towards transgender individuals have been positively associated with males, religiosity, frequency of attendance at religious services, political designation, gender, and sexual prejudice.<sup>13,14</sup> The factors negatively correlated with transprejudice are less knowledge about trans people, taking a human sexuality or gender course, and little contact with trans people.<sup>15</sup>

Discrimination includes behaviours such as assuming a person's assigned sex at birth is fully aligned with that person's gender identity, not using a person's preferred name or pronoun, asking TGNC people inappropriate questions about their bodies, and making the assumption that psychopathology exists given a specific gender identity or gender expression.<sup>4</sup> TGNC people who hold

multiple marginalized identities are more vulnerable to discrimination and violence. TGNC women and people of colour disproportionately experience severe forms of violence and discrimination, including police violence, and are less likely to receive help from law enforcement.<sup>4</sup>

Two other concepts are important when discussing negative attitudes towards transgender persons: internalized transphobia and transmisogyny. Internalized transphobia occurs when TGNC people hold these negative attitudes about themselves and their gender identity. Transmisogyny refers to a simultaneous experience of sexism and anti-trans prejudice directed specifically towards transwomen. Some people believe that trans people have a mental disorder, however the American Psychiatric Association would disagree. Psychiatrists have adopted the term gender dysphoria as a diagnosis characterized by "a marked incongruence between" a person's gender assigned at birth and gender identity.<sup>16</sup> This diagnosis replaced the diagnosis of gender identity disorder (GID) in the *Diagnostic and Statistical Manual of Mental Disorders (DSM) V*.<sup>16</sup> Having a transgender identity is not a mental illness; how one adapts to that identity is more important in the eyes of psychologists and psychiatrists. A summary of these various terms and their definitions is found in Table 1.

### Health status and concerns

Literature on the oral health status of transgender client populations exists but is scanty.<sup>5,7-9</sup> In contrast, in the medical domain there exists a large amount of information on the experiences and health status of transgender patient populations. Recognizing that health care providers have not historically received training in lesbian, gay, bisexual, transgender, queer (LGBTQ) issues during medical school and/or residencies, medical researchers are embarking on

projects that support and disseminate research regarding LGBTQ health disparities.<sup>10,17-20</sup> Authors have identified consistent themes within the experiences of transgender populations that directly and negatively affect their health.<sup>21-23</sup> These themes include:

- **Stigmatization and discrimination:** Structural (societal norms, environmental conditions, institutional laws and practices, i.e., public accommodation), interpersonal (rejection by one's family and community), and individual (self-orientation, anxiety) experiences of stigmatization have been shown to cause adverse health effects.<sup>21,22</sup>
- **Violence:** Approximately half of transgender persons experience some form of physical assault in their lifetime<sup>21</sup> and report being victims of sexual assault; 84% have reported being verbally harassed due to their gender identity or expression.<sup>21</sup> In all categories of violence, higher rates were reported among people of colour.<sup>22</sup> Oral health professionals should be cognizant of this significantly higher rate of violence and consider screening and referring clients as appropriate.
- **Mental health and substance abuse:** Transgender persons report high levels of anxiety, depression, and suicidality; 41% of transgender persons report attempting suicide compared with 3.7% of the general population.<sup>22,23</sup> The incidence of suicide attempts is directly associated with transgender people being more likely to participate in risky behaviour, such as sex work and/or drug and/or alcohol abuse.<sup>4,20-22</sup> Baghaie et al. report a higher rate of dental caries and periodontal disease among those with substance abuse disorders than among the general population.<sup>24</sup> More research is necessary in order to understand the impact of substance use on oral health in the transgender client.
- **Access to adequate health care:** Transgender persons report barriers in accessing health care such as lack of health insurance, denials of claims due to being transgender, and cost. High rates of unemployment further exacerbate difficulties in obtaining health insurance.<sup>20-23</sup> However, the most often cited barrier to accessing health care is related to providers' lack of knowledge and/or bias against transgender persons.<sup>20-22</sup> Low-income and transgender people of colour report a higher frequency of discrimination when accessing adequate health care.<sup>20-22</sup>

### Stress

The devastating frequency of discrimination in every aspect of life accounts for the high levels of stress experienced by transgender populations. Some degree of inflammation is natural, part of a complex response to harmful agents known as stressors, which is designed to repair cell injury and

speed healing. Too much cellular inflammation, however, leads to detrimental tissue damage and contributes to a variety of conditions such as asthma, rheumatoid arthritis, Alzheimer's disease, Crohn's disease, chronic pain, obesity, attention deficit hyperactivity disorder, migraines, heart disease, and periodontal disease.<sup>25-28</sup>

The American Academy of Periodontology (AAP) has long acknowledged stress as a risk factor for periodontal disease.<sup>29</sup> Stress can also affect the oral cavity by increasing the risk of aphthous stomatitis,<sup>30</sup> HSV2,<sup>31</sup> bruxism,<sup>32</sup> and temporomandibular/myofascial pain.<sup>33</sup>

Nearly half of all individuals who identify as transgender experience depression or some iteration of an anxiety disorder as a response to the discrimination, stigma, lack of acceptance, and abuse they face regularly.<sup>34</sup> Heima et al. found that transgender populations experience dental fear as a result of experiences of discrimination and maltreatment in dental care settings.<sup>11</sup>

Stress also has a secondary negative effect. Stigma, for example, forces ostracized individuals to avoid social encounters, shy away from health care professionals, and depend on addictive substances to help manage their anxiety and aloneness. Engaging in risk-taking behaviours, such as unsafe sex, is also an effect of stress among this client population, which contributes to negative health outcomes.<sup>35</sup>

### Sexually transmitted diseases

Risky sexual behaviours, such as having unprotected anal intercourse, having multiple partners, and engaging in sex work, account for the high incidence of sexually transmitted infections (STIs) seen in transgender populations.<sup>35,36</sup> Unsafe needle practice involving injection of hormones and substances such as silicone to alter facial features and a high rate of illegal substance abuse also increase the risk of contracting a STI.<sup>36</sup> Certain STIs, such as gonorrhoea, exhibit oral manifestations which the oral health care professional should identify. Often, the client may be unaware of the presence of a STI, which increases the chances of infecting others and prevents the client from receiving necessary care and/or medication.

Transgender people comprise approximately 1% of all individuals with newly diagnosed human immunodeficiency virus (HIV) infections. The National HIV Surveillance System gathered data regarding HIV incidence in transgender populations from 45 states and the District of Columbia. Of 2,351 transgender people who were newly diagnosed with HIV in the years 2009 through 2014, 84% were transgender women (male to female), 15.4% were transgender men (female to male) and 0.7% listed a different gender identity (queer, bi-gender).<sup>36</sup> Black or African-American transgender women have a higher percentage of confirmed HIV infection (56.3%) compared to whites (16.7%) and Hispanics or Latinos (16.1%).<sup>36</sup> Toibaro et al. reported a 43% prevalence of syphilis in their 2008 study of 105 transgender people.<sup>37</sup> No data regarding

Table 2. Oral lesions seen in HIV infection

Lesion	Presentation/other	Treatment
Oral candidiasis	Whitened, curd-like lesions that easily wipe off; most common oral lesion in HIV+ clients	Topical antifungal medications (nystatin, imidazoles)
Kaposi's sarcoma	Singular or numerous purple, red or brown blotches on the skin or mouth; a cancer that develops from the cells lining lymph or blood vessels	Medical intervention (chemotherapy and HAART) only, not treated by dental professionals
Aphthous ulcer	Singular or multiple painful, round ulcerations	Topical corticosteroids, antibiotics, antifungal medications; laser ablation
Linear gingival erythema (gingivitis in HIV+ clients)	Bright red gingival margin up to 4 mm wide	Possibly due to <i>candida dubliniensis</i> and, therefore, treatable with antifungal medications; HAART; oral health instruction
Periodontitis (necrotizing ulcerative periodontitis/necrotizing gingivostomatitis)	Etiology is aerobic and anaerobic bacteria	Scale and root planing procedures; HAART
Oral hairy leukoplakia	Asymptomatic; whitened mucosa on lateral borders of tongue with projection of filiform papillae which appear as "thick hairs"	Cryotherapy ablation, antiviral medication

prevalence of other STIs in transgender populations were located in this search.

