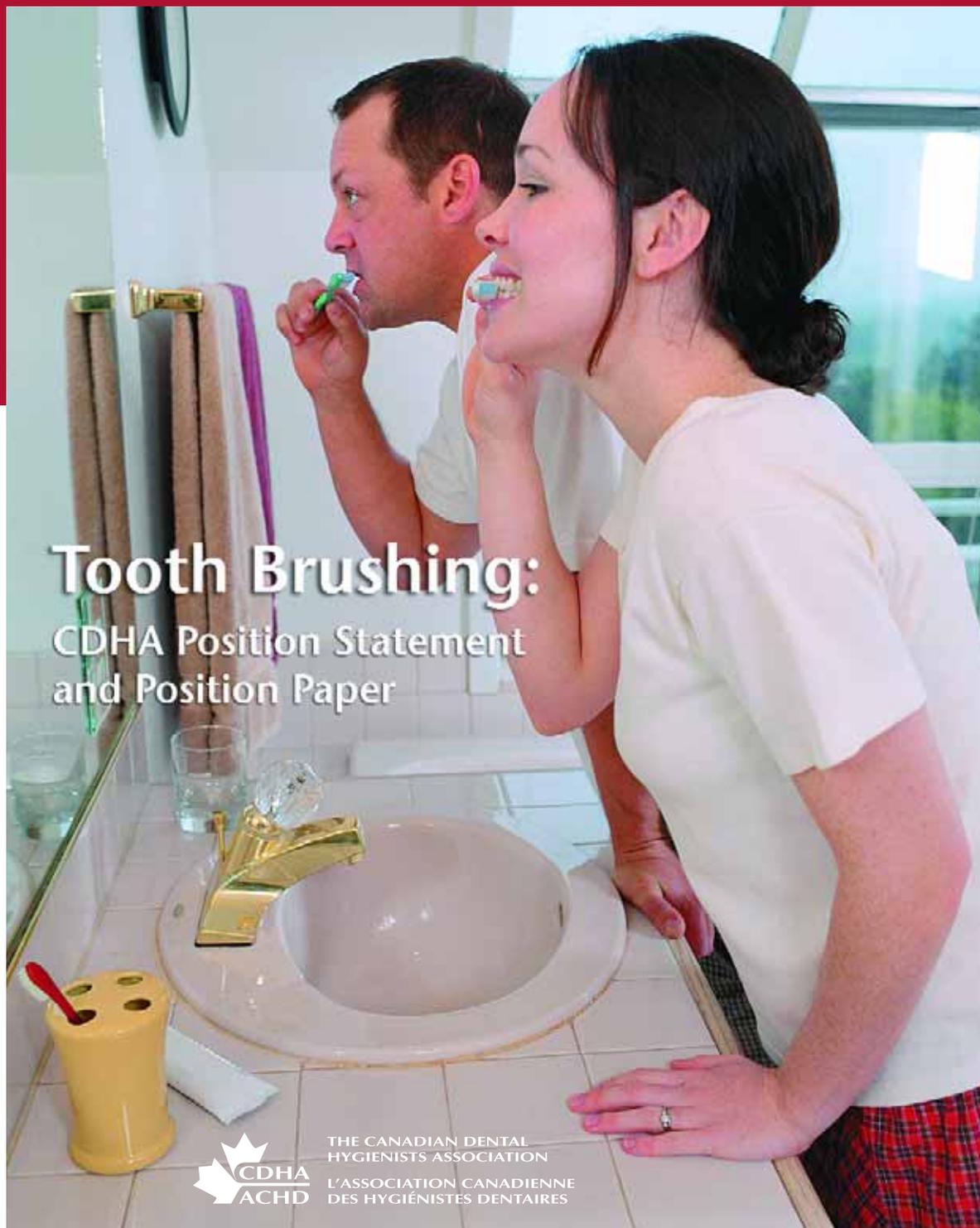


# CJDH JCHD

SEPTEMBER – OCTOBER 2006, VOL. 40, NO. 5



## Tooth Brushing: CDHA Position Statement and Position Paper



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



## Wish List

by Diane Thériault, RDH

IT'S HARD TO BELIEVE THAT MY TERM AS PRESIDENT of CDHA has gone by so quickly. I was apprehensive about taking on this role at first but now am a bit sad that it is over. This experience has been a real personal growth opportunity for me, making me step out of my comfort zone. In my 18 months as president, I have met and worked with many excellent professionals whom I respect greatly. In this spirit, I would like to thank my fellow CDHA board members and staff for helping make my tenure as president a truly rewarding experience. It has been an honour to represent and serve our membership over the past year and a half, and I believe our president-elect, Bonnie Blank, will enjoy the experience as much as I did. In my last "President's Message," I would like to share with you my wish list for our association and profession.

*The desire to join a professional organization must come from within and respond to a need.*

It is my sincere hope that all dental hygienists across our country will become members of CDHA as well as the dental hygienist association in their own province. But non-members will not join just because I would like them to. The desire to join a professional organization must come from within and respond to a need. So I call upon all of you to encourage your colleagues who may be straddling the fence, not quite sure why they should get involved, or why it is so important for them to be a member of their association. Take every opportunity to tell your colleagues about the benefits of belonging to CDHA and their provincial dental hygienist association. Bring them up to speed about the changes that are occurring and the challenges that lie ahead. Finally, I urge you to lead by example and demonstrate to your colleagues that taking responsibility for your professional lives can lead to a fulfilling and challenging career.

If your passion has been stifled and you feel you have an 8-to-5 job rather than a career, then it's time to reclaim yourself. Re-ignite your passion for your profession. One way to do this is by being proactive in your professional association. CDHA and the provincial associations have many opportunities for you to showcase your talents and share your vision for our profession. Sign up for a council or committee, become a trustee or an officer, and awaken

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## Liste de souhaits

par Diane Thériault, RDH

IL EST DIFFICILE DE CROIRE QUE MON MANDAT comme présidente de l'ACHD a passé si rapidement. Au début, j'étais inquiète lorsque j'ai accepté ce poste mais, maintenant, je me sens un peu triste que ce soit fini. Cette expérience a été, pour moi, une véritable opportunité de croissance personnelle, elle m'a permis de sortir de ma zone de confort. Au cours de 18 mois où j'ai été présidente, j'ai rencontré plusieurs excellentes et excellents professionnels que je respecte énormément et j'ai eu l'occasion de travailler avec ces personnes. C'est dans cet esprit que j'aimerais remercier mes collègues, membres du conseil d'administration, et le personnel de l'ACHD qui ont aidé à ce que mon mandat de présidente soit une expérience réellement enrichissante. Ce fut un honneur de représenter et de servir nos membres au cours de la dernière année et demie et je crois que notre présidente élue, Bonnie Blank, appréciera son expérience autant que moi. Dans mon dernier « message de la présidente », j'aimerais partager avec vous ma liste de souhaits pour notre association et notre profession.

*Le désir de se joindre à un organisme professionnel doit venir de soi et répondre à un besoin.*

C'est mon vœu sincère que toutes et tous les hygiénistes dentaires de notre pays deviennent membres de l'ACHD ainsi que de l'association des hygiénistes dentaires de leur province. Mais les non-membres ne s'y joindront pas juste parce que j'aimerais qu'ils le fassent. Le désir de se joindre à un organisme professionnel doit venir de soi et répondre à un besoin. Donc, je demande à chacun et à chacune de vous d'encourager vos collègues qui seraient peut-être prêts ou prêtes à faire le saut mais qui ne sont pas certains ou certaines des raisons pour lesquels ils ou elles devraient le faire, ou qui se demandent pourquoi il est si important, pour elles ou eux, d'être membres de leur association. Profitez de chaque occasion pour parler à vos collègues des avantages d'appartenir à l'ACHD et à son association provinciale des hygiénistes dentaires. Amenez-les à parler des changements qui surviennent et des défis que l'avenir nous réserve. Finalement, je vous demande de donner l'exemple et de montrer à vos collègues que prendre des responsabilités dans vos vies professionnelles peut conduire vers une carrière stimulante et pleinement satisfaisante.

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## Connections

by Susan Ziebarth, BSc, MHA, CHE

*We cannot live only for ourselves. A thousand fibers connect us with our fellow men; and among those fibers, as sympathetic threads, our actions run as causes, and they come back to us as effects.*

– Herman Melville



## Les liens

par Susan Ziebarth, B.Sc., M.H.A., C.H.E.

*Nous ne pouvons vivre seulement pour nous-mêmes. Un milliers de fibres nous relie avec nos semblables ; et, parmi ces fibres, comme des fils de compassion, nos actions agissent comme causes et elles nous reviennent comme effets. [Traduction] [Traduction]*

– Herman Melville

**T**HE QUOTATION BY MELVILLE REMINDS US HOW strong our connections are with our fellow men and is an appropriate metaphor for what you can do on a professional level. Our goal at CDHA is to help you by connecting you with ideas, resources, and each other to evoke positive action on behalf of the profession and Canadians' overall health. In this issue, I highlight two of the many ways in which CDHA is helping dental hygienists *connect* as health professionals.

*We found common ground this year with several national health coalitions on a number of health issues.*

### **CDHA connects members to their health professional peers and government**

Our membership in national health coalitions capitalizes on strength in numbers to create strong connections with the federal government and other health care professionals. We found common ground this year with several national health coalitions on a number of health issues. Participation in HEAL (Health Action Lobby) allows us to engage with 31 health organizations, including groups such as the Canadian Nurses Association, the Canadian Medical Association, and the Canadian Healthcare Association. Participation in the Canadian Coalition for Public Health in the 21st Century, a 27-member organization, also helps us speak to government with a unified voice regarding federal spending on health and health human resources. Connection with these groups lets us monitor health issues, develop joint action plans, represent oral health issues at the table, and advocate for policies that strengthen the public health system and promote and protect the health of all Canadians. As a member of these groups, CDHA has met with government officials such as the Deputy Minister of Health and the Chief Public Health Officer to discuss health human resources issues and funding for the health services.

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**L**A CITATION DE MELVILLE NOUS RAPPELE À QUEL POINT nos contacts avec nos semblables sont forts et est une métaphore appropriée pour décrire ce que nous pouvons faire au niveau professionnel. Notre but à l'ACHD est de vous aider en vous donnant accès à des idées, des ressources et en vous permettant de communiquer entre vous pour suggérer une action positive dans l'intérêt de la profession et de l'état de santé global des Canadiens et des Canadiennes. Dans cet article, je souligne deux des nombreux moyens par lesquels l'ACHD aide les hygiénistes dentaires à jouer un rôle en tant que professionnels et professionnelles de la santé.

*Nous avons trouvé, cette année, des points communs avec plusieurs coalitions nationales pour la santé sur un bon nombre de questions touchant la santé.*

### **L'ACHD tisse des liens entre les membres, leurs pairs professionnels de la santé et le gouvernement**

Notre adhésion aux coalitions nationales pour la santé tire profit de la force du nombre pour tisser des liens solides avec le gouvernement fédéral et les autres professionnels et professionnelles de la santé. Nous avons trouvé, cette année, des points communs avec plusieurs coalitions nationales pour la santé sur un bon nombre de questions touchant la santé. La participation au HEAL (Groupe d'intervention action santé) nous a permis de nous engager auprès de 31 organismes pour la santé, incluant des groupes comme l'Association des infirmières et infirmiers du Canada, l'Association médicale canadienne et l'Association canadienne des soins de santé. Notre participation au sein de la Coalition canadienne pour la santé publique au XXI<sup>e</sup> siècle, un regroupement de 37 organisations, nous aide également à nous exprimer d'une voix unifiée auprès du gouvernement concernant les dépenses fédérales pour la santé et les ressources humaines dans le secteur de la santé. Notre partenariat avec ces

Les liens ...suite page 255

# TOOTH BRUSHING

## Canadian Dental Hygienists Association Position Statement

Research is scarce on several aspects of tooth brushing, disallowing firm conclusions and providing many opportunities for future dental hygiene research. Frequency and duration data are equivocal, and neither ideal bristle stiffness nor tooth-brushing method has been determined. Re-chargeable toothbrushes with oscillating, rotating (with or without pulsating action) mode of action have been shown to be more effective in removing plaque and improving gingival outcomes than manual toothbrushes currently available. Due to the length of the clinical trials that assessed mode of action, only the clinical significance of plaque and gingivitis reduction could be assessed, not the impact on reduction of periodontal destruction. While the ideal force of tooth brushing has not been determined, excessive force may be linked with gingival trauma. Gingival recession and hard-tissue cervical abrasion have multi-factorial etiologies and tooth brushing is considered contributory. Worn toothbrushes have not been shown to be less effective than unworn brushes; therefore, no ideal replacement interval is evident. Toothbrushes support a variety of micro-organisms, but research is lacking that shows a relationship between a contaminated toothbrush and oral/systemic clinical manifestations.

**Keywords:** Dental devices, home care; dental plaque; gingival recession; gingivitis; health behavior; periodontitis; toothbrushing

## CDHA Position Paper on Tooth Brushing

by Joanna Asadoorian, AAS(DH), MSc

### EXECUTIVE SUMMARY

**Purpose:** Tooth brushing is the most commonly recommended and performed oral hygiene behaviour by North Americans and is done ubiquitously in developed nations. It is the primary mechanical means for removing dental plaque, thereby assisting in the prevention of oral diseases including gingivitis and dental caries. The aim of this paper is to report on an investigation of the current state of the science on tooth brushing for the control of plaque and periodontal diseases, particularly gingivitis, and in order to develop a Canadian Dental Hygienists Association (CDHA) position statement.

**Methods:** Using previously published reviews and analyses as a departure point, a comprehensive review and analysis of the literature was conducted. The search was guided by the development of several PICO questions on tooth brushing and included the following databases: MedLine, CINAHL (Cumulative Index of Nursing and Allied Health Literature), and the Cochrane Controlled Trials Register. Salient websites were also examined. Subsequent to the review and analysis, input was solicited from recognized experts and researchers in relevant fields of inquiry.

**Results:** A total of 238 papers were identified and retrieved in full text. Data on tooth-brushing frequency and duration, ideal bristle stiffness, and tooth-brushing method were found to be equivocal. Worn toothbrushes were not shown to be less effective than unworn brushes, and no ideal toothbrush replacement interval is evident.

Re-chargeable power toothbrushes with an oscillating, rotating (with or without pulsating action) mode of action have been shown to be more effective in removing plaque and improving gingival outcomes than manual toothbrushes. Ideal tooth-brushing force has yet to be determined, but excessive force may be associated with gingival trauma. While gingival recession and hard-tissue cervical abrasion are recognized as having multi-factorial etiologies, tooth brushing is considered contributory. Toothbrushes have been shown to support a variety of micro-organisms, but research showing a relationship between a contaminated toothbrush and oral/systemic clinical manifestations is not evident.

**Conclusions:** Seven recommendations were developed representing the current understanding surrounding toothbrush use, based on the best available evidence. While considerable research into tooth brushing has been conducted, it was found that there is a paucity of research on several aspects of tooth brushing; thus many firm conclusions could not be made. This lack of conclusive data in several areas about tooth brushing limits dental hygienists' ability to provide evidence-based recommendations for their clients. In these cases, dental hygienists will need to rely on their clinical experience along with the specific conditions of their clients. It is apparent that many opportunities exist for future dental hygiene research in several areas of tooth brushing.