With the evolution of highly active antiretroviral therapy (HAART), HIV-positive persons receiving treatment and living a healthy lifestyle can expect similar lifespans to those who are not HIV positive. However, oral manifestations are common in people with HIV infection. A brief review of these lesions and their treatment is provided in Table 2. However, because a few of these lesions are classified as "strong indicators for the presence of HIV infection,"<sup>38</sup> readers are encouraged to update their knowledge of these lesions and HIV infection.

Data on human papillomavirus and herpes simplex virus are not routinely reported to the Centers for Disease Control and Prevention (CDC). However, in 2015 among the general population there were 1,526,658 cases of chlamydia reported, 395,216 cases of gonorrhea reported, and 23,872 cases of syphilis (primary and secondary) reported.<sup>39</sup>

This was the second year in a row in which increases were seen in all 3 of these infections. Gonorrhea is particularly troublesome as recent studies have noted the development of bacterial resistance to the antibiotics normally used to treat it.<sup>40</sup>

## Medications

### Hormone therapy

Doctors utilize hormone therapy in order to feminize or masculinize physical features. The World Professional Association for Transgender Health (WPATH) recommends that the following criteria be met prior to initiation of hormone therapy<sup>41</sup>:

- Persistent, well-documented gender dysphoria
- Capacity to make a fully informed decision and to consent for treatment

- Age of majority in a given country (if younger, follow the Standards of Care outlined in section VI)
- If significant medical or mental health concerns are present, they must be reasonably well controlled.

Feminizing hormone therapy has a dual goal—to encourage the presentation of female secondary sex characteristics (breast development, redistribution of fat, changes in emotional and social behaviour, and decreased libido) and discourage the presentation of male secondary sex characteristics (reduction of body mass and body hair except the scalp hair, reduction in perspiration and body odour, deepened voice, reduction of erectile function/sperm/ejaculatory fluid/testicular size).<sup>42-44</sup> The hormone therapy used to elicit these changes combines estrogen (the primary female sex hormone responsible for the production of female secondary sex characteristics) with an androgen blocker (to counteract the effects of androgens, the male sex hormones, testosterone and dihydrotestosterone) and sometimes a progestogen (plays a role in breast development, enhances libido, and skin elasticity, among others).<sup>45</sup> However, the use of progestogens is based on anecdotal evidence (both from transgender women and providers) and not from scientific evidence derived from well-designed studies.<sup>42,43</sup> The most frequently used androgen blocker in the United States is spironolactone; cyproterone acetate is most frequently used in Europe.<sup>45</sup> The primary class of estrogen used is 17-beta estradiol (often shortened to estradiol), which may be administered orally, intramuscularly or via the transdermal route.

Masculinizing hormone therapy develops male secondary sex characteristics and suppresses/minimizes female secondary sex characteristics, and is achieved through the use of several forms of parenteral testosterone. Table 3 summarizes feminizing and masculinizing hormone therapy medications.

**Table 3.** Feminizing and masculinizing hormone therapies

Hormone therapy	Route
<b>Female</b>	
Estradiol/estradiol valerate (estrogen)	Oral or sublingual
Estradiol valerate (estrogen)	Intramuscular
Estradiol cypionate (estrogen)	Intramuscular
Estradiol gel (estrogen)	Topical
Estradiol patch (estrogen)	Transdermal
Spironolactone (androgen blocker)	Oral
Finasteride (androgen blocker)	Oral
Dutasteride (androgen blocker)	Oral
Cyproterone acetate (androgen blocker)	Oral
Gonadorelin (GnRH agonist)	Subcutaneous
Leuprolide acetate (androgen blocker)	Intramuscular
<b>Male</b>	
Testosterone undecanoate	Oral
Testosterone enanthate, cypionate	Subcutaneous, intramuscular
Testopel	Implant
Testosterone gel, patch, cream	Transdermal

A comprehensive discussion of the specific risks and side effects of these agents is beyond the scope of this article, but the reader is encouraged to refer to the reference list for more sources of information on hormone therapy. Psychologically speaking, there is some low-quality evidence to suggest that feminizing and masculinizing hormone therapy improves gender dysphoria.<sup>21</sup>

Hormone levels in non-transgender people are used as reference ranges but are not absolute. The Standards of Care for the Health of Transsexual, Transgender, and Gender Nonconforming People, Seventh Version (SOC7) created by WPATH “allows physicians to tailor their practices based on individual patient issues, special physician skills or knowledge, cultural variations, lack of resources, and the need for harm reduction strategies.”<sup>41</sup> How soon physical changes are seen depends on the dose, route of administration, medications used, and medical risk profile, but changes are generally accomplished within 2 years of initiation of hormone therapy.<sup>42</sup> Therefore, client goals dictate titration levels and providers will increase estrogen and antiandrogens while monitoring hormone and safety levels (e.g., risk factors such as smoking which, in combination with estrogen therapy, is associated with an increased risk of venous thromboembolism, hyperkalemia, and renal function). Once the client has achieved the desired result, hormone levels are monitored yearly.

Research has shown that changes in the periodontal condition might be associated with variations in hormones. The AAP recognizes this effect and included the

following in their 1999 periodontal classification system: puberty-associated gingivitis, menstrual cycle-associated gingivitis, and pregnancy-associated gingivitis.<sup>46</sup> In 2017 the AAP, in partnership with the European Federation of Periodontology, convened a group of experts to examine the most recent science regarding periodontal diseases. The group, known as the World Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions, has recently issued a new classification scheme for periodontal and peri-implant diseases in which the effects of sex steroids on the periodontium is listed as a “potential modifying factor of plaque-induced gingivitis.”<sup>47</sup>

The changes caused by estrogen and progesterone include increased bleeding, inflammation, erythema, and slight increased tooth mobility.<sup>48</sup> Estrogen deficiency is known to be positively correlated with osteoporosis in women.<sup>48</sup> Testosterone has a positive effect on bone metabolism, inhibits prostaglandin secretion, reduces interleukin 6 production (a cytokine), and enhances the work of fibroblasts and osteoblasts.<sup>48</sup>

## CONCLUSION

This review provides a brief introduction to the challenges and health care needs of transgender persons. Health, as defined by the World Health Organization, is one of the fundamental rights of every human being and “is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”<sup>49</sup> Devastating levels of discrimination are experienced by transgender populations and contribute to myriad health issues, not the least of which is mental health. Due to the limited amount of literature on the oral health status of transgender populations, it may be difficult for dental hygienists to provide culturally competent care. As Ludwig and Morrison have stated, “We cannot provide evidence-based dental care to a subset of the population, if that population has yet to be studied.”<sup>51</sup> We hope this review inspires others in the profession to pursue original research in this field.

## CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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# Knowledge of malocclusion supports comprehensive dental hygiene care

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## ABSTRACT

Occlusal assessments are often missed or neglected by dentists and dental hygienists. This short communication discusses how these assessments can be implemented through 4 planes of space: anterior–posterior/anteroposterior, vertical, transverse, and perimeter. Expanded occlusal knowledge can improve the referral process for early preventive care. A chairside guide has been defined for dental hygienists to conduct a systematic occlusal exam.

## RÉSUMÉ

Il arrive souvent que les évaluations occlusales ne soient pas effectuées ou soient négligées par les dentistes et les hygiénistes dentaires. Ce bref article traite de la façon dont ces évaluations peuvent être effectuées au moyen de 4 dimensions de l'espace : antérieure-postérieure/antéropostérieure, verticale, transverse et périmètre. Une connaissance approfondie de l'occlusion peut améliorer le processus de renvoi pour l'obtention de soins préventifs précoces. Un guide au fauteuil a été préparé à l'intention des hygiénistes dentaires pour leur permettre d'effectuer un examen occlusal systématique.

**Keywords:** assessments, occlusal; dentistry; oral hygiene; orthodontics, preventive  
**CDHA Research Agenda category:** risk assessment and management

## WHY THIS ARTICLE IS IMPORTANT TO DENTAL HYGIENISTS

- Malocclusion can negatively affect quality of life, self-esteem, and the health of the periodontium.
- Dental hygienists have the potential to make a significant impact on their clients' oral health by identifying malocclusion early and making referrals.
- Establishing an occlusal assessment during dental hygiene appointments reinforces comprehensive client care and provides greater opportunities for interprofessional collaboration.

## INTRODUCTION

The dental hygienist has several roles as a primary oral health care provider. One of the roles is being a clinician and utilizing ADPIE (assessment, diagnosis, planning, implementation, and evaluation), the process of care module, to develop an individualized, person-centred care plan. A key element in formulating a plan is identifying risk factors that might indicate, progress to or predict diseases.<sup>1</sup> However, risk factors associated with an occlusal assessment are often overlooked, with the main reported restraint being time limitations.<sup>2,3</sup>

Given the frequency of appointments with dental hygienists, each dental visit offers opportunities to identify occlusal conditions.<sup>4</sup> The occlusal assessment is pivotal because dental occlusion goes beyond aesthetics as it can relate to functionality and induction of disease.<sup>2,5-7</sup> There are possible biological associations between malocclusion and periodontal health.<sup>5-7</sup> Dental hygienists are pivotal in coordinating, collaborating, and communicating with interdisciplinary professionals to provide comprehensive care.<sup>8</sup>

This short communication includes a systematic guide for occlusal assessments based on the following 4 planes of space: anterior–posterior/anteroposterior (A–P), vertical, transverse, and perimeter. The systematic assessment follows the Canadian Dental Hygienists Association (CDHA) *Entry-To-Practice Competencies and Standards for Canadian Dental Hygienists*.<sup>9</sup>

## DISCUSSION

### Anterior–posterior/Anteroposterior plane (A–P)

The A–P or sagittal plane looks at the face and dentition from a profile; it therefore includes Angle's classification and overjet.<sup>10-12</sup> The dentition may be asymmetrical, so it is important to examine both left and right sides. Angle's classification defines the relationship between the maxillary and mandibular first molars based on the mesiobuccal groove of the mandibular first molar and the mesiobuccal cusp of the maxillary first molar.<sup>10-12</sup> Three classifications were created: Class I, II, and III (Figure 1).<sup>10-12</sup> Class II can be further differentiated into division 1 and division 2, which

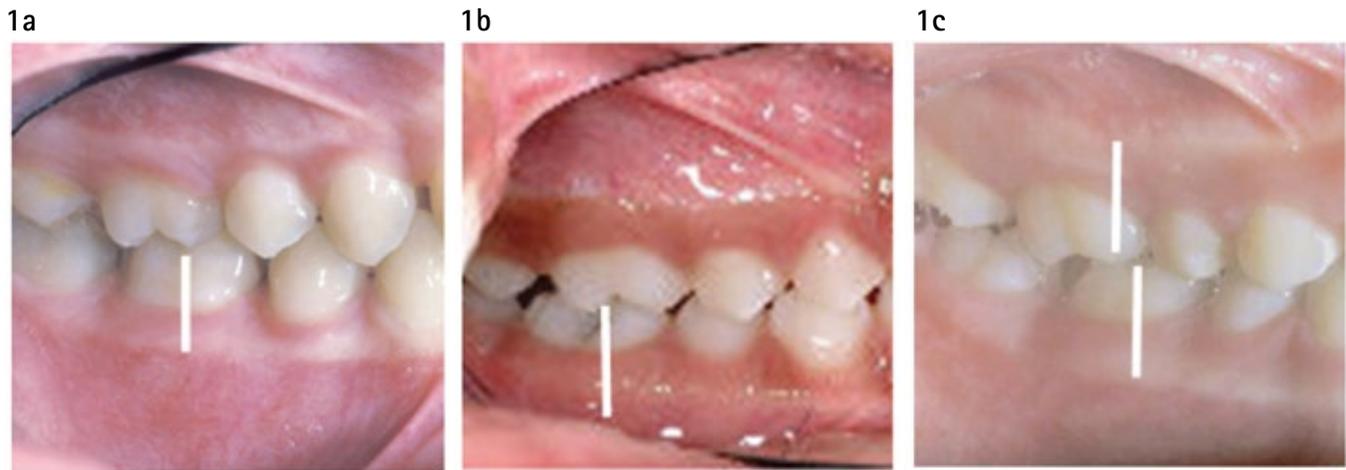
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Figure 1. Angle's classification of malocclusion



1a. Angle's Class I occlusion; 1b. Angle's Class II malocclusion; 1c. Angle's Class III malocclusion

describe the relationship of the anterior teeth.<sup>6</sup> Class II division 1 is when there is protrusion of the anterior teeth creating a large overjet.<sup>6</sup> Class II division 2 is when the maxillary central incisors are retroclined and may present with a deep overbite.<sup>6</sup> When the molar is Class I on one side, and either Class II or III on the other side, the malocclusion is classified as a subdivision. The subdivision refers to the side that is either Class II or III. Angle's classification has been used for over a century. Despite its limitations, Angle's classification acts as a universal language among dental care professionals, especially relative to referrals.<sup>10,13,14</sup>

Overjet focuses on the amount of angulation, protrusion or retrusion of the maxillary incisors.<sup>10</sup> It is the horizontal measurement from the labial surface of the mandibular incisor to the midpoint of the maxillary incisal edge.<sup>10</sup> A measurement of 2 mm to 4 mm is normally seen (Figure 2a).<sup>10</sup> There is a greater chance of trauma on the tooth as the overjet increases (Figure 2b).<sup>10</sup> Mandibular incisors that overlap the maxillary incisors indicate a negative overjet (Figure 2c).<sup>10</sup>