# Déclaration de L'ACHD sur le brossage des dents

Il y a un manque d'études sur plusieurs aspects du brossage des dents, ce qui empêche de tirer des conclusions fermes et offre de nombreuses possibilités pour la recherche future en hygiène dentaire. Les données sur la fréquence et la durée sont équivoques. Ni la rigidité des soies ni la méthode de brossage idéales n'ont été déterminées. Toutefois, il y a quelques études qui indiquent qu'une technique de frottement est moins efficace pour l'enlèvement de la plaque que d'autres techniques ou méthodes. Il a été démontré que les brosses à dents à piles rechargeables oscillantes, rotatives (avec ou sans action pulsatoire) étaient plus efficaces pour l'enlèvement de la plaque et l'amélioration de l'état gingival que les brosses à dents manuelles actuellement offertes. Étant donné la durée des essais cliniques évaluant le mode d'action, seule la portée clinique de la réduction de la plaque et de la gingivite pouvait être mesurée. L'effet sur la réduction de la destruction parodontale n'a donc pas été mesuré. Bien que la force idéale de brossage n'ait pas été déterminée, une force excessive peut causer un traumatisme gingival. La récession gingivale et l'abrasion des tissus durs cervicaux ont des étiologies multifactorielles et le brossage de dents est considéré comme un facteur contributif. Il n'a pas été démontré que les brosses à dents usées étaient moins efficaces que les brosses qui ne l'étaient pas ; par conséquent, aucun intervalle de remplacement idéal n'est évident. Les brosses à dents favorisent le développement d'une multitude de microorganismes, mais peu d'études démontrent qu'il y a une relation entre une brosse à dents contaminée et les manifestations cliniques systémiques et buccales.

## RÉSUMÉ

**Le but :** Le brossage des dents est le comportement d'hygiène buccale le plus couramment recommandé et adopté par les Nord-Américains et est fait de façon systématique dans les nations développées. C'est le principal moyen mécanique d'enlever la plaque dentaire, aidant ainsi à prévenir les affections buccales, incluant la gingivite et la carie dentaire. Le but de cet article est de faire rapport sur une investigation de la position actuelle de la science sur le brossage des dents comme moyen de contrôle de la plaque et des affections parodontales, particulièrement la gingivite et d'en arriver à formuler une déclaration de l'Association canadienne des hygiénistes dentaires (ACHD).

**Les méthodes :** En utilisant les études et analyses publiées antérieurement comme point de départ, une étude et une analyse approfondie de la littérature a été faite. La recherche était guidée par le développement de plusieurs questions PICO sur le brossage des dents et incluait l'utilisation des bases de données suivantes : MedLine, CINAHL (Cumulative Index of Nursing and Allied Health Literature) et le Cochrane Controlled Trials Register. Des sites Web sérieux ont également été vérifiés. À la suite de l'étude et de l'analyse, des commentaires ont été sollicités auprès d'experts et de chercheurs reconnus oeuvrant dans des domaines pertinents d'investigations.

**Les résultats :** Au total, 238 articles ont été identifiés et récupérés en texte intégral. Les données sur la fréquence et la durée du brossage des dents, sur la rigidité des soies et la méthode de brossage idéales se sont révélées équivoques. Il n'a pas été démontré que les brosses à dents usées étaient moins efficaces et aucun intervalle de remplacement idéal

n'est évident. Il a été démontré que les brosses à dents à piles rechargeables avec action oscillante, rotative (avec ou sans action pulsatoire) sont plus efficaces pour l'enlèvement de la plaque et l'amélioration de l'état gingival que les brosses à dents manuelles. La force idéale de brossage n'a pas encore été déterminée, mais la force excessive peut être associée à un traumatisme gingival. Bien que la récession gingivale et l'abrasion des tissus durs cervicaux sont reconnues comme ayant des étiologies multifactorielles, le brossage de dents est considéré comme un facteur contributif. Il a été démontré que les brosses à dents favorisent le développement d'une multitude de microorganismes, mais les études montrant une relation entre une brosse à dents contaminée et les manifestations cliniques systématiques et buccales ne sont pas évidentes.

**Les conclusions :** Basées sur les meilleures données probantes disponibles, sept recommandations, représentant la vision commune actuelle concernant l'utilisation de la brosse à dents, ont été développées. Bien qu'une recherche considérable ait été réalisée sur le brossage de dents, il a été démontré qu'il y a un manque d'études sur plusieurs aspects du brossage de dents ; par conséquent, il n'a pas été possible de tirer plusieurs conclusions fermes. Ce manque de données concluantes dans plusieurs aspects du brossage de dents limite la capacité des hygiénistes dentaires de faire des recommandations basées sur des données probantes à leurs clients. Dans ces cas, les hygiénistes dentaires devront s'en remettre à leur expérience clinique en tenant compte de l'état spécifique de leurs clients. Il est évident que de nombreuses possibilités existent pour la recherche future en hygiène dentaire dans plusieurs aspects du brossage des dents.

## RECOMMANDATIONS

1. Les brosses à dents manuelles sont une option viable pour le contrôle de la plaque.
2. Il a été démontré que le seul type de brosse à dents électrique à être cliniquement supérieur aux brosses à dents manuelles en ce qui concerne l'élimination accrue de la plaque dentaire et la réduction des risques de gingivite est celui qui incorpore une action oscillante, rotative (avec ou sans action pulsatoire) dans un modèle à pile rechargeable ; les autres types de brosses à dents électriques se sont révélés aussi efficaces que les brosses à dents manuelles.



3. L'utilisation d'une brosse à dents électrique n'est pas plus dommageable pour les tissus buccaux que l'utilisation d'une brosse à dents manuelle et peut être moins dommageable.
4. En ce qui concerne l'efficacité d'une technique de brossage de dents, aucune méthode ne s'est révélée clairement supérieure. Cependant la technique de frottement peut être moins efficace que les autres méthodes.
5. Il n'y a pas d'éléments probants qu'une brosse à dent aux soies usées est moins efficace qu'une brosse à dents aux soies non usées. Par conséquent, aucun intervalle de remplacement idéal n'a encore été déterminé.
6. Les clients montrant une récession gingivale et/ou des lésions des tissus durs cervicaux non carieuses devraient être conseillés, sur une base individuelle, concernant les interventions et les recommandations devraient inclure de l'information sur l'étiologie multifactorielle de ces manifestations.
7. Bien que la recherche démontre que les brosses à dents favorisent le développement d'une multitude de microorganismes, il n'a pas été démontré que cela se traduisait en manifestations cliniques systémiques et buccales.

## INTRODUCTION

INADEQUATE PLAQUE CONTROL CAN LEAD TO AN INCREASE in pathogenic microflora, which is considered the primary cause of gingivitis and is certainly implicated in the progression of periodontitis although its relationship to the latter is more complex.<sup>1,2</sup>

Tooth brushing is the most commonly recommended and performed oral hygiene behaviour in North America and is done ubiquitously in developed nations.<sup>3-5</sup> It is considered a primary mechanical means of removing substantial amounts of plaque in order to prevent oral disease, including gingivitis and dental caries, while also maintaining dental aesthetics and preventing halitosis.<sup>2</sup> While the primary mechanism of action of tooth brushing is the mechanical removal of plaque, it is also used as a means of delivering chemotherapeutic agents via toothpaste.<sup>6</sup>

Though most people in developed countries use tooth brushing as part of their routine oral health interventions, the adequacy in controlling plaque through this means is considered sub-optimal, particularly in the gingival area, which is critical in preventing inflammation.<sup>5,7,8</sup> In an early review, it was reported that the average daily toothbrush cleaning of two minutes would remove only 50% of all plaque.<sup>5</sup> Factors affecting the efficacy of tooth brushing include the technique, frequency, duration, brush type and design, and the dentifrice used.<sup>5,6</sup>

Dental clients look to oral health professionals, particularly dental hygienists, for current and accurate information about oral health care behaviours. The influx of oral health care aids, including new designs of both manual and power toothbrushes, has contributed to much confusion for consumers surrounding the efficacy and safety of new models.<sup>9</sup> It is therefore critical that dental hygienists be knowledgeable about toothbrushes and tooth brushing in order to make evidence-based recommendations to their clients.<sup>10</sup> This task is equally confusing for oral health care professionals in that there have been international workshops and abundant research studies, sometimes presenting contradictory findings.<sup>10</sup>

The aim of this paper is to report on an investigation into the current state of the science on tooth brushing for the control of plaque and periodontal diseases, particularly gingivitis. This review will encompass traditional toothbrushes, both manual and power, but will exclude specialized toothbrushes designed for specific areas of the dentition. The outcome of the investigation is this position paper

and accompanying position statement that will provide dental hygienists with a current knowledge base on the topic in order to provide evidence-based client education.

## BACKGROUND

The toothbrush has been reported to have been invented in China in approximately 1000 AD.<sup>11</sup> This early configuration is reported to have had an ivory or oxen bone handle with either horse mane or hog bristles.<sup>10,11</sup> It was not until the 17th century that the toothbrush made its way to Europe, and it was the latter part of that century before American dentists were recommending its use.<sup>11</sup> In 1885, it is reported toothbrushes were being mass produced<sup>11</sup> and, as a result, were more commonly in use, albeit often shared among family members due to the expense.<sup>6</sup> In the late 1930s, nylon bristles had largely replaced natural ones.<sup>6,11,12</sup> Improvements in manufacturing also allowed for the development of plastic handles and a subsequent decrease in price, making toothbrushes more readily accessible.<sup>6</sup> Interestingly, it was a result of a mandatory tooth-brushing protocol for American soldiers in the Second World War and subsequent bringing the habit back home that gave the impetus for widespread use of tooth brushing.<sup>11</sup>

*It is therefore critical that dental hygienists be knowledgeable about toothbrushes and tooth brushing in order to make evidence-based recommendations to their clients.*

Powered toothbrushes were first developed in Switzerland after the Second World War and were powered by electricity.<sup>11</sup> Introduced to the United States market in 1960, powered toothbrushes were an immediate success, but these early versions were not superior to manual toothbrushes and suffered from mechanical failure.<sup>11</sup> These first powered toothbrushes were designed simply to mimic the manual tooth-brushing motions, some up and down and others side to side.<sup>13</sup> Continuous developments have occurred since these initial models.<sup>14,15</sup> However, the second generation of powered toothbrushes did not emerge until the 1990s and they have increasingly become a household item ever since.<sup>1,6,11</sup>

## MATERIALS AND METHODS

This position paper, commissioned by the Canadian Dental Hygienists Association (CDHA), represents a comprehensive review of the literature on tooth brushing in order to develop a position statement about the practice of tooth brushing as a preventive oral health behaviour. The first step in the investigation was to develop several PICO questions that subsequently guided the literature search and this report. In this case, more than one PICO question was deemed essential due to the multi-dimensional facets of tooth brushing. The following questions were developed:

1. For an adult client with plaque and/or gingivitis (*Population*), will powered tooth brushing (*Intervention*) as compared to manual tooth brushing (*Comparison*) better reduce plaque and/or reduce bleeding and/or gingival and/or periodontal related scores (*Outcome*)?
2. For an adult client with plaque and/or gingivitis (*Population*), will manual tooth brushing using a specific technique, duration, force and/or frequency (*Intervention*) as compared to normal manual tooth brushing (*Comparison*) better reduce plaque, and/or reduce bleeding and/or gingival and/or periodontal related scores (*Outcome*)?
3. For an adult client with plaque and/or gingivitis (*Population*), will tooth brushing with unworn toothbrush bristles (*Intervention*) as compared to tooth brushing with worn toothbrush bristles (*Comparison*) better reduce plaque, and/or reduce bleeding and/or gingival and/or periodontal related scores (*Outcome*)?
4. For an adult client with plaque and/or gingivitis (*Population*), will specified toothbrush storage and/or cleaning procedures (*Intervention*) as compared to normal toothbrush storage and/or no cleaning procedures (*Comparison*) better reduce microbial contamination, cross-contamination and/or re-infection (*Outcome*)?

A state-of-the-science workshop was held in 1985 to examine the status of dental plaque control measures and oral hygiene procedures.<sup>5</sup> A year later, the proceedings, which included both state-of-the-science and reaction papers plus reports of the working groups and workshop participant discussions, were published and included a chapter by Frandsen on mechanical oral hygiene practices.<sup>5</sup> Frandsen reported that the investigation was based on available research and several previous workshops: Ann Arbor (1966), Malmö (1971), Chicago (1977), and Santa Monica (1980).<sup>5</sup> Brothwell et al. later conducted a review, which involved a search from 1984 to 1995, thus proceeding from the 1986 workshop.<sup>3</sup> This subsequent review focused only on studies that examined disease outcomes, recognizing that a certain amount of plaque is compatible with a healthy periodontium.<sup>3</sup> In 2003, the Cochrane Collaboration conducted a systematic review and meta-analysis on manual tooth brushing versus powered tooth brushing, and that review was subsequently updated in 2005.<sup>1,16</sup> This present position paper uses these previous reviews as a departure point for its literature search and findings.

The literature search for the present investigation was conducted in stages beginning in April 2006 through to May 25, 2006. The search included the following databases: MedLine, CINAHL (Cumulative Index of Nursing and Allied Health Literature), and the Cochrane Controlled Trials Register. The search focused on those papers reporting on both *in vitro* and *in vivo* randomized controlled trials (RCT) but also included other relevant papers such as systematic or unsystematic reviews and various other sources including websites.

The first stage of the review was of the three databases and included combinations of the following keywords: tooth brush(ing), power, electric, manual, soft, medium, hard, bristles, filaments, method, Bass, Stillman's, Fone's, Charter's, Roll, frequency, storage, replacement, contamination and the outcome measures, plaque, gingivitis, gingival bleeding. The search was limited to the English language from 1996 to 2006 for all search terms (or combinations) with the exception of tooth brushing, power tooth brushing and manual tooth brushing. In these cases, the search was limited to the period 2000 to 2006. This initial search of the three databases, using titles, abstracts and full text, resulted in 872 articles. Papers were retrieved if they examined any of the tooth-brushing variables in relation to an outcome measure. Other relevant literature was similarly retrieved at this point if deemed to provide background information. A total of 209 papers were identified and subsequently retrieved in full text.

The second stage of the search used all papers through the initial search and involved manually checking bibliographies and references for additional salient materials. This stage resulted in an additional 29 papers being retrieved in full text. Websites were also subsequently examined including those of the Canadian Dental Association (CDA) and the American Dental Hygienists Association (ADHA).

A unique element of a position paper is the solicited input from recognized experts and researchers. For this paper, input was sought from experts within preventive oral health care, periodontology, and community oral health and epidemiology. The rationale for this combination was to provide expertise in this rather broad scientific theme of inquiry.

## RESULTS

### Part I: The Instrument

At the time of the Frandsen review (1986), it was reported that no evidence was yet available to show the superiority of any one specific toothbrush type or design in removing plaque, and research into the field was scanty.<sup>5</sup> It was reported that, in general, the available toothbrushes were satisfactory in aiding in plaque removal, providing that the individuals using them were sufficiently motivated and educated in their use.<sup>5</sup> At the time, it was also concluded, consistent with the Ann Arbor and Chicago workshops, that neither power nor manual toothbrushes had been shown to be superior to the other.<sup>5</sup> It was believed at the time of Frandsen's report that if plaque removal fails, improvements were more likely by altering the conditions





determining toothbrush use, such as tooth-brushing technique, frequency and duration, rather than the toothbrush itself.<sup>5</sup>

Due to technological advances, the findings from the Brothwell et al. review contrasted with the Frandsen report in that oscillating/rotating action power brushes were found to be more effective in reducing gingivitis than manual toothbrushes and less likely to cause gingival damage.<sup>3</sup> Furthermore, it was concluded that other designs of power toothbrushes had no advantage over manual toothbrushes.<sup>3</sup> While the Brothwell paper was published several years prior to the Cochrane review, these findings were in agreement with each other.

Commonly agreed-upon features for manual toothbrushes included a large, comfortable handle with a good grip and a small-to-moderate-sized contoured brush head set on an angle.<sup>5,6,17</sup>

### Manual versus manual toothbrushes

The abundant research and development surrounding manual toothbrush designs have not reinforced Frandsen's assertion that improvements in plaque control will result from users' technique rather than from the instrument itself. However, despite continuous toothbrush modifications, compelling evidence is yet to emerge that demonstrates one toothbrush design to be consistently superior in plaque removal and to improve gingival outcomes.

Recent short-term trials evaluating manual toothbrush designs have shown some designs to be significantly superior in plaque removal.<sup>7,18,19</sup> For example, toothbrush prototypes with multi-level bristle trim patterns or those with tightly packed and tapered bristles have demonstrated significant reductions in plaque scores over a conventional toothbrush design.<sup>7,18</sup> However, other studies with variously designed manual toothbrushes have shown no significant differences in plaque removal.<sup>10,20-22</sup>

A relatively newly designed manual toothbrush (Oral-B CrossAction) has undergone considerable study. This toothbrush has angled filaments in opposing directions (criss-cross) along the horizontal axis of the brush and features elliptical-shaped tufts of bristles and a large monotuft at the tip containing more than 700 filaments. This manual brush has shown significant improvements in plaque removal in laboratory studies<sup>23</sup> and in several *in vivo* studies,<sup>24-28</sup> which have also shown gingivitis reductions.<sup>26</sup> However, conflicting results have also emerged: other studies show other manual designs to significantly reduce plaque<sup>19,29</sup> and gingivitis<sup>29</sup> scores more effectively, while yet other studies have demonstrated no difference.<sup>22</sup> The successor to this manual toothbrush (Oral-B CrossAction Vitalizer) has been modified with two lateral rows of non-latex rubber nubs; it has been shown to be more effective than its predecessor and another conventional manual toothbrush.<sup>30</sup> Some authors are still in agreement with the Frandsen and Brothwell reviews, concluding that the technique employed may be a more important variable than the toothbrush design where manual brushes are concerned.<sup>20</sup>

### Powered versus manual toothbrushes

A Cochrane systematic review and meta-analysis published in 2003 compared tooth brushing with powered toothbrushes to various manual toothbrushes.<sup>16</sup> Systematic reviews of randomized controlled trials (RCTs) are considered the gold standard for assessing health care intervention effectiveness. By using explicit and stringent scientific methods, they provide objective and comprehensive reviews of the available literature.<sup>31</sup> The literature search for the Cochrane systematic review was conducted from 1966 to 2002 with 354 articles being identified. Using stringent exclusion criteria (RCT,  $\geq 28$  days, clinical etc.), 29 trials were included in the final analysis. The primary reason for excluding a study from the meta-analysis was that the study was too short in duration.<sup>31</sup> Approximately 25 powered toothbrushes were clustered into six modes of action: side-to-side (moves laterally), counter oscillation (adjacent tufts independently rotate in one direction, then the other, and in opposite direction to adjacent tufts), rotation oscillation (brush head rotates in one direction and then the other), circular (brush head rotates in one direction), ultrasonic (bristles vibrate at ultrasonic frequencies [ $> 20$  kHz]), and unknown.<sup>16</sup>

*Compelling evidence is yet to emerge that demonstrates one [manual] toothbrush design to be consistently superior in plaque removal and to improve gingival outcomes.*

The primary outcome measures used in the studies that were included in the meta-analysis and its subsequent update were quantified levels of plaque and/or gingivitis.<sup>1,16,31</sup> When possible, gingivitis values were recorded at the time of arrival for assessment. But, where necessary, values were taken after tooth brushing was conducted at the assessment visit as it was assumed that a single tooth brushing would not influence the gingival outcome scores.<sup>1,16</sup> However, only those plaque values taken before brushing at the assessment visit were included in the reviews because these scores were believed to be more reflective of actual home use.<sup>1,16</sup>

The only cluster that removed more plaque (7%) and reduced gingivitis more effectively (17%) than manual tooth brushing in both the short ( $\geq 28$  days) and long term ( $\geq 3$  months) was the rotational oscillation powered toothbrush cluster. The authors concluded that both manual and powered toothbrushes were effective in reducing gingivitis, possibly preventing periodontitis, and preventing tooth decay if using fluoridated toothpaste.<sup>16</sup>

The Cochrane review is significant to this body of literature because it is the most comprehensive independent review of power tooth brushing ever conducted.<sup>11</sup> The review was updated in 2005 with the search extending into 2004 but it still confined studies to those comparing various manual toothbrushes with powered brushes.<sup>1</sup> However, the clustering was somewhat different in that

there were seven groups, with the ionic group being added: side-to-side laterally, counter oscillation, rotation oscillation, circular, ultrasonic, ionic (brush aims to impart an electrical charge to tooth surface) and, finally, unknown motion.<sup>1</sup>

In the update, results and conclusions were similar to the previous Cochrane review. The rotation oscillation brushes removed more plaque and reduced gingivitis more effectively than manual brushes in the short term (11% plaque reductions and 6% gingival indices reductions) and reduced gingivitis over three months (17% Bleeding on Probing reductions).<sup>1</sup> It was concluded that individuals who prefer to use a power toothbrush can be assured that powered tooth brushing is at least as effective as manual tooth brushing, and there is no evidence that powered tooth brushing will cause any more injuries to the gums than with manual.<sup>1</sup> Thus, Frandsen's and Brothwell's conclusions that use of a manual toothbrush is worthwhile were reaffirmed.

*Individuals who prefer to use a power toothbrush can be assured that powered tooth brushing is at least as effective as manual tooth brushing, and there is no evidence that powered tooth brushing will cause any more injuries to the gums than with manual.*

The investigators of both the Cochrane review and the update identified several possible weaknesses of the study and its update, including the grouping of the brushes by their modes of action.<sup>1,16</sup> While these groupings allowed for a more powerful meta-analysis, subtle differences between brushes could not be assessed.<sup>1,16</sup> For example, isolated, individual toothbrush design features such as toothbrush head size and design and filament size and arrangement could not be analyzed.<sup>1,16</sup> This limitation may in turn imply that while some oscillating, rotational toothbrushes are more effective than manual toothbrushes, some indeed may not be. Furthermore, the effectiveness of some individual designs may have been masked due to clustering with less effective designs. For example, some much earlier designs were grouped together with later versions with similar modes of action. Furthermore, because of the length of the trials included in the review (typically less than three months), only the clinical significance of plaque and gingivitis reductions could be assessed and not the impact on reductions of periodontal destruction.<sup>16</sup>

While studies of fewer than 28 days were excluded from the Cochrane review, several recent single-use and shorter-term studies have been conducted comparing power toothbrushes with various manual toothbrushes, and since the Cochrane update, 28-day or longer studies have been published. Results from these studies have demon-

strated that various powered designs—including hybrid power designs (meaning a combination of design features, for example a power rotational head and a manual component), battery-operated and rechargeable rotational oscillating designs and sonic re-chargeable designs—have been shown to be significantly more effective in reducing plaque than conventional manual toothbrushes.<sup>2,13,21,32-37</sup> Similarly, findings were reported, demonstrating hybrid power designs (Crest SpinBrush Pro) to be superior in plaque reduction to non-conventional manual toothbrushes (Oral-B CrossAction).<sup>27</sup>

However, other studies produced conflicting results and have revealed manual toothbrushes to be more effective than powered toothbrushes,<sup>31,33,38,39</sup> or of equal effectiveness.<sup>40</sup> A more recent manual toothbrush design (discussed previously), distinct in that it has a brush head with tufts of bristles angled from the vertical (Oral-B CrossAction), has been shown to be more effective in plaque removal than two different battery-powered designs: one a oscillating rotating design (Colgate Actibrush) and the other a hybrid design that combines an oscillating rotational head with an un-powered component (Dr. Johns Spin Brush Classic).<sup>38,39</sup> These plaque reductions were confirmed in longer-term studies, but no significant differences were shown in gingivitis scores.<sup>39</sup> In a single-use study, a recent modification of this particular manual toothbrush design (Oral-B CrossAction Vitalizer) has also been shown to be superior in plaque removal than a battery-operated hybrid design.<sup>30</sup>

#### Powered versus powered toothbrushes

Several studies have been conducted that compare oscillating rotating, and now pulsating, power toothbrushes with high-frequency/sonic tooth brushes.<sup>37,41,42</sup> Some of these studies have been consistent with the Cochrane findings in that the oscillating rotational brushes had significantly greater reductions in plaque on all surfaces,<sup>9,41-44</sup> and in other studies, on some surfaces.<sup>37</sup> Some of these same trials were also able to show reductions in gingival parameters, including gingival bleeding.<sup>9,37</sup> In addition, some of these same studies conducted surveys of study participants and showed significantly greater preference for the oscillating, rotational design.<sup>9,42</sup>

Interestingly, results of other studies conflict with the preceding findings. While the oscillating, rotating, pulsating power toothbrush has demonstrated greater reductions in plaque and bleeding indices over the sonic brush, these differences were not found to be statistically significant.<sup>45</sup> The efficacy of sonic brushes is claimed to be the result of “micro-streaming” of the saliva-toothpaste slurry caused by the high-frequency bristle movement, resulting in a “beyond the bristle” efficacy.<sup>37,42</sup> This effect is described as generating localized hydrodynamic shear forces in the fluids that surround the brush head.<sup>46</sup> In an uncontrolled study comparing two sonic toothbrushes with oval heads in reversing experimental gingivitis, no difference between the two brushes could be detected.<sup>47</sup> In an *in vitro* study comparing a sonic brush with an oscillating, rotating, pulsating power toothbrush, it was shown

that the sonic brush was capable of removing significantly more plaque bacteria beyond its bristles than the other.<sup>46</sup> The authors concluded that this would result in more effective plaque control *in vivo*,<sup>46</sup> although this was not demonstrated.

Of the increasing number of powered toothbrushes becoming available, many are low-cost battery-operated designs, but there is a lack of published clinical data to support their use.<sup>38</sup> A laboratory study comparing battery-operated oscillating, rotating power toothbrushes with each other has shown significant differences between brushes in removing artificial plaque.<sup>48</sup> In single-use studies comparing a battery-operated oscillating, rotating power toothbrush (Colgate Actibrush) with a hybrid design (Crest SpinBrush), the latter significantly outperformed the former in plaque reduction.<sup>49,50</sup> A three-month *in vivo* study comparing two battery-operated oscillating, rotating power toothbrushes (Braun Oral-B [D4], Colgate Actibrush) showed that one (D4) was superior to the other.<sup>51</sup> A single-use cross-over study compared a rechargeable oscillating, rotating, pulsating power toothbrush (Braun Oral-B 3D Excel [D17]) with a battery-operated oscillating, rotating brush (Colgate Actibrush). Results showed the re-chargeable design to affect significantly greater plaque removal.<sup>52</sup>

Other single-use studies have compared different powered hybrid designs with subtle design modifications to each other (Crest SpinBrush flat bristle profile, Crest SpinBrush rippled bristle profile). In some cases, the studies found significant improvements in plaque removal scores;<sup>53</sup> in other cases, no significant differences were evident (Crest SpinBrush Pro, re-designed Crest SpinBrush Pro).<sup>54</sup>

### Bristle design

For most of the previous century, manual toothbrush designs have had flat bristle trim patterns and rectangular heads.<sup>35</sup> More recently, brush heads have been modified into more tapered, oval and diamond shapes with bristle trim patterns evolving into bi-leveled, multi-leveled and rippled trims, and some designs having criss-cross angulated bristle tufts.<sup>35</sup>

Based on available evidence at the time, Frandsen recommended that a manual toothbrush have soft nylon end-rounded bristles with a diameter of approximately 0.2 mm and a length of 10 mm with a multi-tufted straight trimmed brush head design.<sup>5</sup> According to the Brothwell review, more recent studies suggested serrated tufts, raised toe bristles, and an angled head may present advantages.<sup>3</sup> It was concluded in that latter review that most commercially available manual brushes could be used effectively with the exception of foam brushes, which had been shown to be less effective.<sup>3</sup>

Toothbrush design is believed to have an impact on tooth-brushing efficacy, particularly in areas that have traditionally been more difficult to clean, such as the lingual, interproximal, and posterior surfaces.<sup>18</sup> Design modifications can include improvements to the handle, brush head, and bristles. However, some reports are more in

alignment with Frandsen's assertion in that they claim the design features of a toothbrush have little to do with plaque removal efficacy,<sup>20</sup> and poor technique combined with insufficient brushing duration lead to inadequate plaque removal.<sup>26</sup>

Of toothbrush components, perhaps the most studied is the bristle design. It is believed that the bristle design contributes to the plaque removal efficacy of the toothbrush, and more tapered bristles have been shown *in vitro* to have improved access to the sub-gingival region.<sup>55</sup> Other *in vitro* studies have shown modified filaments to be superior in plaque removal to end-rounded designs. For example, feathered filaments, when compared with end-rounded filaments, removed significantly more artificial plaque below the gingival margin than the control.<sup>56</sup> In a recent RCT, conical shaped filaments with "microfine tips" that immediately bend when pressure is applied were evaluated against an American Dental Association (ADA) reference toothbrush, using several outcome measures.<sup>8</sup> However, no significant difference was detected between the two designs.<sup>8</sup>

### *Toothbrush design is believed to have an impact on tooth-brushing efficacy.*

It is believed that filament stiffness can contribute to the traumatic potential of a toothbrush, but the influence of this factor is not clear.<sup>6,17</sup> The majority of commercially available toothbrushes today are marketed as being "soft," meaning that they have thinner diameter bristles and some degree of polishing applied to the cut ends.<sup>12</sup> However, hard-bristled brushes have been shown to be more effective in plaque removal than medium bristles in one study that employed several tooth-brushing techniques.<sup>57</sup> While conventional brushes typically incorporate cylindrical filaments with end-rounded tips,<sup>8</sup> filaments can be of different materials, lengths, thicknesses, and tip geometries and be situated within the brush head with varying compactness and angulations to the head.<sup>58</sup>

Bristle tips have received much attention from researchers. Contemporary understanding favours end-rounded filament tips as they are believed to be less abrasive to soft tissue; however, their clinical value is less defined.<sup>12,17,59</sup> Despite many toothbrush designs claiming to have end-rounded bristles, studies have shown that commercially available toothbrushes demonstrate non-uniform filament morphology and that many brushes do not present with an acceptable level of quality.<sup>12,17,60</sup> While the proportion of acceptable tips may be increasing,<sup>17</sup> regardless of the original geometry of bristle tip, rounding of sharp-edged filaments occurs when the brush is being used by the client.<sup>12,17</sup> It has been shown that, when less than 10% of the expected toothbrush life has elapsed, bristle tips of various geometries will display a flattened shape.<sup>12</sup> This change in bristle tip geometry has not been shown to significantly affect the abrasiveness of the brush.<sup>12</sup> Despite this, it is asserted that filaments should begin with an acceptable level of quality.<sup>60</sup>

## *Individuals typically brush for about one minute or less but ... most people significantly overestimate tooth-brushing duration.*

### **PART II: THE USER**

#### **Tooth-brushing duration**

Frandsen and later Brothwell et al. did not make conclusions regarding the optimal duration of tooth brushing. Recent reports have concluded that tooth-brushing duration is an important variable in plaque removal efficacy.<sup>18</sup> However, scientific investigations into the ideal brushing time have been problematic.<sup>6</sup> While it is believed that increased brushing time does result in more plaque removal, the brushing technique used can confound study comparisons.<sup>6</sup> Some have recommended three minutes as ideal for manual brushing.<sup>6</sup>

It has been shown that individuals typically brush for about one minute or less but that most people significantly overestimate tooth-brushing duration.<sup>18</sup> Studies have shown ranges of brushing times from 56.7 to 83.5 seconds, whereas estimated brushing times by these subjects range from 134.1 to 154.6 seconds.<sup>4,10</sup> These differences between actual and estimated brushing times have been found to be statistically significant.