With a paradigm shift towards preventive care, action to reduce overjet reduces trauma risk; this is especially important for injury-prone children who can damage protruding teeth.<sup>15,16</sup> Additionally, excessive overjet can lead to lack of anterior guidance in the excursive pathways of teeth as they function.<sup>16</sup> This lack of anterior protection can increase tooth wear and increase muscle activity causing muscle pain. Additionally, lack of anterior contact can lead to supraeruption of the anterior teeth and esthetic issues.<sup>16</sup> Early identification, referral, and treatment broaden options and may minimize complications.<sup>17</sup>

#### Vertical plane

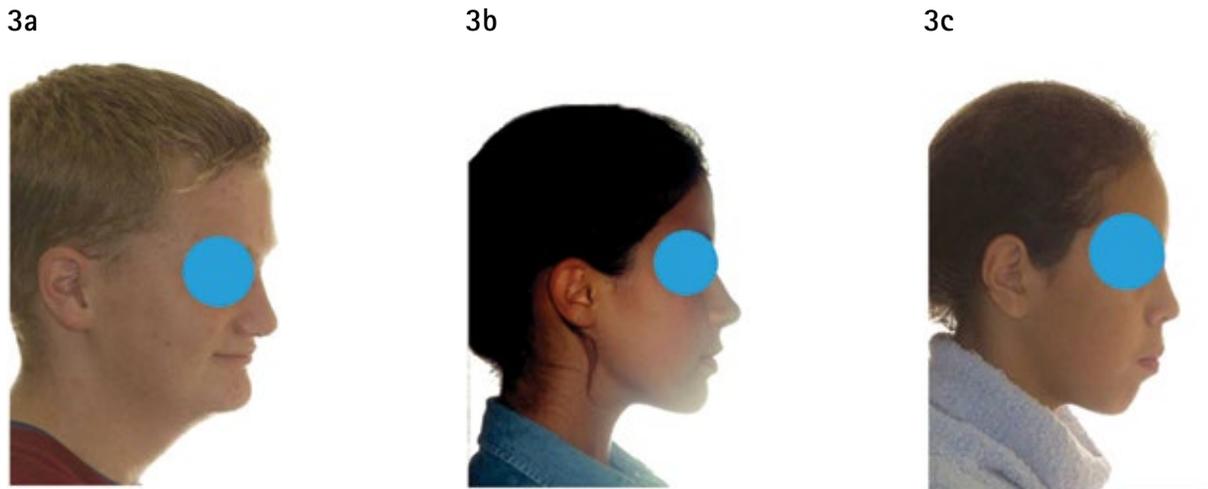
The vertical plane includes facial types, vertical anterior open bite (AOB), deep overbite, and presence of posterior open bite.<sup>13</sup> The cephalic index measures the skull and its facial proportions.<sup>17</sup> Three major terms of this index are dolichocephalic, mesocephalic, and brachycephalic reflecting long, average, and short facial types (Figure 3).<sup>17</sup> These facial types involve the area from the nose to the chin; this area is also called the anterior lower third.<sup>10,13</sup>

Figure 2. Overjet examples



2a. Normal overjet; 2b. Increased overjet; 2c. Negative overjet

Figure 3. Facial types



3a. Short face (brachycephalic); 3b. Average face (mesocephalic); 3c. Long face (dolichocephalic)

Dentofacial appearance has a significant impact on individuals, especially children.<sup>12,16</sup> Shaw et al. reported that children were teased about their dentition more than any other factors.<sup>16</sup> Malocclusion may therefore affect the individual's quality of life and self-esteem.<sup>16</sup>

Overbite is the measurement of vertical overlap of the maxillary incisor over the mandibular incisor.<sup>18</sup> Hering et al.<sup>18</sup> used 3 measurements to classify overbite. Overbite usually measures 2 mm to 4 mm (Figure 4a). Values equal to zero or negative indicate AOB (Figure 4b); AOB is often associated with long facial types.<sup>10,13,14,19</sup> Causes may include digit sucking, mouth breathing or tongue thrusting.<sup>10-14</sup> AOB can be aesthetically displeasing and may cause masticatory complications and speech deficiencies.<sup>20</sup> Biting into a sandwich can be difficult when incisors do not touch.<sup>10,16</sup> Identifying the etiology of these malocclusions is critical to practising preventive care. Early detection and correction of digit sucking and tongue thrusting can prevent future malocclusion development.<sup>20</sup>

An overbite greater than 4 mm is considered to be a

deep overbite (Figure 4c)<sup>13</sup> and tends to be associated with short faces.<sup>19</sup> The shorter the anterior facial height, the higher the chance an individual will have a deep overbite.<sup>13</sup> Deep overbite can be traumatic to the palatal gingiva and result in extensive incisal edge wear.<sup>10</sup> A posterior open bite is rare but should be ruled out during examination.<sup>10</sup>

#### Transverse plane

The transverse or horizontal plane examines symmetry of the face and occlusion by looking at midlines and presence of posterior crossbite.<sup>10,13</sup> This category includes narrow and wide facial types.<sup>17</sup> Facial asymmetry may be caused by stunted or excessive growth on one side of the face.<sup>13</sup> Facial asymmetry can be due to skeletal disturbances, trauma during birth, trauma to the face, acromegaly, and condyle fracture (Figure 5).<sup>12</sup> Dental midlines (Figure 6) are also examined for facial symmetry.

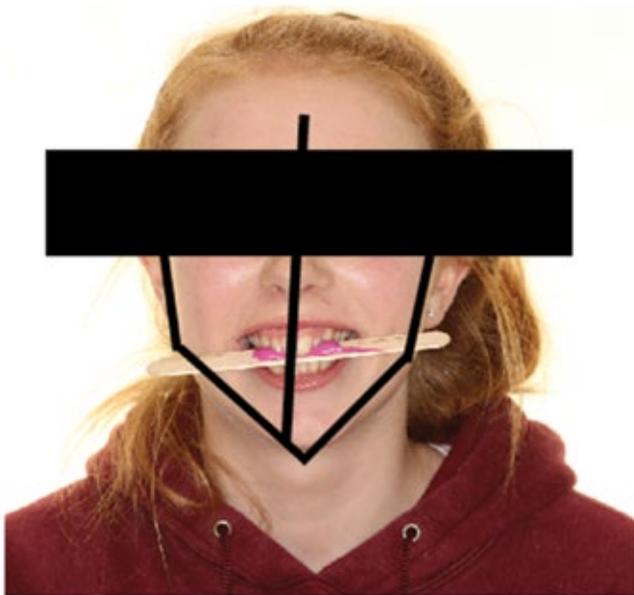
Crossbites occur when maxillary teeth are in a more lingual position to the corresponding mandibular tooth (Figure 7). When many teeth are involved, there is an increased likelihood that the etiology is skeletal.<sup>10</sup> Posterior

Figure 4. Overbite examples



4a. Normal overbite; 4b. Anterior open bite; 4c. Deep overbite

Figure 5. Facial asymmetry



Note: The centre of the nose is not aligned with the centre of the chin; occlusal plane is tilted.

Figure 6. Dental midlines

6a



6b



6a. Midlines aligned; 6b. Midlines not aligned

Figure 7. Crossbites

7a



7b



7a. Posterior crossbite not present; 7b. Posterior crossbite present

crossbites are often associated with Class II subdivision malocclusion and may also be present due to a history of prolonged digit sucking or pacifier use.<sup>10</sup> When lower jaw displacement is associated with crossbite, the individual shifts the lower jaw to achieve maximum occlusion resulting in facial asymmetry.<sup>10</sup>

#### Perimeter plane

The perimeter plane includes spacing, ectopic and missing teeth, anomalies, and crowding.<sup>12,21</sup> Both genetics and environmental factors can affect the perimeter plane. Disturbances during initial tooth maturation could result in congenitally missing teeth.<sup>12</sup> When no teeth are present, it is termed anodontia; the presence of a few teeth with the others absent is called oligodontia.<sup>12</sup> With missing teeth and spacing, there may be a risk for drifting of teeth.<sup>12</sup> Ectopic eruption, which commonly affects maxillary permanent canines, can cause damage to adjacent lateral incisors.<sup>11</sup> Examples of anomalies include missing teeth (Figure 8a), peg lateral incisors (Figure 8b), and ectopic eruption (Figure 8c).<sup>11</sup>

Crowding is classified as mild, moderate or severe (Figure 9).<sup>10</sup> Generally, the greater the crowding, the more

Figure 8. Dental anomalies

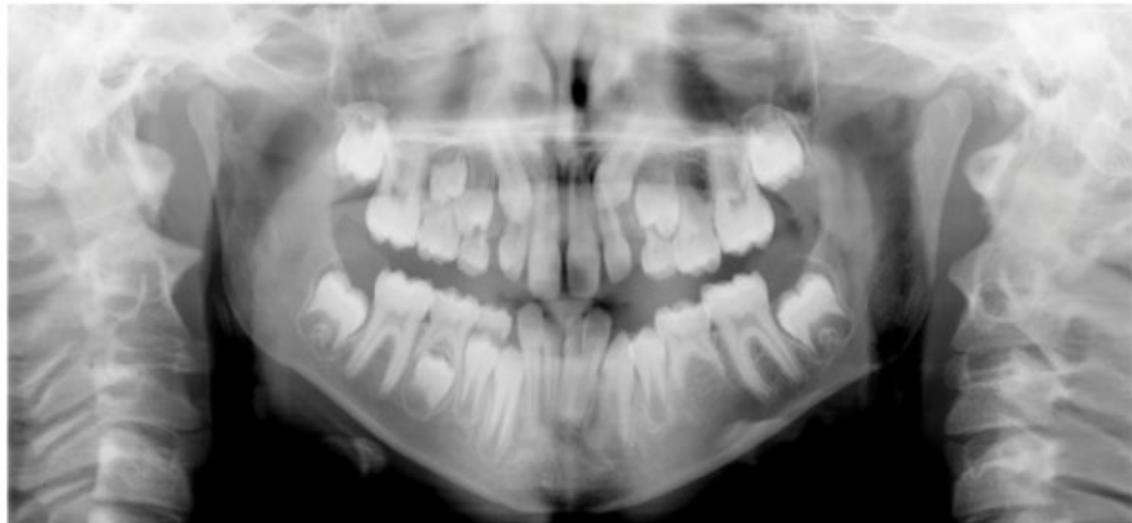
8a



8b



8c



8a. Missing maxillary lateral incisors; 8b. Peg-shaped maxillary right lateral incisor; 8c. Missing left second premolars with ectopic maxillary canines

likely extractions are needed.<sup>22</sup> A client with crowded teeth may have difficulty with personal self-care causing an increase of biofilm; therefore, they are at increased risk for gingivitis and periodontitis.<sup>23</sup> Though this may be true in some cases, there is some controversy surrounding whether or not increased crowding contributes to an increased risk of gingivitis and periodontitis. Some studies show that crowding contributes little to periodontitis.<sup>5,24</sup> Individuals with poor personal self-care would have poor oral hygiene regardless of crowding.<sup>22</sup>

#### Incorporating occlusal assessment into ADPIE

A dental hygienist's ability to identify and understand occlusal issues will not only help the client by providing more holistic and competent care, but will also broaden a dental hygienist's viewpoint on the interrelationship

between periodontal diseases and occlusion. For example, Angle's classification looks at interdigitation, which is similar to how the teeth in a zipper fit together.<sup>24</sup> Laterotrusive and protrusive movements from eating can cause wear. Teeth in malocclusion with improper intercuspation may cause interferences during function or excursive movements, causing tooth wear, sensitivity or fracture.<sup>24,25</sup> Parafunctional habits with bruxism and clenching may also wear the dentition.<sup>6</sup> Bruxism can be associated with tooth loss due to periodontal disease, vertical bone loss, and circumferential bone defect.<sup>26</sup> Similarly, AOB is an etiological risk factor because it assists opportunistic bacteria in causing localized periodontal disease.<sup>27</sup> Deep traumatic overbites can also contribute to localized periodontal breakdowns.<sup>28</sup> The condition is often exacerbated by poor oral hygiene.<sup>28</sup> There is some debate about whether or not correcting a malocclusion helps to

Figure 9. Examples of crowding



9a. Mild crowding (0 mm to 3 mm); 9b. Moderate crowding (3 mm to 6 mm); 9c. Severe crowding (>6 mm)

prevent periodontal disease.<sup>5</sup> Despite this, it is essential to understand that malocclusion can negatively affect an individual’s quality of life and self-esteem.<sup>14</sup> Thus, a referral may significantly and positively change an individual’s life. Maintaining a healthy periodontium is vital for the success of any orthodontic treatment.<sup>5</sup> Understanding the etiology, risk factors, and impact of malocclusions will support dental hygienists as primary oral health care providers in making informed decisions and in achieving comprehensive person-centred care plans.

The systematic occlusal exam presented in Table 1 can

serve as a best-practice guideline and can be incorporated into the assessment phase of ADPIE. The examination could be conducted annually or biennially and would support the clinician in making informed decisions.

**CONCLUSION**

An occlusal exam is often neglected during assessments. Implementing an occlusal exam and expanding the knowledge of the 4 planes—A–P, vertical, transverse, and perimeter—will provide a comprehensive occlusal

Table 1. Dental hygiene chairside systematic occlusal examination guide

Planes of space	Checklist
Anterior–posterior/Anteroposterior (Sagittal)	Angle’s Classification <input type="checkbox"/> Angle Class I: max 1st molar MB cusp placed <b>within</b> the groove of mand 1st molar <input type="checkbox"/> Angle Class II: max 1st molar MB cusp placed <b>anterior</b> to groove of mand 1st molar <sup>a</sup> <input type="checkbox"/> Angle Class III: max 1st molar MB cusp placed <b>posterior</b> to the groove of mand 1st molar <sup>a</sup> Overjet <input type="checkbox"/> Normal overjet (2 mm to 4 mm) <input type="checkbox"/> Increased overjet (>4 mm) <sup>a</sup> <input type="checkbox"/> Negative overjet/underbite <sup>a</sup>
Vertical	Face <input type="checkbox"/> Short <sup>a</sup> <input type="checkbox"/> Average <input type="checkbox"/> Long <sup>a</sup> <hr/> Anterior bite <input type="checkbox"/> Open bite (0 or open) <sup>a</sup> <input type="checkbox"/> Normal overbite (2 mm to 4 mm) <input type="checkbox"/> Deep overbite (>4 mm) <sup>a</sup> Posterior <input type="checkbox"/> Open bite <sup>a</sup>
Transverse (Horizontal)	Face <input type="checkbox"/> Narrow <input type="checkbox"/> Wide <hr/> Anterior <input type="checkbox"/> Midlines: relativity of mandibular and maxillary midlines (nose and chin) <sup>a</sup> Posterior <input type="checkbox"/> Crossbite present <sup>a</sup> <input type="checkbox"/> Crossbite not present
Perimeter	<input type="checkbox"/> Spacing <sup>a</sup> <input type="checkbox"/> Crowding <input type="checkbox"/> Mild crowding (0 mm to 3 mm) <input type="checkbox"/> Moderate crowding (3 mm to 6 mm) <sup>a</sup> <input type="checkbox"/> Severe crowding (7 mm) <sup>a</sup> <input type="checkbox"/> Missing teeth <sup>a</sup> <input type="checkbox"/> Ectopic teeth <sup>a</sup> <input type="checkbox"/> Anomalies <sup>a</sup>