Recent studies have shown that a significant relationship exists between recession and tooth-brushing duration.<sup>61</sup> In a study using a powered toothbrush, both brushing force and duration significantly affected the level of plaque removed, but these outcomes were not uniform.<sup>62</sup> The authors concluded that little advantage could be realized when brushing for more than two minutes at a force of 150 grams (g).<sup>62</sup> Powered toothbrush designs have incorporated this understanding by incorporating timers, typically set for two minutes, to enable the user to accurately assess their brushing time. However, the efficacy of this feature has not been evaluated.<sup>63</sup>

#### **Tooth-brushing frequency**

In the state-of-the-science workshop, Frandsen reported that confusion surrounded optimum brushing frequency.<sup>5</sup> He reiterated that the quality of brushing is likely a more important factor than the frequency.<sup>5</sup> Frandsen concluded that findings from the previous workshops, which had identified a brushing frequency up to two times a day, was still substantiated and that no significant gains could be achieved by increasing this frequency.<sup>5</sup> The Brothwell update, while concluding that studies have suggested that increased brushing frequency is indeed related to improvements in periodontal health, asserted that no optimum frequency had yet been established.<sup>3</sup>

Since these reviews, few studies have been published on tooth-brushing frequency, and those that have been published also found frequency data to be equivocal.<sup>61</sup> Recent research conducted on dogs reinforced tooth brushing once a day as being necessary to maintain gingival fibro-

last activity and proliferation of the junctional epithelium.<sup>64</sup> However, a study conducted in 2001 assessed the relationship among several variables, including frequency of tooth brushing, on recession and found that a significant positive relationship did exist.<sup>61</sup>

#### **Tooth-brushing force**

Most of the literature surrounding tooth-brushing force has examined its impact on gingival abrasions and recession and hard-tissue abrasions. Fewer studies have looked at the relationship between force and plaque removal efficacy. Of those that have been conducted in the last decade, it has been demonstrated for manual and power tooth brushing that increased pressure, up to a point, is associated with an increase in plaque removal efficacy.<sup>65,66</sup> Interestingly, further force resulted in reduced efficacy.<sup>65</sup> However, other recent studies have demonstrated contradictory findings and have shown that a lower force ( $\pm 1.5$  Newtons [N]) with powered tooth brushing resulted in greater plaque removal compared with higher forces ( $\pm 3.5$  N).<sup>14</sup> The optimal force has been found to be between 300 to 400 g.<sup>65,66</sup> Further confusing the literature, several other authors have concluded that no correlation has been shown between force and efficacy.<sup>65,66</sup> Manual tooth brushing has been associated with greater levels of tooth-brushing force and perception of force with manual toothbrushes is less accurate.<sup>14,66</sup>

Both powered and manual toothbrush designs have incorporated mechanisms to provide feedback to the user when employing excessive force.<sup>63</sup> A recent study examined the impact of an audible feedback mechanism that was sufficiently sensitive to enable users to modify their brushing behaviours.<sup>63</sup> Results showed that tooth-brushing behaviour was modified subsequent to use with the feedback system and that an optimum range of feedback force was determined to be from 250 to 280 g.<sup>63</sup> Some powered toothbrushes (Braun oscillating/rotational powered toothbrush) stop entirely or partially (pulsating motion) when excessive amounts of force are employed by the user (over 2.5 N).<sup>14</sup>

#### **Tooth-brushing method**

Frandsen reported that, while a multitude of tooth-brushing techniques were developed, no one method had been shown to be superior.<sup>5</sup> Research conducted into methods was sparse, and that which had been conducted up to that point had been equivocal.<sup>5</sup> Furthermore, it was concluded that the conscientious and correct application of a brushing method was more critical than use of any specific method.<sup>5</sup> The Brothwell et al. update found no published literature recommending a specific method but did, however, recommend avoiding overly forceful brushing.<sup>3</sup>

Manual tooth-brushing methods including Bass, Stillman's, Fones, Charter's, horizontal, vertical, scrub, and roll have been taught for decades, with the Bass and roll methods the most commonly recommended.<sup>5,6,67</sup> It has been estimated that over 90% of people employ their "personal tooth-brushing method," which is generally a

“scrub” method using vigorous horizontal, vertical, and/or circular movements.<sup>67</sup> While this method will remove plaque from smooth outer and inner surfaces of the teeth, it has been considered detrimental because it can encourage gingival recession and areas of tooth abrasion.<sup>67</sup>

Prior to 2003, some studies indicated that specific tooth-brushing techniques produce superior oral hygiene than a “normal” technique (meaning scrubbing) while no one method had been shown to be superior.<sup>67</sup> It has been reported that study findings were largely equivocal: some studies showed the Bass method to be superior in plaque removal to other methods while in other trials, either no differences were detected or the Bass technique was found to be less effective than other methods.<sup>67</sup>

Recent studies compared three-minute brushing with either the modified Bass or “normal” method and found that the modified Bass method removed significantly more supra-gingival plaque than did the normal technique for all sites and all times examined.<sup>67</sup> The modified Bass method was especially effective on the lingual sites,<sup>67</sup> an area commonly showing higher plaque scores.

*Some studies indicate that using newer toothbrushes results in lower plaque scores and significantly improved gingivitis scores; other investigators have concluded that toothbrush age and wear was not related to plaque control.*

### PART III: OTHER VARIABLES

#### Bristle wear

Indicators of a worn-out toothbrush are bristles that are splaying, bending, curling, spreading, bending, tapering, or have matting of the filaments.<sup>68,69</sup> While neither Frandsen nor Brothwell reached conclusions about the association between bristle wear and toothbrush efficacy, it has typically been recommended that toothbrushes be replaced every three months as it is generally believed that toothbrushes are less effective as they become worn.<sup>70</sup> The occurrence of toothbrush wear is also highly variable:<sup>68,71</sup> brushes used by some individuals show evidence of wear within two weeks of use; for others, there is little wear over six months.<sup>69</sup> It is believed that wear is affected by factors such as the method, frequency, and force of tooth brushing. Further complicating the issue, there have been varied methods of recording wear within studies.<sup>69</sup>

In a survey of Australian dentists, Daly (in Hegde) found that dentists recommend patients renew their brushes every two to three months.<sup>69</sup> While the hypothesis that worn brushes are less effective makes sense intuitively, the evidence supporting this belief is scarce and the studies that have been conducted have been equivocal.<sup>68-71</sup> In an earlier study, Daly found that there were no significant differences in plaque scores with subjects who had the highest toothbrush wear compared to those with the lowest.<sup>71</sup> It was concluded that the status of bristles was not critical in ensuring optimal plaque removal.<sup>68,71</sup> More recent trials continue to show conflicting results: some studies indicate that using newer toothbrushes results in

lower plaque scores and significantly improved gingivitis scores;<sup>70,72</sup> other investigators have concluded that toothbrush age and wear was not related to plaque control.<sup>69,73,74</sup> Further contradictory results have also emerged with improved plaque scores with less-worn brushes but improved gingivitis scores with more-worn brushes.<sup>68</sup>

#### Soft-tissue lesions

Incorrect tooth-brushing techniques, particularly very vigorous methods, have traditionally been strongly linked with gingival abrasions and recession,<sup>12,75</sup> but research confirming this association has been less clear.<sup>76</sup> A 2003 review asserted that only circumstantial evidence existed linking improper toothbrush use to recession and that recession likely has a multi-factorial etiology.<sup>15</sup>

Tooth brushing has been described as a traumatic procedure to the gingiva<sup>14</sup> and that, under scanning electron microscopic examination, brushing in many cases results in moderate-to-severe injuries to the gingiva.<sup>77</sup> While gingival abrasion is not a common finding,<sup>14</sup> gingival recession is a fairly common phenomenon with 78% to 100%

of the middle-aged U.S. population showing some level of recession.<sup>61,78</sup> In 30-to-90 year olds in the United States, almost one quarter had recession of 3 mm or greater.<sup>78</sup> While high levels of recession (64%) have been demonstrated in younger populations as well,<sup>75</sup> prevalence data suggest that the prevalence, extent, and severity of gingival recession increases with age.<sup>78</sup> Gingival recessions can cause thermal sensitivity, increased risk of root caries, and are a considerable aesthetic concern to clients.<sup>78</sup>

Recently, studies with power toothbrushes have shown consistent findings in that there were no significant differences in gingival abrasions with higher brushing forces compared to normal forces.<sup>14,79</sup> Most gingival abrasions were located in the mid-gingival aspect and were mostly defined as small, with medium and large abrasions being relatively uncommon.<sup>14,75</sup> These authors concluded that factors other than force were more important in the etiology of gingival brushing lesions.<sup>14,79</sup>

There was initially concern that power toothbrushes may promote gingival recession; however, current understanding considers powered tooth brushing to be at least as safe as manual tooth brushing.<sup>14,80</sup> Studies have shown that less force is used with power tooth brushing than with manual; specifically, a 1.0 N difference has been reported between power and manual brushing with no increase in gingival abrasion documented.<sup>11,14,80,81</sup> Even when greater amounts of force were employed with powered tooth brushing ( $\pm 3.5$  N), there was no significant difference in gingival abrasions with the differing forces.<sup>14</sup>

Recent studies have recognized the role that technique, frequency, and duration of tooth brushing has on recession, showing significant relationships between recession and these variables.<sup>61</sup> In one study, the greatest recession was found to be associated with a horizontal scrubbing technique, and recession increased with increased duration and frequency of brushing.<sup>61</sup> Other studies have shown that tooth-brushing technique and brushing frequency were both associated with recession.<sup>75</sup> In a university dental program population, those who were in first year and used more "simple" brushing techniques (i.e., scrubbing) were found to have less recession, whereas those in fifth year who employed more sophisticated techniques demonstrated more recession.<sup>75</sup> Age was not found to be associated with increased recession. The somewhat contradictory results were explained by the very small proportion of the fifth-year students who had maintained simple brushing methods and who accounted for the increased recession.<sup>75</sup> Other studies have shown that the bristle hardness of the toothbrush was correlated with recession whereas brushing technique was not.<sup>82</sup> Furthermore, end-rounding of toothbrush bristles has been shown to affect the incidence of gingival abrasions.<sup>79</sup>

A review conducted in 2003 concluded that gingival recession has a multi-factorial etiology: anatomical factors (tooth malposition, path of tooth eruption, tooth shape, profile and position in the arch, alveolar bone dehiscence, muscle attachment, and frenal pull), pathological factors (periodontal disease and treatment and iatrogenic restorative and operative treatment), along with improper oral hygiene methods and self-inflicted injuries were all contributory.<sup>76</sup> Other reports are in agreement that factors beyond tooth-brushing force are more influential in gingival recession.<sup>14</sup> The premise exists that toothbrush trauma causes gingival abrasion leading to recession.<sup>76</sup> While there is evidence that gingival trauma and abrasion do occur in the short term, their consequences in regard to recession are still unclear.<sup>76</sup> While it is believed that abrasion plays a major role in the etiology of gingival recession, causal relationships have not been established.<sup>76</sup> Finally, the combined benefit of soft toothbrushes, low-abrasive toothpastes, and better patient education about less aggressive brushing techniques has contributed to less concern about gingival lesions.<sup>12</sup>

#### Hard-tissue lesions

While the term "abrasion" has been defined as a loss of hard tissue due to mechanical process involving foreign objects or substances, the term "abfraction" was traditionally associated with a pathologic loss of tooth structure caused by biomechanical loading forces, which resulted in tooth flexure.<sup>83-86</sup> Available data surrounding loss of cervical hard tissue are scant.<sup>15,84</sup> The process by which abfractions occur has not been supported by the data. Therefore, the term "non-cariouse cervical lesion" has been more recently accepted as it implies a multi-factorial etiology for these lesions.<sup>15,83,84</sup>

Studies have linked hard-tissue wear to incorrect and over-vigorous tooth brushing, in particular brushing with

increased frequency, longer duration, and a scrubbing technique.<sup>15</sup> Additionally, intra-oral chemical forces have also been identified as contributory.<sup>86</sup> Frandsen reported that the exact causal mechanisms for abrasions had not yet been established.<sup>5</sup> However, tooth brushing was implicated in the process and more so with improper or overly-vigorous technique.<sup>5</sup> Even at the time of Frandsen's review, it was recognized that the etiology of hard-tissue abrasions was likely multi-factorial and that enamel abrasions were not a clinical problem although cervical ones may be for some clients.<sup>5</sup>

*In vitro* studies have shown that toothbrush abrasion can induce cervical lesions of a variety of defect shapes.<sup>83</sup> The most frequent morphology reported was v/wedged, followed by a mixed appearance; the least encountered was u/rounded.<sup>83</sup> Furthermore, the morphology of defects changed over time and increased recession was associated with cervical lesions that tended to be rounder and broader in contrast to sharper and angled lesions with decreased recession.<sup>83</sup> One *in vitro* study showed similar progression of lesions to that seen *in vivo*, and the authors surmised that the position of the gingival margin may also play a role in abrasion shape.<sup>83</sup> Prevalence data has also shown that tooth brushing is a contributing factor for wedge-shaped lesions.<sup>84</sup>

Anecdotal reports and *in vitro* studies have supported the contribution of tooth brushing with toothpaste as a consistent factor in hard-tissue non-cariouse lesions.<sup>58,87</sup> It is well recognized that toothpaste is important for delivering fluoride for preventing caries. Frandsen reported that dentifrice use has been associated with increased plaque reductions over brushing with water alone.<sup>5</sup> Interestingly, the toothbrush on its own is currently understood to have negligible effects on dentin and enamel.<sup>58</sup> It has become evident that abrasion is considered to be a result of the brush moving the paste over the tooth structure.<sup>58,87</sup> Most surprising are the accumulated data showing that soft-bristled brushes have the most influence on abrasion.<sup>58</sup> It is believed that the smaller diameter filaments of soft toothbrushes hold the toothpaste better than do the hard filaments, and the greater flexion of soft bristles increases the contact area of the filaments with the tooth surface.<sup>58,87,88</sup> In lab studies, it has been demonstrated that brushing with water resulted in no abrasion of hard surfaces.<sup>58</sup> Interestingly, *in vivo* studies have shown that the amount of toothpaste used with power brushes is directly related to the size of the head.<sup>81</sup>