<sup>a</sup>suggests further evaluation or referral

assessment, which can identify the need for early preventive care. A chairside guide was created to facilitate a systematic occlusal exam. For dental hygienists, the precision of occlusal measurements may not be the sole focus, but rather the ability to identify risk factors that can affect the stability and health of the periodontium and signal the need for collaboration with other dental disciplines for referrals to enhance the client's oral and overall health.

#### CONFLICTS OF INTEREST

The authors have no affiliations or involvement in any organizations with any financial or non-financial interests in this research.

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# Oral rapid HIV testing in the dental setting: Experiences from three dental hygiene clinics

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## ABSTRACT

**Background:** Oral rapid HIV testing (ORHT) is implemented in the dental setting to make individuals aware of their possibly undiagnosed HIV infection. The testing process and characteristics of clients willing to receive ORHT has yet, however, to be systematically collected. **Case description:** Three dental hygiene clinics located in academic institutions implemented ORHT from March 2016 to April 2017. **Results:** 231 persons received ORHT; all had non-reactive results. Most had seen a primary care provider in the past year (n = 130), had had a previous ORHT (n = 111), and described themselves as extremely likely or likely to accept a chairside screening in the future (n = 169). The main reason cited for accepting ORHT was that it was free (n = 138). **Conclusion:** In order to ensure everyone living with HIV is aware of their infection, HIV testing should be expanded into non-traditional settings. The dental setting may help achieve this important public health milestone.

## RÉSUMÉ

**Contexte :** Le test de dépistage rapide du VIH par voie orale (TDRVO) a été mis en place dans le milieu dentaire pour que les gens soient sensibilisés à la possibilité d'une infection au VIH non diagnostiquée. Toutefois, les données du processus de dépistage et les caractéristiques des clients disposés à recevoir le TDRVO restent à être recueillies systématiquement. **Description du cas :** Le TDRVO a été mis en place dans 3 cliniques d'hygiène dentaire situées dans des établissements scolaires, de mars 2016 à avril 2017. **Résultats :** 231 personnes ont reçu un TDRVO; elles ont toutes obtenu des résultats non réactifs. La plupart des personnes avaient consulté un prestataire de soins primaires au cours de la dernière année (n = 130), avaient précédemment obtenu un TDRVO (n = 111) et s'étaient décrites comme étant extrêmement susceptibles ou susceptibles à accepter un dépistage au fauteuil à l'avenir (n = 169). La gratuité du TDRVO demeure la raison principale pour avoir accepté le test (n = 138). **Conclusion :** Le test de dépistage du VIH devrait être offert dans des milieux non traditionnels pour veiller à ce que les gens vivant avec le VIH soient conscients de leur infection. Le milieu dentaire peut aider à franchir cette étape importante de santé publique.

**Keywords:** clinical research, dental hygiene, health services, HIV/AIDS, oral/systemic disease, public health  
**CDHA Research Agenda category:** capacity building of the profession

## INTRODUCTION

Currently, there are over 1.1 million people in the United States (US) living with human immunodeficiency virus (HIV). According to the Centers for Disease Control and Prevention (CDC), 1 in 8 individuals are unaware of their HIV status and almost 40% of newly diagnosed individuals with HIV have advanced stages of the disease.<sup>1,2</sup> Despite continued prevention and education efforts, the incidence of new infections has continued to rise.<sup>1</sup> CDC reported 923,777 persons living with diagnosed HIV in 2013, 948,494 such persons in 2014, and 973,866 such persons in 2015.<sup>3</sup> Significant race-related disparities exist among individuals

infected with HIV; the rates of new HIV diagnoses among non-Hispanic Blacks and Hispanics are 7.3 and 4.9 times higher, respectively, than the rate for non-Hispanic Whites.<sup>1</sup> In addition to race-related disparities, there are notable differences in HIV mortality and survival rates among individuals living in impoverished neighbourhoods.<sup>1</sup>

Public health policy has shifted towards early diagnosis and treatment.<sup>4,5</sup> CDC recommends offering HIV testing for all individuals ages 13 to 64 in all health care settings on an opt-out basis as opposed to waiting for them to request testing.<sup>2</sup> These recommendations, along with the

## WHY THIS ARTICLE IS IMPORTANT TO DENTAL HYGIENISTS

- Dental hygienists are often the first to interview clients and obtain their health history, including HIV status, in a dental office.
- Oral rapid HIV testing using saliva is a quick and low-risk means of determining HIV status.
- Expanding HIV testing into the dental setting may increase the number of clients who are aware of their HIV infection and can thus begin treatment. It also has population health benefits through the potential reduction in community viral load.

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widespread availability of rapid HIV testing (RHT), now enable HIV testing and screening to be conducted in other venues. The use of HIV screening in these venues may assist in finding those persons living with HIV who are unaware of their status.<sup>5</sup>

The dental setting has been introduced as a venue to conduct HIV testing using saliva.<sup>2,4,6-7</sup> Scientific research shows that HIV and its antibodies can be detected in the saliva of people living with HIV.<sup>6,8</sup> The oral rapid HIV test (ORHT) is a screening tool that delivers results in less than 20 minutes. It can detect HIV antibodies as early as 3 weeks after exposure to the virus.<sup>6</sup> All reactive/positive HIV antibody tests must receive a confirmatory blood test.<sup>6</sup> HIV antibodies can be found in cells along the cheeks and gums. The ease of sample collection, increased client acceptability, and a greater compliance in higher risk groups are all advantages to ORHT.<sup>4,9</sup> Furthermore, the use of the dental setting has a potential to reduce occupational hazards, considering that there is no need for needles and lancets.<sup>9</sup> The risk of HIV transmission during testing is also reduced with this method of testing, because there are lower amounts of HIV antigens and antibodies in saliva than in blood.<sup>9</sup>

Another reason that dental practices are suitable places for disease screening and testing is that systemic diseases affect the oral cavity.<sup>1-2,4,8,10</sup> This includes diabetes, chronic kidney disease, heart disease as well as HIV-related diseases.<sup>11</sup> The use of routine evaluation of hemoglobin A1c and the monitoring of blood pressure along with other medical screenings may help identify individuals with chronic diseases and could help prevent future disease complications.<sup>12</sup> People living with HIV often are diagnosed with opportunistic oral diseases, which can be indicators of the progression of HIV to AIDS.<sup>10,13</sup> The use of risk assessment in the presence of these systemic conditions, as well as detailed medical histories and chairside screening, places the dental professional, specifically the dental hygienist, in an optimal position to offer education, interventions, and referrals.<sup>4-9,11</sup>

The US federal government's *Healthy People 2020* agenda proposes to "increase the proportion of adults who receive preventive interventions in dental offices."<sup>2</sup> While the agenda references testing for glycemic control, it is clear that preventive interventions are not limited to diabetes. Preventive interventions are essential for managing all chronic infections including HIV. Dental providers can play a significant role in administering screening for early detection and treatment.<sup>2,4</sup> One reason is the frequency of visits; approximately 58% to 75% of the US population seek dental care annually, potentially putting dental professionals in contact with clients who are living with HIV yet are asymptomatic.<sup>2,4-5,7</sup> A survey of dental clients also showed that they approve of disease screening in the dental setting.<sup>14</sup>

The current case study documents the ORHT process

and captures characteristics of dental clients who received ORHT in the dental setting.

## CASE DESCRIPTION

This case study took place in 3 university-based dental clinics in a major metropolitan area. The program proceeded as follows at all 3 testing sites: flyers were placed in the reception area on designated HIV testing days, which ranged from 1 to 3 days a week, to inform both new and returning clients of the study. Interested clients over the age of 18 were instructed to approach their dental provider (a senior dental hygiene student or dental hygiene faculty member) about receiving ORHT. The provider reviewed the test process and the consent form with the participant. After giving consent, the client was escorted to a remote cubicle or private office setting where an oral swab was taken with a test kit. Twenty minutes later the dental hygienist interpreted the result as reactive, non-reactive or indeterminate, while another trained student or faculty study team member provided a second reading before results were shared with the client.

Each study participant completed a questionnaire while waiting for the ORHT results. The questionnaire consisted of demographic questions, risk behaviours, attitudes towards testing, and a self-assessment of overall and oral health. All clients tested were informed immediately that their result was non-reactive. Had any been reactive/positive, the provider would have taken a dried blood spot specimen by fingerstick to be sent overnight to the State Public Health Laboratory for Western Blot processing. An appointment would have also been made within 48 hours of receiving the preliminary reactive result with an HIV physician at a local Designated AIDS Center (where each site had an executed Memorandum of Understanding) and the client would have received the results of the confirmatory Western Blot test as well as follow up care, if needed. The Designated AIDS Center would have had the responsibility of providing the HIV diagnosis and providing HIV care and treatment services, assuming the client was ready and willing to initiate treatment. An HIV prevention brochure was distributed upon completion of the visit to all participants. Institutional review board approval was received from the participating institutions.

## RESULTS

Across the 3 university-based dental clinic sites, 231 persons received ORHT. As described in Table 1, the majority of study participants identified as White (48.9%), non-Hispanic (68%), and female (74%). Only about half (56%) had seen a primary care provider in the past year, and just under half (48%) had been tested for HIV in the past. The majority (58.4%) had rated their overall health as "excellent" or "very good," and approximately half (46.3%) rated their oral health as "excellent" or "very good." The majority (73.2%) described themselves as likely or extremely likely to accept another health screening in

Table 1. Demographics of study participants (N = 231)

Demographic	n (%)
<b>Mean age (SD): 31.7 (10.46)</b>	
<b>Race (n = 190)</b>	
White	113 (48.9)
African American	32 (13.9)
American/Alaskan Native	2 (0.9)
Asian	43 (18.6)
<b>Ethnicity (n = 187)</b>	
Hispanic/Latinx	74 (32.0)
<b>Gender identity (n = 230)</b>	
Female	171 (74.0)
Male	58 (25.1)
Transwoman	1 (0.9)
<b>Saw primary care provider in last 12 months (n = 207)</b>	
Yes	130 (56.3)
<b>Previous HIV test</b>	
Yes	111 (48.1)
<b>Self-rated overall health (n = 216)</b>	
Excellent or very good	135 (58.4)
Good	69 (29.9)
Fair or poor	12 (5.2)
<b>Self-rated oral health (n = 218)</b>	
Excellent or very good	107 (46.3)
Good	75 (32.5)
Fair or poor	36 (15.6)
<b>Likelihood of accepting a health screening in dental setting in the future (n = 209)</b>	
Extremely likely or likely	169 (73.2)
Neutral	23 (10.0)
Extremely unlikely or unlikely	17 (7.4)

the dental setting.

Table 2 describes the reasons participants accepted ORHT in the dental setting. The main reasons were that the test was free (59.7%) and that they believed the dental clinic was an appropriate setting to have testing done (42%).

Table 3 describes the reasons participants had not received an HIV test in the past, if they indicated they had not received one. The main reasons included being confident that they did not have a reactive/positive diagnosis (13.9%) and not having enough time to take the test and/or wait for the results (9.5%).

## DISCUSSION

This case highlights the process for implementing ORHT

by dental hygienists and dental hygiene students in the dental setting. Data collected from participants align with prior research findings that low- or no-cost testing in the dental setting appeals to clients.<sup>7-8,15</sup> Another key finding is that most participants (73.2%) said they were “likely” or “extremely likely” to have testing conducted in the dental setting in the future.

Results of previous studies involving dental hygienists’ and dentists’ attitudes towards medical chairside screening have been favourable. Continuing education targeted to practising dental hygienists and dentists who did not receive any HIV testing and training in their formal dental education and the incorporation of ORHT training into the educational curriculum would support dental professionals’ acceptability and readiness to conduct ORHT.<sup>15-16</sup> Currently dental and dental hygiene curricula include training and screening for hypertension, oral cancer, periodontal infection, and dental caries risk assessment. ORHT can easily be an additional service incorporated into the curricula.

In another study assessing physicians’ attitudes towards medical screening in the dental setting, the majority of respondents believed medical screening for a variety of diseases would be valuable.<sup>17</sup> These results highlight the value of this chairside screening. Previous studies have noted a need for inclusion of rapid testing training and education to prepare dental professionals such as dental hygienists and dentists for these additional screening roles.<sup>17-20</sup> Taking on the role of administering HIV testing is aligned with the many professional roles of the dental hygienist: clinician, advocate, administrator, researcher, and educator.<sup>4</sup>

In a similar study at a Canadian dental school, a majority of the study sample (n = 80, 82%) agreed that HIV screening was within the scope of practice of a dental professional, while many in our study (n = 169, 73.2%) were “extremely likely” or “likely” to accept a screening in a dental setting the future. Moreover, most Canadian study participants (n = 52, 91%) believed dental settings are an appropriate venue for RHT compared to only half (n = 97, 42%) in our study. Finally, participants in both studies largely agreed to receive the HIV screening because it was free. No positive/reactive results were found in either the Canadian study or ours.<sup>21</sup>

This study has limitations that need to be addressed before wide-scale implementation. First, the study was limited geographically to the dental clinics in one major metropolitan area. Second, university dental clinics may not be typical, and future research might examine such programs in private practices and dental medicine departments within clinics and hospitals.<sup>22</sup> Third, while 60% of participants stated the reason for acceptance of RHT was that it was free, this result could be biased due to the mode of data collection. Attention should be given since participants’ rate of acceptance would conceivably

**Table 2.** Reasons study participants accepted rapid HIV testing in the dental clinic (N = 231)

Reason for accepting ORHT	n (%)
Test is free	138 (59.7)
Believes dental clinic is an appropriate setting to have testing done	97 (42.0)
Has never been tested before	76 (32.9)
Wants to appease/reassure a partner or family member	58 (25.1)
Feels more comfortable knowing	43 (18.6)
Last HIV test was a long time ago	40 (17.3)
Trusts the dentist/dental hygienist	38 (16.5)
Suspects partner had been unfaithful	8 (3.5)
Considers him or herself at risk	7 (3.0)
Doesn't know	46 (19.9)

be affected if there were a cost associated with ORHT. Finally, data should have been collected on individuals who refused the ORHT offer to see how similar or different they were from those who accepted the offer.