While studies have demonstrated that different brushing motions result in significant differences in hard-tissue abrasion, especially with increasing numbers of brush strokes, the resulting abrasions were considered small.<sup>87</sup> Authors have concluded that brushing with toothpaste over many years would produce minimal damage to dentin, and tooth brushing with differing bristle stiffness likely has little clinical significance.<sup>58,87</sup> However, one caveat to this is in the case of abrasion in the presence of dental hard tissues that have already been demineralized by erosion, where a synergistic effect is suggested, and hard-tissue loss may have more clinical significance.<sup>88</sup> In

laboratory studies using previously chemically eroded bovine enamel samples, it was revealed that while manual, inactivated power and even some activated power toothbrushes induced no more loss of hard tooth structure than the erosion alone, some other activated power toothbrushes produced significantly greater abrasion.<sup>88</sup> It was concluded that power toothbrushes differ in their transportation of toothpaste and subsequent abrasion.<sup>88</sup> It was surmised that the frequency, movement, and filament configuration may influence the loss of hard tissue.<sup>88</sup>

A recent review concluded that "it is now accepted that abrasion of hard tissues is almost entirely related to toothpaste, little, if any, damage occurring with a toothbrush alone" with other tooth-brushing variables such as method, force, time, frequency, type of brush, filament stiffness, filament end-rounding influencing abrasion overall.<sup>15</sup> The reviewers did assert that conclusions were formulated based primarily on *in vitro* studies and logical assumptions.<sup>15</sup> The authors also state that difficulties arise under conditions of over- or misuse of tooth brushing, but, even then, the clinical manifestations would be evident in dentin and not enamel.<sup>15</sup>

#### Tooth-brush contamination

The typical storage conditions of toothbrushes may act as a reservoir for the re-introduction of potential pathogens to the oral cavity and for the introduction of

other potential pathogens from the bathroom environment.<sup>89-92</sup> These micro-organisms have the potential to colonize the oral cavity due to the micro-trauma that tooth brushing can cause.<sup>93</sup> However, studies investigating the implications of toothbrush storage and contamination have been intermittent with varying methodologies,<sup>89,90</sup> making it difficult to reach definite conclusions. Neither Frandsen nor Brothwell made comments surrounding this matter.

Studies that have been conducted are in agreement that toothbrushes do support a wide variety of micro-organisms.<sup>89-92</sup> *In vitro* research has shown the viability of micro-organisms varies depending on the aerobicity of the micro-organism (the susceptibility of the microbe to oxygen) and the design of the brush, specifically whether it had a hollow area that was accessible to the bacteria.<sup>91</sup> Aerobes survived best as did anaerobes on hollow designs.<sup>91</sup> These authors recommended solid toothbrush designs and thorough rinsing and shaking of brushes after use.<sup>91</sup>

Studies examining the association of filament-anchoring methods and microbial contamination showed that bristles having what is described as individual in-mold placement (where each filament, rather than the entire tuft, is placed individually into the toothbrush head), in contrast to in-mold tufting and staple set tufting, made retention of micro-organisms significantly more diffi-

cult.<sup>93</sup> Individual in-mold placement eliminates the bundling of filaments and associated gaps and spaces within the anchor but provides greater space between filaments and allows for more effective rinsing.<sup>93</sup>

Other studies have recommended antimicrobial (i.e., chlorhexidine) post-brushing sprays as a method of disinfection for preventing cross-infection or re-infection, finding that rinsing with water was ineffective in reducing contamination.<sup>94</sup> Interestingly, the routine use of a pre-brushing mouth rinse has been shown to be associated with the least amount of toothbrush contamination.<sup>89,90</sup> Toothpastes with a strong surfactant or with amine and stannous fluoride have also been shown to significantly reduce the amount of contamination of toothbrushes.<sup>92</sup> Antiseptic coatings placed during the manufacturing process exert contact antibacterial activity over 45 days, but investigations into the efficacy of reducing contamination have not shown positive results.<sup>92</sup>

In a study examining the viability of micro-organisms, specifically *Streptococcus mutans*, on toothbrushes made of opaque versus transparent brush head materials, it was demonstrated that transparent materials more effectively inhibited the retention of micro-organisms. This was due to the ability of light to penetrate more transparent materials, thus impeding the proliferation of micro-organ-

isms.<sup>95</sup> However, the differences were not shown to be statistically significant and micro-organisms decreased with time, regardless of brush head materials.<sup>95</sup>

Other researchers have concluded that intra-individual spread does not occur readily.<sup>96</sup> The implications of toothbrush contamination may be more of an issue for at-risk clients, such as medically compromised individuals.<sup>91</sup>

## CONCLUSIONS

Since the publication of the state-of-the-science workshop in 1986 and the 1998 update conducted by Brothwell et al., considerable research into tooth brushing has been conducted. This body of literature has helped to clarify some critical issues surrounding this commonly recommended and performed oral health care intervention, which has subsequently permitted researchers—and in turn, oral health care providers—to make definitive statements about these practices. However, several issues surrounding toothbrush use remain unclear and definitive conclusions still cannot be made, thus limiting the dental hygienists' capacity to make evidence-based recommendations to their clients. In these cases, dental hygienists will need to rely on their clinical experience along with the specific conditions of their clients.

## RECOMMENDATIONS

The following seven recommendations represent the current understanding surrounding toothbrush use and are based on the best available evidence:

1. Manual toothbrushes are a viable option for plaque control.
2. The only power toothbrush designs that have been shown to be clinically superior to manual toothbrush designs in removing more plaque and reducing gingivitis are those that incorporate oscillating, rotating (with or without pulsating) action in a re-chargeable design; other designs of power toothbrushes have been shown to be as effective as manual toothbrushes.
3. Use of a power toothbrush is no more damaging than a manual toothbrush to oral tissues and may be less damaging.
4. Regarding the efficacy of tooth-brushing technique, no method has been shown to be clearly superior.
5. There is inconclusive evidence that worn toothbrush bristles are less effective than unworn bristles. Therefore, an ideal re-placement interval has yet to be identified.
6. Clients demonstrating gingival recession and/or non-carious hard-tissue cervical lesions should be advised on an individual basis regarding interventions, and recommendations should incorporate the multi-factorial etiology of these manifestations.
7. While research shows toothbrushes support a variety of micro-organisms, this has not been shown to translate into oral/systemic clinical manifestations.

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#### Les liens (suite de la page 231)

groupes nous permet d'assurer le suivi des questions de santé, de développer des plans d'action communs, de signaler des problèmes en matière de santé buccodentaire et de préconiser des politiques qui renforcent le système de santé public et favorisent et protègent la santé de tous les Canadiens et toutes les Canadiennes. En tant que membre de ces groupes, l'ACHD a rencontré des représentants gouvernementaux comme le sous-ministre de la Santé et l'administrateur en chef de la santé publique pour discuter des problèmes de ressources humaines dans le secteur de la santé et de financement pour les services de santé.

L'ACHD a récemment été invitée à faire des présentations par affiches lors de la Conférence mondiale sur le tabagisme ou la santé et lors de la Conférence nationale sur le tabagisme ou la santé. Les affiches – opportunité de montrer la nouvelle implication de l'ACHD dans le renoncement au tabac – mettaient l'emphase sur la déclaration de l'ACHD « Le renoncement au tabac et le rôle de l'hygiéniste dentaire », le cours de formation continue en ligne sur le renoncement au tabac et une trousse d'information sur les meilleures pratiques pour les programmes de formation continue sur le renoncement au tabac destinés aux hygiénistes dentaires. La réaction aux affiches a été extraordinairement positive et de nombreux autres professionnels et professionnelles de la santé voient maintenant les hygiénistes dentaires comme des partenaires dans la mission de réduire le tabagisme au Canada.

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buccodentaire à partager avec vos clients ou que vous désiriez commander des fournitures, l'ACHD vous permet de vous montrer sous votre meilleur jour au point de vue professionnel en vous aidant à entrer en contact avec les leaders de l'industrie.

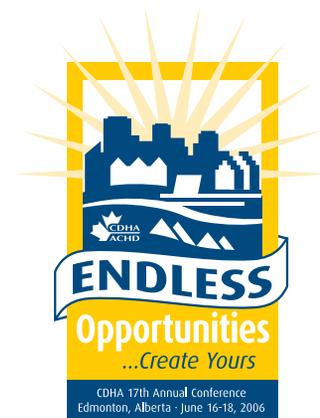
L'ACHD vous permet de rester facilement à jour en vous donnant l'information la plus récente sur les produits, grâce au répertoire des produits et à la vitrine virtuelle que vous trouverez dans la section *Réservé aux membres* du site Web. Vous pouvez également rencontrer directement les exposants et les commanditaires en soins de santé buccodentaire lors de la conférence professionnelle annuelle de l'ACHD. De plus, les membres reçoivent des échantillons de produits, des offres spéciales et des rabais, des ressources pour la clientèle, des bourses d'études et des prix, et beaucoup plus encore grâce aux initiatives de partenariat de l'ACHD avec ces entreprises.

Vous pouvez également avoir accès à des rabais substantiels sur beaucoup de choses, allant des locations d'autos aux uniformes, grâce au programme affinité-partenaires de l'ACHD. Nous sommes sur le point de lancer notre nouveau magasin virtuel, *Boutique ACHD*, où les membres auront droit à une expérience de magasinage unique. La *Boutique ACHD* offrira un gamme d'articles professionnels et personnels incluant des pièces conçues exclusivement pour les membres de l'ACHD. Ouvrez une session dans la section *Réservé aux membres* du site Web pour réaliser des économies.

Nous espérons consolider davantage nos liens avec vous au cours de l'année à venir. Surveillez l'arrivée de vos documents de renouvellement dans le courrier ou dans votre boîte de courriel. 



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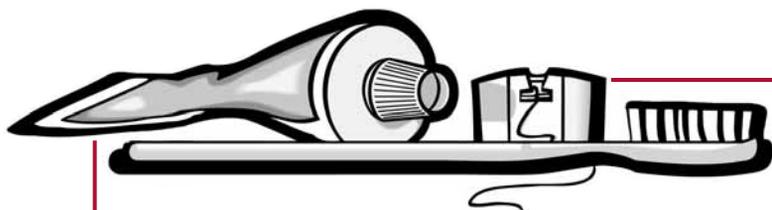
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It is your exceptional efforts that made this year's conference a great success. Thank you!



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We want to hear how creative you've been in promoting your profession this year. Send us your stories and photos. Entries will be judged on their creativity, planning, volunteer recruitment, educational elements, community impressions and impact as well as innovative partnerships. Applicants must submit an essay of less than 500 words. By submitting their essay and photos, applicants agree to have their essay or parts thereof published in the *Canadian Journal of Dental Hygiene*, at the discretion of CDHA. To help you get your submission ready, please e-mail us at [info@cdha.ca](mailto:info@cdha.ca), fax us at 613-224-7283, or call toll free at 1-800-267-5235. Entries must be received by December 8, 2006, at CDHA, 96 Centrepointe Drive, Ottawa, Ontario, K2G 6B1.

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Nous désirons savoir à quel point vous avez fait preuve de créativité pour promouvoir votre profession cette année. Faites-nous parvenir des anecdotes et des photos. Les envois seront jugés selon les critères suivants : créativité, planification, recrutement de bénévoles, éléments éducatifs, impressions et impact sur la collectivité ainsi que sur la dimension innovatrice des partenariats créés. Les candidates et les candidats doivent soumettre un essai de moins de 500 mots. En soumettant leur essai et leurs photos, les candidates et les candidats acceptent que leur essai ou des extraits de celui-ci soient publiés dans le *Journal canadien de l'hygiène dentaire*, à la discrétion de l'ACHD. Pour qu'on puisse vous aider à préparer votre présentation, faites-nous parvenir un courriel à [info@cdha.ca](mailto:info@cdha.ca), télécopiez au 613-224-7283 ou appelez sans frais au 1-800-267-5235. Les inscriptions doivent être reçues au plus tard le 8 décembre 2006 à l'ACHD, 96 promenade Centrepointe, Ottawa, Ontario, K2G 6B1.

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N'oubliez pas — la date limite pour la présentation de votre candidature est le 8 décembre 2006.

# The Chart Audit Process in a Clinical Teaching Environment: Fostering Excellence in Record Keeping

by Carmela Miliucci,\* BSc, RDH, and Lisa Rogers,\*\* RDH, BEd (Adult)

## ABSTRACT

Review of clinical charts is a standard of practice of the College of Dental Hygienists of Ontario (CDHO) and a requirement of the Canadian Dental Accreditation Commission. The purpose of a chart audit is to ensure student accountability in competent record keeping and quality assurance of individualized client care in the dental hygiene learning clinic throughout all phases of the dental hygiene process of care. A chart audit is a method of reviewing techniques of student documentation of client charts. It is a random selection of 25% of the database of completed clients for whom students have provided care in each term.

This article describes the process of developing/revising an existing chart audit system to ensure competency in record keeping of client records by dental hygiene students in an educational setting. Over a two-year period, we developed a newer chart audit process at George Brown College in Toronto with a goal to meet the standards of practice. The purpose of this revision was to create and implement a more comprehensive, accountable, and reliable chart audit process.

Through formative and summative learning practices in a competency-based learning environment, we integrated a process that mentored student learning and faculty calibration for excellence in record keeping. Existing chart audit policies and procedures were revised, piloted, evaluated, and implemented. Our aim in this paper is to share our endeavour with our peers and to challenge readers to examine their own record-keeping practices.

**Keywords:** Clinical competence; dental records/standards; educational measurement; quality assurance, health care

## INTRODUCTION

**G**EORGE BROWN COLLEGE (GBC) IS A COMMUNITY college in downtown Toronto, Ontario. The dental hygiene program is a two-year, direct-entry program. In first year, students provide clinical care for a minimum of 5 clients; in second year, a minimum of 24 clients. Each student is responsible for documentation of client records, which is supervised on an ongoing basis by clinical faculty. GBC client records are comprehensive clinical charts that foster methodic, systematic record keeping throughout all phases of the dental hygiene process of care.

Quality assurance demands that client records be audited, particularly in the final year of the program.<sup>1</sup> Our chart audit process is a method to review documentation of active client records in the clinical component of the dental hygiene program. This involves an audit, for each clin-

*Our chart audit process is a method to review documentation of active client records in the clinical component of the dental hygiene program.*

ical term, of a random sample of oral health records of clients for whom students provide care. The purpose of the chart audit is to ensure student accountability in competent record keeping, including ethical and legal considerations;<sup>2</sup> quality assurance of individualized client-centred care; and the development of skills that comply with the standards of practice of the College of Dental Hygienists of Ontario (CDHO).<sup>3,4</sup>

In the past, the process at George Brown College involved review of a varied number of clinical charts that had been selected randomly at the beginning of the clinical term. These charts would be audited by clinical faculty within their instruction time during the term, using a basic chart audit template (figure 1). Clinical faculty found it challenging to review all the charts as required. Charts that were audited often required amendments, but follow-up by students to implement revisions was inconsistent.

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# GEORGE BROWN COLLEGE DENTAL CLINICS CHART AUDIT FORM

Case # \_\_\_\_\_ Student name \_\_\_\_\_

- |   |                              |                             |
|---|------------------------------|-----------------------------|
| 1. All forms present                                | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2. All required signatures / dates                  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 3. All treatment planned<br>Complete or in progress | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4. Record of appointments<br>Complete and accurate  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 5. Concerns regarding documentation                 | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Staff signature: \_\_\_\_\_

Date of audit: \_\_\_\_\_

## STUDENT REQUIRED TO:

- Make required corrections; resubmit to above staff.
- Critical error: Records & Documentation (Criteria see DHP Manual, Evaluation System Section)
- Arrange to see Program Co-ordinator

Dental Clinic Policies & Procedure Manual

SECTION 4

Figure 1. Original chart audit form

GBC has over 30 part-time clinical faculty, which provides diversity in learning as instructors have a wealth of clinical experience. However, calibration of clinical staff on all aspects of chart audit expectations and outcomes remained a challenge. Different instructors demanded different chart amendments, and there were no specific criteria for review. Moreover, a chart audit team leader was not designated to mentor the program. Accountability for the audit program therefore remained a concern. An alternate chart audit process was tested in 2001, where students would audit charts through a peer review process. Although peer review is a high quality assurance skill, this

peer review process presented challenges as students predictably were biased. This method was therefore considered unreliable as an objective measurable system at this point in their learning.

In 2002, a chart audit review was undertaken by both the GBC program coordinator and the clinical team leaders. It soon became apparent that more staff were required to implement a more effective chart audit process. In January 2003, we were asked to create a more comprehensive chart audit system that would provide an accountable and reliable process for GBC. The following is a step-by-step account of that process.

## RÉSUMÉ

La révision des dossiers cliniques est une norme de pratique de l'Ordre des hygiénistes dentaires de l'Ontario (OHDO) et une exigence de la Commission de l'agrément dentaire du Canada. Le but d'une vérification des dossiers est d'assurer la responsabilité des étudiants pour une tenue des dossiers compétente et l'assurance qualité des soins individualisés fournis aux clients dans une clinique d'apprentissage en hygiène dentaire au cours de toutes les phases du processus de soins en hygiène dentaire. La révision des dossiers est une méthode de réviser les techniques de documentation des dossiers des clients des étudiants. Elle comporte une sélection au hasard de 25 % de la base de données des clients à qui les étudiants ont prodigué des soins à chaque session.

Cet article décrit le processus de développement et de révision d'un système de vérification de dossiers existant pour assurer la compétence des étudiants et étudiantes en hygiène dentaire en tenue de dossiers des clients dans un environnement éducationnel. Au George Brown College à Toronto, nous avons développé, sur une période de deux ans, un processus de vérification de dossiers plus actuel avec comme objectif de satisfaire aux normes de pratique. Le but de cette révision était de créer et de mettre en œuvre un processus de vérification des dossiers plus complet, plus responsable et plus fiable.

Par des techniques d'apprentissage formatives et sommatives dans un environnement d'apprentissage fondé sur la compétence, nous avons intégré un processus qui encadre l'apprentissage des étudiants et l'étalonnage du corps professoral pour l'atteinte de l'excellence dans la tenue des dossiers. Les politiques et procédures existantes de révision des dossiers ont été révisées, essayées, évaluées et mises en œuvre. Le but de cet article est de partager notre expérience avec nos pairs et d'inciter les lecteurs et les lectrices à examiner leurs propres méthodes de tenue des dossiers.

## FIRST STEPS

Our first step was a needs assessment to facilitate the development of a strategy. We critically reviewed past methodologies that had been in place. We asked questions including the following: (1) What did we hope to accomplish by auditing charts? (2) What specifically should we target when auditing charts? (3) What tools would we need? and finally, (4) What process would be successful in our particular learning environment? We wanted to build on our existing strengths: clinical staff that wanted to be calibrated in a chart audit process; staff willingness to mentor excellence in record-keeping strategies; support from clinical leaders and our program coordinator; an existing chart audit template; and a reasonable time frame to develop a new process. The developmental process would be ongoing and would require adjustment and review as we moved forward.

As we looked at strategies to design the new process, we discovered there was minimal published information on other chart audit processes. We had a study from the School of Dentistry at the University of Washington,<sup>5</sup> guidelines from the CDHO Standards of Practice, and written documentation of chart audit requirements from the accreditation document. We concluded that, with limited available resources that could serve as a model, we would need to create a new model for our program.

Learning of the quality management principles of the ISO (International Organization for Standardization)<sup>6</sup> became a catalyst for us in the early stages of development. Loosely considering this philosophy, we decided our strategy would first consider good leadership when developing a strong chart audit process. Having leadership in the process could ensure accountability, communication, and a vehicle to set goals. Second, the process would need to involve all team members—clinical faculty, client services, and students—with appropriate learning and training. Third, the process would need to define the criteria for

excellence in record keeping. This could be achieved by designing an improved tool to audit the charts with specific learning outcomes and targeted timelines. Finally, the process would have to be reviewed on a regular basis, with feedback from staff and students; this was viewed as critical to our success.

Our plans for the chart audit process would follow the principles of the dental hygiene process of care. We ASSESSED the existing model; considered the needs and goals of all involved (DIAGNOSIS); PLANNED interventions specific to our program to IMPLEMENT an improved process, with a method for EVALUATION of the chart audit process.<sup>7</sup>

## GOALS OF THE CHART AUDIT PROCESS

The following goals were essential to ensure reliability of the chart audit process:

1. Identify the team leader's role.
2. Review record-keeping policies and standards.
3. Establish criteria to assess compliance with the policies and standards.
4. Create a tool to measure the criteria.
5. Select a representative sample for audit.
6. Develop a method for reporting back to students, including feedback and follow-up.
7. Present the new chart audit process plans and goals to full-time faculty and the dental hygiene program coordinator for consideration and approval for pilot implementation.
8. Establish timelines for a full-year pilot implementation of the audit process.
9. Select, train, and calibrate auditors.
10. Educate and calibrate clinical faculty and students.
11. Pilot test the chart audit process.
12. Evaluate the chart audit process, including surveys of staff and students for feedback and to address concerns.

### 1. Identify the team leader's role

To create a new, efficient audit model, we believed it essential to have demonstrable leadership. The role of the new chart audit team leader was constantly redefined as we implemented the audit during the trial phase and the pilot project. The leader's role would include administrative functions and organization for implementation of the audit each semester. In addition, the team leader would liaise with the client records management staff, first- and second-year clinic leaders; educate clinical faculty and students about the audit; and train auditors. At the end of the audit process, the chart audit team leader would have to conduct surveys of the students and clinical faculty for feedback to re-evaluate the process and implement any necessary changes for improvement. Forms and clinic manuals would then be revised as necessary. The chart audit team leader would also provide remedial instruction for students who have difficulty reaching competency in record keeping. We believe that these duties would ensure accountability.

### 2. Review record-keeping policies and standards

Clinical faculty follow established record-keeping policies and procedures that are consistent with the CDHO standards of practice as outlined in the *GBC Dental Hygiene Pre-Clinic and Clinic Manual*<sup>8</sup> and the *Dental Clinics and Laboratories Policies and Procedures Manual* (DCLPPM).<sup>9</sup> All faculty are provided with copies of clinic manuals for their

review so that they remain calibrated. Students also receive a copy of the manuals as part of their reference material. In addition, record-keeping guidelines are taught in the professionalism component in the Dental Hygiene Principles II course, and record keeping begins during first-year pre-clinical sessions where "mock records" are kept while students practise skills on each other.

In developing the chart audit process, we reviewed all practices related to record keeping, identifying the criteria to audit records. This enabled us to devise a tool to measure the criteria for record keeping.

### 3. Establish criteria to assess compliance with the policies and standards

At GBC, our students are evaluated in clinic, using the principles of competency-based learning.<sup>10</sup> Competency-based education allows the student to apply theoretical knowledge in a clinical setting. Students move through various stages of the learning continuum, with repeated attempts at a skill, until competency is achieved. Given that the chart audit occurs in the clinical setting at the college, we agreed that this would be the approach to take with the audit process. Each student would be given repeated opportunities and experiences to allow the development of skills in competent record keeping. The more opportunities students were given, the closer they would be to reaching competency. And in competency-based

education, criteria for learning must be clearly defined for teachers to help students achieve competency.<sup>11</sup>

To create the criteria for assessing compliance with record-keeping policies and to identify what would determine competency, we reviewed the benchmarks that meet regulatory requirements, including ethical and legal considerations.<sup>3</sup> These criteria include the following:<sup>1(p.39-40)</sup>

- collection of complete client information including data related to medical/dental/social histories;
- appropriate medical alerts;
- client consent;
- documentation of faculty approval/supervision throughout all phases of care;
- client-specific orders for clients with compromised medical histories;
- evidence of assessment data;
- development of client-specific dental hygiene care plan;
- documentation that all intended individualized care; and
- decision-making strategies related to evaluation of care provided and future continuing care.

*The audit was intended not only as an administrative audit of forms but also as an audit of client care.*

Understanding the benchmarks allowed us to create criteria that became the characteristics of our chart audit (table 1). If a student had not followed the above criteria for record keeping, an infraction would occur. We then would table the infractions as either minor or major.

Therefore, upon audit, there would be three possible results:

1. **No action** required if the chart audit is deemed to have no infractions
2. **Minimal action** required based on an outcome of minor infractions only
3. **Major action** required based on an outcome of major infractions

Students with a result of “no action” would possess the skills necessary to show competency in their learning. Students who had demonstrated “minor infractions” (up to three) would still exhibit competency but would require assistance in their learning. Students with chart audit results of “major infraction(s)” would have demonstrated non-competency in record-keeping skills. In keeping with competency-based learning principles, further charts of these students would be audited until competency was demonstrated.

4. Create a tool to measure the criteria

Our next goal was to develop a tool to document how criteria were being met. While reviewing a clinical chart piece by piece, it was evident that we needed to begin at the end, that is, with the quality assurance form. At GBC, a quality assurance form is included with each client record and used as a “checklist” or summary of all phases of the dental hygiene process of care. We used this summary to create a new template for a chart audit form. The new audit form would list all clinical forms that pertain to records that are used by students in client care. Thus information regarding the proper collection of complete documentation on all forms, including signatures and dates, would be addressed.

Auditing a clinical chart is demanding and takes time to reflect and review all entries. To make the audit form user-friendly, we implemented check boxes to minimize the need for writing to explain findings. The audit was intended not only as an administrative audit of forms but also as an audit of client care. All planned interventions appropriate to assessment were to have been completed. If, for some reason they were not, was there supporting documentation to explain? Had referrals been documented, if necessary? In other words, did all documentation agree with the dental hygiene care plan? We provided areas on the form for anecdotal comments for this part of the criteria.

The audit form also needed an area to inform the student of the result of the audit. And, if revisions were required, a section was required to give the student a date for amendment completion.

Minor chart audit infractions	Major chart audit infractions
<ul style="list-style-type: none"> <li>• Forms out of order/dividers not inserted into completed chart</li> <li>• Missing dates</li> <li>• Missing signatures (not including medical history)</li> <li>• Treatment implemented but not listed in the Dental Hygiene Care Plan or Revision Section of the DHCP</li> <li>• Dental hygiene planning does not correlate with assessment findings</li> <li>• Appropriate referral letter as indicated in Dental Hygiene Care Plan missing/or no indication in Record of Appointment of referred treatment</li> <li>• Standard Protocol # not documented or incorrect</li> <li>• Illegible writing</li> </ul>	<ul style="list-style-type: none"> <li>• More than three missing dates</li> <li>• More than three missing signatures</li> <li>• Signatures missing on the medical history</li> <li>• Any form missing appropriate client signatures</li> <li>• Treatment in the Dental Hygiene Care Plan <b>not implemented</b>, and no supportive documentation in revisions/ROA</li> <li>• Medic alert form missing</li> <li>• Use of erasable pen, white-out, or pencil</li> <li>• <b>Any combination of more than three minor infractions</b></li> </ul>

Table 1. Chart audit infractions

When the final template for the chart audit was ready, we tested the form to see if it evaluated the intended criteria. We randomly selected 10 students from the second-year class. With their knowledge, we audited two clinical charts per student. We interviewed the students at the completion of the test run to explain the results of the audit. We analyzed the success of the forms with specific questions and invited anecdotal feedback from the students. We discovered some discrepancies with the form and made appropriate revisions prior to implementation of a proposed pilot for the upcoming school year (figure 2).

#### 5. Select a representative sample for audit

Students are assigned clients each term for client care clinics through an equitable distribution process. Students are required to complete a minimum of 5 clients in first year and 24 in second year. For the chart audit, we chose to select a random sample of 36% of the completed client charts to gauge student competency. This number of charts should also be manageable by the audit team.

The audit process would include an additional audit of client records if a student's audit outcome did not demonstrate competency. For example, if a student's chart audit outcome reflected two major infractions, the team would audit an additional four client charts. Thus the sample size for this student would be 75%. Furthermore, if a student had major infractions as a result of the follow-up audit, then the audit would be halted and all the client charts reviewed in a scheduled mentoring meeting with the student and the chart audit team leader. At this meeting, while specific student record-keeping challenges would be identified, the focus would be on formative feedback by reviewing standards in policies and procedures related to client charts. The student's progress would be continually monitored by the chart audit team leader until competency was demonstrated.

#### 6. Develop a method for reporting back to students, including feedback and follow-up

The student would be notified of the audit outcome by receiving a photocopy of the chart audit form; the original copies would be kept on file. Generally, students would be given a two-week period to make revisions if required. Students would have to meet with clinical faculty to review any infractions as a result of the audit. When revisions were completed, both the student and a clinical faculty member would sign the original chart audit form as complete.

#### 7. Present the new chart audit process plans and goals to full-time faculty and the dental hygiene program coordinator

Prior to implementing our pilot, we presented the chart audit process project to the full-time faculty and the coordinator of the dental hygiene program. We shared our proposed recommendations, from the inception of the project to our hope for implementing a pilot the following school year. The recommendations were received positively and

we were given full support to implement our pilot the following September.

#### 8. Establish timelines for a full-year pilot implementation of the audit process

Table 2 explains the proposed timeline for the chart audit. Initially, only client charts of second-year students were to be audited. But, after discussion, it was decided to introduce the process to the first-year students early in their learning. Students in first year would be mentored by clinical faculty in record keeping. As students continued to practise this skill, they would be able to meet the criteria to attain competency with less and less dependence on their teachers.<sup>1</sup> It was therefore proposed that

- completed client records from second term of first year would be audited the following September;
- completed client records from the first term of second year would be audited at the end of the term; and
- completed client records in the last clinical term of the dental hygiene program would be audited over the last three months.

Student Year	Term	Weeks audit to run
1st year	2nd term	September of 2nd year
2nd year	1st term	December-January
2nd year	2nd term	March-May

Table 2. Proposed timeline for chart audit

#### 9. Select, train, and calibrate auditors

Each year, the clinical team leader and dental hygiene program coordinator would select five to six clinical faculty members to make up the chart audit team. The team members would be expected to be flexible in their working hours for the duration of a full school year. The chart audit team leader would train the team in the audit process, using the new chart audit template.