Further research is also needed. Insurance coverage and reimbursement are concerns and barriers that must be addressed in order to implement ORHT as a routine part of dental care.<sup>15-16</sup> Additionally, use of valid and reliable measures to collect data on socioeconomic status, residence, and dental/healthcare coverage of participants is needed to offer greater perspective on the client population. Also, data on clients who refuse the ORHT offer should be collected in order to compare measures between groups. Finally, an economic evaluation of the dental setting's ability to identify undiagnosed HIV in a more cost-effective manner than more traditional venues such as primary care and inpatient hospital settings is needed.

## CONCLUSION

This case demonstrates that dental clinics may be an appropriate venue for ORHT. The ORHT process is quick, simple, and non-invasive, which should encourage client participation, even in non-traditional settings. The dental setting has wide potential as point of care screening; however, dental providers need to be made aware of the testing process and population health benefit of ORHT. With additional research and evaluation, ORHT may help end the HIV/AIDS epidemic.

**Table 3.** Reasons study participants had not previously received an HIV test (N = 231)

Reason for not having had an HIV test previously	n (%)
Confident he/she does not have a positive diagnosis and does not feel the test is necessary	32 (13.9)
Not enough time to take test and/or wait for results	22 (9.5)
Has already been tested recently	18 (7.8)
Is fearful of the test results	8 (3.5)
Does not feel comfortable taking the test	7 (3.0)
Too embarrassed to take the test	7 (3.0)
Is concerned about his/her confidentiality	7 (3.0)
Does not want to know the test result	4 (1.7)
Does not feel that the test is important	3 (1.3)
Does not want to discuss his/her sexual history	1 (0.4)
Is fearful of the procedure (if using finger stick method)	1 (0.4)
Does not believe dental clinic is an appropriate setting in which to have testing performed	0 (0)
Does not trust dentist/dental hygienist	0 (0)
Doesn't know	24 (10.4)

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## CONFLICT OF INTEREST

The authors have no conflict of interest to report.

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## In search of dental hygiene's "big ideas"

Dear editor,

I am writing in response to Corinne Story's letter to the editor, "Clarifications on social theory in dental hygiene research," published in the February 2019 issue (*Can J Dent Hyg* 2019;53[1]:76).

Dental hygienists have employed social theory and philosophical ideas for years. Many theses in the Canadian Dental Hygienists Association archives are grounded in social theory. Although qualitative research and social theory may have "fallen out of favour," the future of dental hygiene will not be found solely in randomized controlled trials or systematic reviews such as those published by Cochrane. Dental hygiene has, and needs, to look at the broad theories that involve community: gender, knowledge, power, and professional dominance. How and why did dental hygiene get so narrowly focussed on quantitative clinical studies?

In my opinion, dental hygiene will only survive as a primary preventive profession by exploring "big ideas" and moving into community with other preventive health care professionals, such as dietitians, respiratory therapists, and pediatric physicians.

Non dental hygiene researchers Tracey Adams, A Kazanjian, and Linda Bohnen have studied and published about dental hygiene using social theory.<sup>1-3</sup> Colleague Sandy Cobban's research was often philosophically based. She, like Michele Darby, Peggy Walsh, and Denise Bowen—many of our "big thinkers," has now passed on. A great loss to our profession.

But there is hope. The journal, *Nursing Philosophy*,<sup>4</sup> is proof that a rigorous examination of philosophical issues in health care is possible. Are we, as a profession, up for the challenge?

Sincerely,

LL McKeown, HBA, MA, RDH  
Thunder Bay, Ontario, Canada

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# CJDH ethics policy

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

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

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- contributed to writing or critically reviewing the article, AND
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Approuvé par le comité de rédaction du JCHD le 9 avril 2014; révisé le 19 janvier 2015

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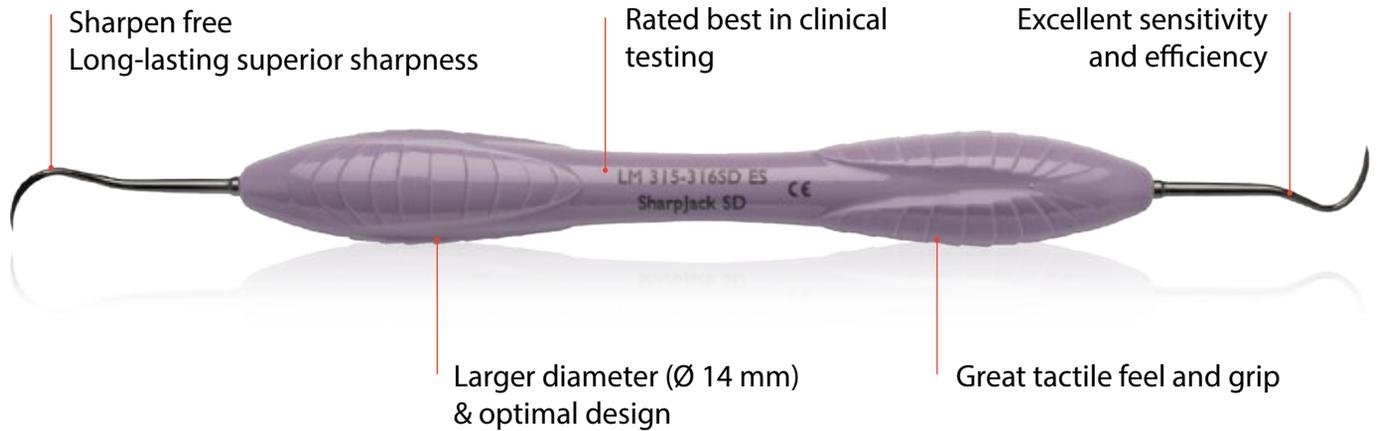


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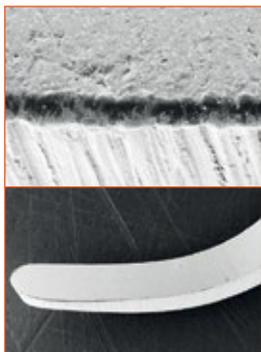
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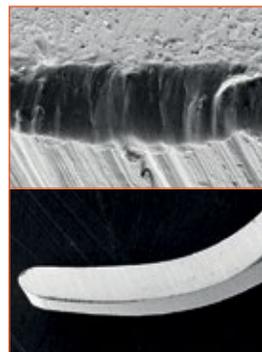
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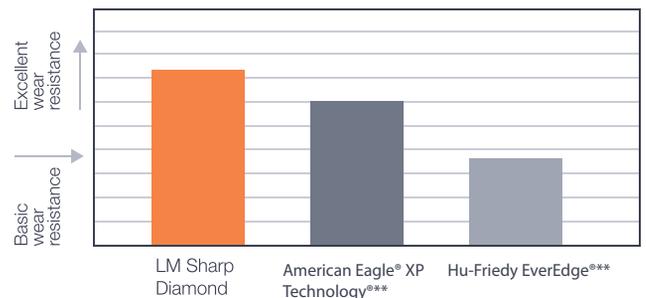


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