Clinical faculty who were approached to join the chart audit team were eager to take part in the process as many of our faculty enjoy further teaching opportunities to work with students and mentor them in another facet of their learning. In addition, the chart audit team is a collaborative opportunity for further professional development.

The chart audit team would review the following in the course of the chart audit to assess whether

1. all applicable chart forms are present in the chart, in the appropriate section and order;
2. all appropriate dates on forms are correct and listed;
3. all forms have the appropriate signatures from dental hygiene instructors, students, clients, dentists, and dispensary staff;
4. entries in the record of appointments are accurate;
5. all dental hygiene planning co-relates to assessment findings; and
6. all implemented treatment co-relates to planned dental hygiene interventions.





Special concurrent sessions hosted by Dental Hygiene Educators Canada for dental hygiene educators.

# Attention Students and Educators

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- Make important career connections
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## 10. Educate and calibrate clinical faculty and students

At GBC, we have over 25 part-time clinical faculty who teach more than 70 students in each of the first- and second-year clinics in the dental hygiene program. Ongoing calibration is therefore an important goal for reliability of the chart audit process.

Upon completion of the chart audit process, the student will have acquired the knowledge and application to demonstrate the following learning outcomes:

1. Define the criteria for a successful chart audit.
2. Correlate the findings of the chart audit to understand the differences between minor and major infractions.
3. Recognize how to make amendments in a chart to meet the expectations of a successful chart audit.
4. Utilize data from the new chart audit process findings to improve future record keeping in clinic and to develop skills that comply with the CDHO standards of practice.

To facilitate calibration of clinical faculty, review of the written policies and procedures concerning documentation is expected as a component of clinical teaching responsibilities. In addition, all clinical faculty were re-trained to review a chart for the purpose of chart auditing. Prior to implementing the pilot, a written explanation of the chart audit process was included in the clinical manuals for faculty and students to provide standards in record keeping. In addition to clinical staff meetings and debriefing sessions that occur before each clinic, e-mail facilitated communication among clinical faculty.

## 11. Pilot test the chart audit process

Using the timelines for implementation of the chart audit process, the team leader randomly selected client charts from the students' completed-clients database. The chart audit team was assigned a group of students and audited the selected clinical charts. When the chart audit was completed, the student was notified of the outcome. If the audit resulted in no infractions (no action required), the student signed off on the original chart audit form and the chart audit was deemed complete.

If the chart audit discovered minor infractions (to a maximum of three), the student was requested to make the appropriate corrections within two weeks. The student then presented the chart for a re-audit, which ensured appropriate amendments had been made. At this time, the student and a clinical faculty member signed off on the original chart audit form and the chart was stamped indicating the date of a successful audit. The chart audit is deemed complete.

When the chart audit revealed a major infraction(s), the same process was followed for the minor infractions, with one exception. Two more charts per major infraction were audited. Students were expected to make amendments to all charts requiring attention. If there were further major infractions beyond the original two, then all charts pertaining to client care for that student were audited. In addition, they met with the chart audit team leader and/or the clinical team leader and/or coordinator of the program.

## 12. Evaluate the chart audit process

At the end of the pilot project, we conducted a survey to review the process from the perspective of both the students and the clinical faculty. We wanted to determine if the learning outcomes had been met. We asked students and clinical faculty both for answers to specific questions and for anecdotal comments so that we could review the process and make amendments as required. The perspectives of all stakeholders were considered.

### WHAT WE LEARNED FROM THE PILOT PROGRAM AND SUBSEQUENT CHANGE

1. Feedback from clinical faculty indicated that it was difficult to re-audit amended charts during clinic time. As a result, this year, auditors assigned to a specific group of students re-audited amended charts outside of clinic time. Two weeks after the students were notified of the audit outcomes and the requested revisions were completed, students met with their assigned auditor to review the changes. If the revisions were approved, that auditor signed and stamped the chart. Assigned groups and auditors rotate each term. This creates further reliability, improves calibration, and eliminates possible personality conflicts and bias.
2. During the initial timeline for the pilot project, we realized that it was ineffective to audit client charts of the first-year students three months later in the fall of the next school year. Students could not recall missing information, if required, about the client. As well, clinical faculty who had taught in the spring were not necessarily the same faculty in clinic in the fall. As a result, the chart audit of the first-year students is conducted in the last three weeks of their first-year clinical term.
3. Upon audit, we discovered that the students did not always complete some intended care. Often valid reasons existed, but the proper documentation was unclear. Since the client must sign the chart to accept proposed interventions, we revised the dental hygiene care plan form to reflect amendments to proposed interventions or treatment. All revisions required student, client, and staff signatures. This created improved accountability immediately.
4. Upon audit, we also noticed that our radiographic prescription form required amendment. If a student was given a radiographic prescription, radiographs may not necessarily be taken due to non-compliance by a client. We therefore added a line to the radiographic prescription form to indicate "radiographs declined"; this was in addition to the already documented notes in the record of appointment.
5. The most important change as a result of the audit was related to competency-based learning. If auditors reviewed the initial client charts for audit and found major infractions, they would immediately pull two more charts per audit for that student. Inevitably, the auditor would discover further infrac-



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tions. This told us that we did not allow an opportunity for students to learn from their errors to become more competent. Yip and Smales comment in their review<sup>11</sup> that competency-based education encourages student critical self-assessment. Therefore, after learning of a major infraction, students are given a two-week grace period to self-audit their other client records. At the end of the two-week period, two more charts per major infraction are audited. This process is repeated until students can demonstrate competency.

6. While the audit team continually calibrates, human error can occur and this is something we strive to minimize. Auditing client charts is a demanding and a fatiguing process. As we re-evaluate the process again this year, increasing the number of auditors to mentor smaller groups of students is being considered. In addition, the chart audit team leader and auditors will audit previously audited charts to identify any shortfalls and calibrate accordingly.
7. The new chart audit process is now a formalized system in the program. This has helped to promote calibration of faculty in excellence in record keeping and has allowed improved mentoring of students.
8. The authors of this paper acted as the interim audit team leaders during the pilot. It is important to have a leader drive the audit process and keep it organized to ensure accountability. It is also important to keep as many members of the audit team from year to year. This ensures calibration of auditors and effective and efficient implementation of the audit process. However, given the availability and flexibility of part-time clinical faculty, introducing new auditors to the team is inevitable. Allowing one to two new members to be added to the team annually allows familiarity with the process without compromising calibration.

## CONCLUSION

Our involvement with the chart audit process over the past two years at George Brown College has been a rewarding and personal learning experience. Our aim was to create a method for an accountable, reliable, and streamlined process for our students and clinical faculty, while endeavouring to meet the CDHO standards of practice and Canadian accreditation guidelines.

Our collaborative approach to auditing has assisted further formative learning for our students. The learning outcomes set out at the beginning of the process were met by students. The number of major infractions overall decreased dramatically as students approached the end of their course of study at GBC. This indicated to us that the continuum of reviewing charts throughout the clinical program kept the students motivated to meet standards in record keeping. This is a skill that students will carry throughout their career, and we believe that an accountable process for chart review will foster career-long excellence in record keeping. In addition, registered dental hygienists become part of a randomized professional port-

folio review. The process of random selection of client charts as students develop competency in their learning simulates career-long audit expectations.

The chart audit process provided a mechanism for further faculty calibration with regards to standards in record keeping. Although the audit is a sophisticated process, elimination of human error by clinical faculty and auditors requires ongoing calibration. In a program that has a large part-time teaching component and large student body, we strive to keep our error rate at a minimum. With yearly re-evaluation of the chart audit process, clinical faculty can review charts that have been previously audited in order to reflect on the process and on any areas that may need improvement because of human error. Students provide feedback and reflection annually through surveys and exit interviews. Thus collaborative re-evaluation allows for revisions and amendments where required to achieve a high standard in the audit process.

The pinnacle of our work was the successful implementation of the chart audit process this year. What does the future hold? We would like to see an electronic application of this process. In addition, the audit process could be used by other health professionals in an interprofessional health education setting.

## ACKNOWLEDGEMENTS

We would like to thank the faculty and staff at George Brown College for their patience and support during this process. In addition, we would like to express our appreciation to the Class of 2005 for their collaboration and cooperation during our pilot test.

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NOTICE OF ANNUAL MEETING  
OF MEMBERS OF CANADIAN DENTAL  
HYGIENISTS ASSOCIATION (CDHA)

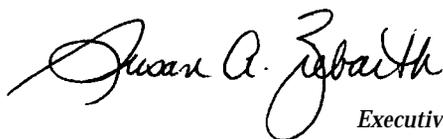
NOTICE is hereby given that the annual meeting of the members of **CANADIAN DENTAL HYGIENISTS ASSOCIATION** will be held at CDHA, 96 Centrepointe Drive, Ottawa, Ontario, on Saturday the 21st day of October, 2006, at the hour of 9:00 o'clock in the morning, to:

- I. receive the financial statement of the corporation for the fiscal period ended April 30, 2006, and the report of the auditors thereon;
- II. appoint auditors; and
- III. transact such further and other business as may properly be brought before the meeting or any adjournment thereof.

Copies of the financial statements and the auditors' report are available for review at the corporation's head office during normal business hours.

DATED the 15<sup>th</sup> day of September, 2006.

BY THE ORDER OF THE BOARD OF DIRECTORS



*Executive Director / Directrice générale*

AVIS DE CONVOCATION DE  
L'ASSEMBLÉE ANNUELLE DES MEMBRES  
DE L'ASSOCIATION CANADIENNE DES  
HYGIÉNISTES DENTAIRE (ACHD)

AVIS est par les présentes donné que l'assemblée annuelle des membres de **L'ASSOCIATION CANADIENNE DES HYGIÉNISTES DENTAIRE** aura lieu à l'ACHD au 96, promenade Centrepointe, à Ottawa (Ontario) le samedi 21 octobre 2006, à neuf heures. En voici l'ordre du jour:

- I. recevoir l'état financier de l'Association pour l'exercice ayant pris fin le 30 avril 2006 et le rapport des vérificateurs à ce sujet;
- II. nommer les vérificateurs;
- III. régler toute autre question dûment soulevée à l'assemblée annuelle ou à toute nouvelle assemblée convoquée en cas d'ajournement de l'assemblée annuelle.

Des exemplaires des états financiers et du rapport des vérificateurs peuvent être examinés au siège social de l'Association pendant les heures d'affaires ordinaires.

FAIT le 15 septembre 2006.

PAR DÉCRET DU CONSEIL D'ADMINISTRATION

*Wish List (continued from page 227)*

your untapped talents. Another way to renew your passion for dental hygiene is by learning new techniques and seeking new challenges. Staying abreast of the cutting-edge procedures in dental hygiene and dentistry could open up new avenues and keep you motivated in your chosen profession.

It is also my sincere wish that all present and past volunteers will mentor at least another dental hygienist and help him or her take the helm of our professional organizations and profession. We must all do our part to create a spirit of mentorship within our organization to develop a new generation of volunteers and leaders to help our organization and profession prosper. We have travelled a good distance on the road to a better future for all dental hygienists but more road still stretches ahead of us. We need your vision and your participation to navigate the challenges and obstacles that are sure to arise. "Knowledge is power" and sharing our knowledge with others will enable them to pick up where we left off and continue the progression toward a better future for all dental hygienists.

A favourite quote of mine is "I have a dream" by Dr. Martin Luther King. The profession of dental hygiene is vastly different from what it was 10 or 20 years ago, and I can assure you that it will undergo more changes in the

future. Keep in mind that we can flourish through these changes by being pro-active and fashioning the future of our profession. I believe the next few years will offer more opportunities for entrepreneurship and will greatly increase the types of professional settings in which dental hygienists can provide oral health care services to the public. We have to be self-reliant and push ourselves to guide these changes.

The time is definitely here for dental hygienists to work in multidisciplinary teams with other health professionals to help prevent the onset of chronic diseases. Prevention is key. Get in touch with your local and provincial health professions, health associations, and community groups and work together to develop a strategy to improve the general health of all Canadians. Multidisciplinary intervention is needed to improve the total wellness of the population. I also urge you to consult with other dental hygienists. The combination of different ideas and different skills produces a much stronger team.

Once again, thank you for giving me this opportunity to take part in such a wonderful organization. Although very challenging at times, it has been very rewarding. My pride in this profession has only increased over the year and I look forward to a bright future for the profession.

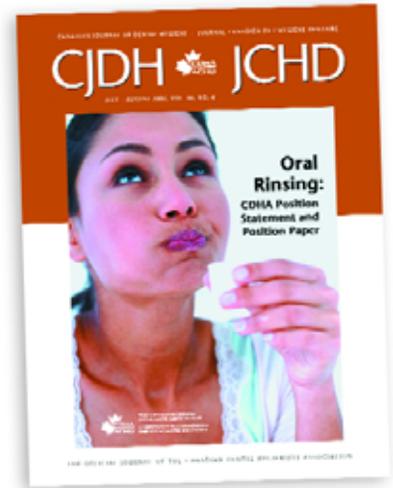
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## CJDH Reviewers – An Essential Part of the Journal

Articles in this journal are peer-reviewed. This is possible only because of the generous assistance of dental hygienists who volunteer to review the papers. They give freely of their time and expertise and their help is both valuable and greatly appreciated. We would like to acknowledge the contribution of the following dental hygienists over the past few years:

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The journal always welcomes new reviewers. You can choose to review as many or as few papers as you wish and we provide guidelines and check lists to help you assess the paper. If you would like more information, please contact Patricia Buchanan, the Managing Editor, at [peb@cdha.ca](mailto:peb@cdha.ca).

### Liste de souhaits (suite de la page 227)

Si votre passion s'est endormie et que vous avez l'impression d'avoir un travail routinier de 8 à 5 plutôt que d'avoir une carrière, c'est qu'il est temps de vous régénérer. Rallumez votre passion pour votre carrière. Une façon de le faire, c'est d'être proactif et proactive au sein de votre association professionnelle. L'ACHD et les associations provinciales peuvent vous offrir plusieurs occasions de montrer vos talents et de partager votre vision pour notre profession. Siégez sur un conseil ou un comité, devenez un administrateur ou une administratrice ou encore un membre de la direction, et découvrez vos talents inexploités. Une autre façon de réveiller votre passion pour l'hygiène dentaire, c'est d'apprendre de nouvelles techniques et de chercher de nouveaux défis. Rester au courant des procédures de pointe en hygiène dentaire et en dentisterie pourrait vous ouvrir de nouveaux horizons et alimenter votre motivation dans la profession que vous avez choisie.

C'est également mon vœu sincère que tous et toutes les bénévoles, anciens et actuels, mentorent au moins un ou une autre hygiéniste dentaire et l'aide à prendre la relève au sein de nos organismes professionnels et de notre profession. Nous devons tous et toutes faire notre part pour créer un esprit de mentorat au sein de notre organisme afin de créer une nouvelle génération de bénévoles et de leaders pour aider notre organisme et notre profession à prospérer. Nous avons franchi de bonnes étapes sur la route qui mène vers un avenir meilleur pour tous et toutes les hygiénistes dentaire, mais la route qui se déroule devant nous est encore longue. Nous avons besoin de votre vision pour explorer les défis et franchir les obstacles qui ne manqueront pas de surgir. « La connaissance, c'est la force » et partager nos connaissances avec les autres leur permettra de reprendre où nous avons laissé et de poursuivre la progression vers un avenir meilleur pour tous et toutes les hygiénistes dentaires.

Une de mes citations favorites est « J'ai un rêve » du Dr Martin Luther King. La profession de l'hygiène dentaire est énormément différente de ce qu'elle était il y a 10 ou 20 ans et je peux vous assurer qu'elle subira beaucoup de changements dans le futur. Gardez à l'esprit que nous pouvons progresser grâce à ces changements en étant proactifs et proactives et en façonnant l'avenir de notre profession. Je crois que les prochaines années offriront encore plus de possibilités d'entrepreneuriat et que les types de milieux professionnels où les hygiénistes dentaires pourront offrir des services de soins de santé buccodentaire au public augmenteront considérablement. Nous devons être autonomes et nous efforcer de régir ces changements.

Le temps est définitivement arrivé pour les hygiénistes dentaires de travailler au sein d'équipes multidisciplinaires avec d'autres professionnels de la santé pour aider à prévenir l'apparition d'affections chroniques. La prévention, c'est la solution. Demeurez en rapport avec vos collègues locaux appartenant à différentes professions de la santé, vos associations de santé locales et vos groupes communautaires locaux ; travaillez ensemble pour développer une stratégie qui permettra d'améliorer l'état général de santé de tous les canadiens et les canadiennes. L'intervention multidisciplinaire est nécessaire pour améliorer le mieux-être de la population. Je vous demande également de consulter d'autres hygiénistes dentaires. La combinaison d'idées différentes et de compétences différentes engendre une équipe beaucoup plus forte.

Encore une fois, je vous remercie de m'avoir donné l'opportunité de participer à cette magnifique organisation. Bien que cela ait été parfois très exigeant, cela a été très enrichissant. La fierté que je tire de cette profession n'a fait qu'augmenter au cours de l'année et j'anticipe un brillant avenir pour la profession.

On peut communiquer avec Diane Thériault à l'adresse [president@cdha.ca](mailto:president@cdha.ca).



## On Our Bookshelf

by CDHA staff

THE PAST FEW COLUMNS HAVE FOCUSED ON THE USE OF Internet research to assist you in making evidence-based clinical decisions. Electronic media are valuable, yes, but there are times when hard-copy texts or illustrated handbooks are more useful for day-to-day practice. So we would like to promote some new library acquisitions that are available in a traditional format. CDHA members can borrow these items for three weeks with one three-week renewal allowed. All you have to do is provide us with a credit card number for security and pay the postage when you return the item. Once we receive the item, we delete your credit card information.

This is a convenient way to pre-view a new reference text you are planning to buy. In most jurisdictions, reviewing these books can also be an important contribution to your quality assurance portfolio.

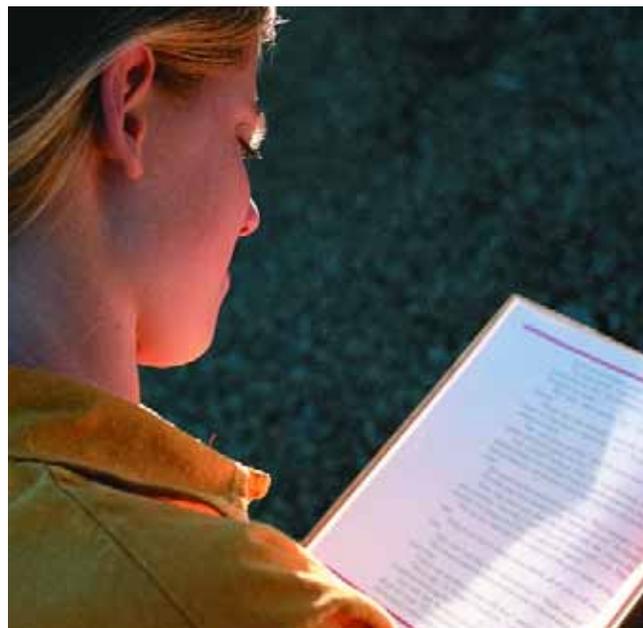
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### New acquisitions of interest

#### Texts and handbooks

- Baer ML. *Dentistry explained: a patient guide to dental implants*. Hudson (OH): Lexi-Comp; 2005.
- Dumsha TC. *Dentistry explained: patient guide to root canal therapy*. Hudson (OH): Lexi-Comp; 2001.
- Nanne SM. *Dentistry explained: a patient guide to periodontal disease*. Hudson (OH): Lexi-Comp; 2004.
- Nathe CN. *Dental public health: contemporary practice for the dental hygienist*. 2nd ed. Upper Saddle River (NJ): Pearson Prentice Hall; 2005.
- Newland JR. *Oral hard tissue diseases: a reference manual for radiographic diagnosis*. Hudson (OH): Lexi-Comp; 2003.
- Nield-Gehrig JS. *Fundamentals of periodontal instrumentation and advanced root instrumentation*. 5th ed. Philadelphia: Lippincott Williams & Wilkins; 2004.
- Summitt JB, Robbins JW, Hilton TJ, et al. *Fundamentals of operative dentistry: a contemporary approach*. 3rd ed. Chicago: Quintessence; 2006.
- Watt RG, Harnett R, Daly B, et al. *Oral Health promotion evaluation toolkit*. London: Stephen Hancocks; 2004.



*We would like to promote some new library acquisitions that are available in a traditional format.*

### Reports and policy statements

- Baranek PM. *A review of scopes of practice of health professions in Canada: a balancing act*. Toronto: Health Council of Canada; 2005.
- Canadian Dental Hygienists Association. *Endless opportunities...create yours*. Presentation Notes from the CDHA's 17th Annual Professional Conference; 2006 Jun 16-18; Edmonton, Alberta. Ottawa: CDHA; 2006.
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In a future column, we will review the professional journals held in our library collection. And we always welcome your recommendations for texts or documents to be added to our collection. 



# Latex Allergy

by CDHA Staff

WITH THE INCREASED FOCUS ON infection control in health care, latex gloves have been used extensively. However, latex allergies—to the gloves and to other health and dental equipment—have also increased. Below are some excellent resources to give you a greater understanding of this common allergy as well as suggestions to avoid or minimize exposure in your workplace.

## Latex Allergy (Mayo Clinic)

[www.mayoclinic.com/health/latex-allergy/DS00621](http://www.mayoclinic.com/health/latex-allergy/DS00621)

This Mayo Clinic site examines latex allergy with the clinic's usual thoroughness and expertise. The site breaks down the information into the following categories: *Introduction, Signs and symptoms, Causes, Risk factors, When to seek medical advice, Screening and diagnosis, Treatment, and Prevention*. An informative slide show and video show common skin rashes with links from the final slide in the series to two more slide shows, *Types of dermatitis, Common baby rashes*, and to the Skin Center.



## Contact Dermatitis and Latex Allergy (National Center for Chronic Disease Prevention and Health Promotion)

[www.cdc.gov/OralHealth/infectioncontrol/faq/latex.htm](http://www.cdc.gov/OralHealth/infectioncontrol/faq/latex.htm)

This site from one of the Centers for Disease Control is a comprehensive look at latex allergy. The site has clear descriptions and definitions and a very useful table on the categories of glove-associated skin reactions. There are also suggestions on how to avoid latex in the dental office environment, both for the allergic dental hygienist and an allergic client. At the end of site, there are links to valuable on-line documents published by the Centers for Disease Control: *Preventing Allergic Reactions to Natural Rubber Latex in the Workplace* ([www.cdc.gov/niosh/latexalt.html](http://www.cdc.gov/niosh/latexalt.html)) and *Latex Allergy: A Prevention Guide* ([www.cdc.gov/niosh/98-113.html](http://www.cdc.gov/niosh/98-113.html)).

## American Latex Allergy Association

[www.latexallergyresources.org](http://www.latexallergyresources.org)

This association was formed to “provide educational information about latex allergy and support latex-allergic individuals.” One of the main tabs, *Latex Allergy Topics*, has links to statistics, symptoms, lists of common latex products, cross reactive allergens, and lists of alternatives. Its newsletter, *ALERT*, has a short list of articles; the latest, “School Safety Guidelines for Latex-Allergic Students,” was posted in mid-August 2006.

## Latex Allergy Links

[www.latexallergylinks.org/dental.html](http://www.latexallergylinks.org/dental.html)

This is a private individual's site but some of the links appear very interesting and come from reputable journals. Although one should always be vigilant about the reliability of any web site, this is definitely the rule with individually authored sites. The creator of the web site has divided information on latex allergies into many categories including the following: *Cross-Reactivity, Dentistry, Gloves, Hospitals, Journals, and Manufacturers*. The *Dentistry* link brings up a long list of articles, such as “Hand protection in the dental office” from the Paris-based French dental association, “Adverse reactions to latex products” from the *Journal of Contemporary Dental Practice*, and “Latex-free dental cartridges” from *Dimensions of Dental Hygiene*.

## “Adverse Reactions to Latex Products:

*Preventive and Therapeutic Strategies*” (in *Journal of Contemporary Dental Practice*, February 2006, Vol. 7, No. 1)

[www.thejcdp.com/issue025/a\\_pdfs/huber.pdf](http://www.thejcdp.com/issue025/a_pdfs/huber.pdf)

This comprehensive evidence-based 15-page article is free on the Internet. It covers the etiology and epidemiology of latex allergies, clinical manifestations of the allergy (with photos), diagnosis, diagnostic tests, preventive strategies, treatment strategies, plus an extensive list of references.

## Latex in Healthcare: A Guide to Latex Sensitivity and the Latex Database (Occupational Health and Safety Agency for Healthcare in BC [OHSAH])

[www.ohsah.bc.ca/EN/309/](http://www.ohsah.bc.ca/EN/309/)

This publication (and you can access only a sample free over the Internet) “provides an overview of latex and latex sensitivities, with a particular focus on the use of latex in healthcare. It also provides instructions on accessing and using the OHSAH Latex Database, a new tool for identifying the latex content of products and latex-free alternatives.” Health care facilities in British Columbia can order them free of charge. Other health care facilities can order it for \$20 plus shipping and handling. The Latex Database has 12,000 items so the readers “can find, at a glance, which products or supply items contain latex and which ones are latex free. Research is also underway to identify latex free alternatives.”

## Preventing Allergic Reactions to Natural Rubber Latex in the Workplace (National Institute for Occupational Safety and Health [NIOSH], 1997)

[www.cdc.gov/niosh/latexalt.html](http://www.cdc.gov/niosh/latexalt.html)

This ALERT contains general information about latex allergy—what it is, what equipment contains it, types of reactions, levels and routes of exposure, who is at risk, diagnosis and treatment, prevalence, brief case reports, and recommendations for both employers and workers to minimize the exposure. 

## CLASSIFIED ADVERTISING

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**DUNCAN DENTAL HYGIENIST WANTED!** Wonderful patients, staff and office would like a second dental hygienist to work with our team. Hours and days are flexible. Full-time is available. Alderlea Dental Health Centre is located in Duncan on beautiful Vancouver Island, midway between Victoria and Nanaimo. We think this is a marvelous area to work and live. Please contact us at [raedae@shaw.ca](mailto:raedae@shaw.ca) or fax your résumé to 250-748-9868. Office telephone: 250-748-1842. Telephone evenings: 250-748-2086 or 250-715-1837.

**VERNON** Have you always wanted to have the time you need to spend with your patients to attain a healthy result? We have a permanent part-time position available in our modern, well-equipped office, located in the sunny Okanagan Valley. Must be a member in good standing with the College of Dental Hygienists of British Columbia. References required. Dr. Rex Hawthorne Inc., 101-4005 27th street, Vernon, BC V1T 4X9. Telephone: 250-545-5604; fax: 250-558-9917; e-mail: [dr.rex@shaw.ca](mailto:dr.rex@shaw.ca).

### ALBERTA

**MEDICINE HAT** Dental practice seeking a personable, compassionate, progressive dental hygienist. We are family-oriented practice with a team offering services in all areas of dentistry including implants, orthodontics, periodontics, prosthodontics, and esthetic dentistry. If interested in a full-time position, please forward your résumé including career goals, personal interests, and references to Mrs. Val Leitch, River Centre Dental Clinic, 378-1 Street SE, Medicine Hat, AB T1A 0A6. Telephone: 403-526-5991; fax: 403-529-9043.

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### ONTARIO

**TORONTO** River Ridge Dental Placement Agency, servicing Toronto and surrounding areas, is looking for registered dental hygienists to fill part-time, full-time, and temporary positions. No fee to register. New grads welcome. Please contact Alison at 416-876-2286 or by e-mail at [dental@aci.on.ca](mailto:dental@aci.on.ca).

### NOVA SCOTIA

**TRURO** Victoria Court Dental is seeking high-energy, self-motivated, and enthusiastic dental hygienists to join our team. To further explore this opportunity, mail, fax, or e-mail résumés to: 510 Prince St., Truro, NS B2N 1G1, Attn: Deborah Tobin. Fax: 902-893-8913; e-mail: [vcdenthygiene@eastlink.ca](mailto:vcdenthygiene@eastlink.ca); website: [www.victoriacourt dental.com](http://www.victoriacourt dental.com).

### CONTINUING EDUCATION

**UNIVERSITY OF MANITOBA, SCHOOL OF DENTAL HYGIENE** A Local Anesthesia Continuing Education Program for Licensed Dental Hygienists will be held November 3-5, 2006, at the Faculty of Dentistry. Self-study portion six weeks in advance. Registration deadline is October 1, 2006. If you are interested in participating, you can obtain further information by contacting Lisa Chrusch, Administrative Assistant for the School of Dental Hygiene, at 204-789-3683 or at [lisa\\_chrusch@umanitoba.ca](mailto:lisa_chrusch@umanitoba.ca).

### INTERNATIONAL

**NEW ZEALAND (AUCKLAND)** Our team of professionals in beautiful Auckland, New Zealand, is in search of a career-minded registered dental hygienist who knows the value of communication skills and enthusiasm while delivering state-of-the-art care to patients. You will be working alongside another Canadian dental hygienist who has been with us for the past 5 years. Our practice is fully computerized and we are offering this challenging position with an excellent benefit package, where hours and days are negotiable. Please contact Susi Lay: address: Queen Street Dental, Level 1, Dingwall Building, 87 Queen St., Auckland, New Zealand; tel: 0064 9 373 2456; fax: 0064 9 373 5194; e-mail: [queenstdental@clear.net.nz](mailto:queenstdental@clear.net.nz).

### CDHA CLASSIFIED ADS

Classified job ads appear primarily on the CDHA's website ([www.cdha.ca](http://www.cdha.ca)) in the Career Centre (*Members' Only* section). On-line advertisers may also have their ad (maximum of 70 words) listed in the journal *CJDH* for an additional \$50. If an advertiser wishes to advertise only in the print journal, the cost will be the same as an on-line ad. These classified ads reach over 11,000 CDHA members across Canada, ensuring that your message gets to the target audience promptly. Contact CDHA at [info@cdha.ca](mailto:info@cdha.ca) or 613-224-5515 for more information.



