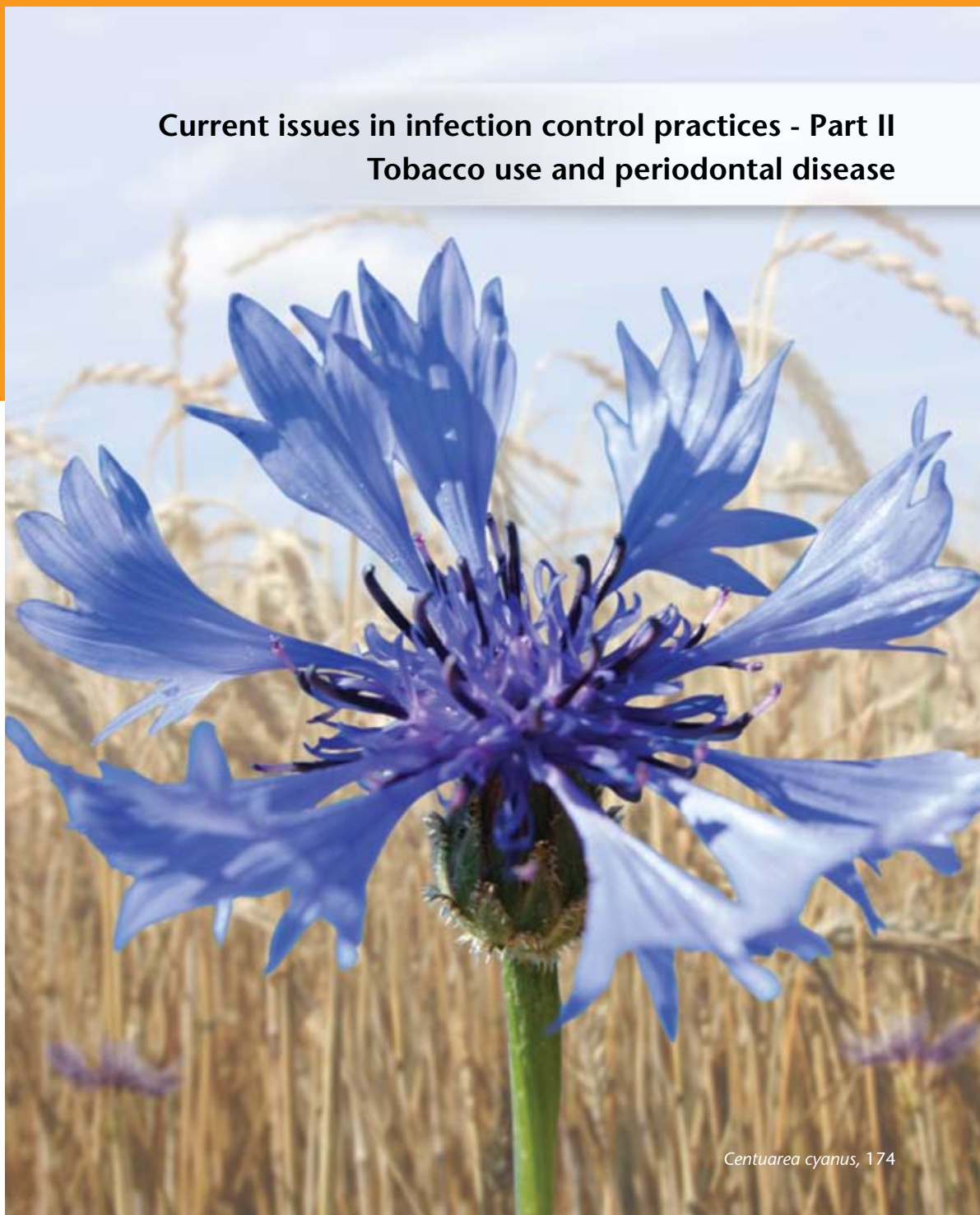


CJDH JCHD

MAY-JUNE 2008, VOL. 42, NO. 3

Current issues in infection control practices - Part II Tobacco use and periodontal disease



Centuarea cyanus, 174

Navigating the imagination – looking back, looking forward

I recently attended our Faculty of Dentistry's celebratory launch of its golden jubilee at the University of Manitoba. "A Blast from the Past, a Launch into the Future" was a great beginning to reflect on the past and create an ambitious plan for the future. This event also included contributing items for a time capsule for the centennial celebration. What would a time capsule from 1963 have held regarding dental hygiene, the year University of Toronto dental hygienists formed what has become the Canadian Dental Hygienists Association? What in 50 years would be an interesting representation of 2008 for dental hygiene? My colleague and I chose to include prophylaxis paste, a hand scaler and latex gloves, considering these mainstay items may, with time, become obsolete.

What does the future hold for the profession of dental hygiene? Leading change in our profession does not happen by chance; it is an ongoing process of looking back, looking forward, of navigating one's imagination. The CDHA Board of Directors continues to drive change with its "Ends" policy, a future-directed action plan for the association. At our meeting in February, we turned the clock ahead fifteen years, forecasting CDHA's accomplishments for 2023. This valuable exercise demonstrated that CDHA's "Ends" could not only withstand the test of time, but could also translate into positive and exciting change in our future as a profession. We liked what the future holds.

Nelson Mandela once said, "Education is the most powerful weapon which you can use to change the world". As a dental hygienist, how prepared are you to welcoming changes in a profession that is evolving? From a time when rubbing alcohol, soap and water were considered "best practices" to this journal edition's "Current Issues in Infection Control Practices", it is clear that incorporating knowledge and evidence from current research will help prepare us for change. Whether you want to make changes in your daily practice, to your current position, or want to change the world of dental hygiene, embracing new educational and professional opportunities are excellent ways to get there. I encourage you to attend CDHA's first leadership event, *Navigating the Imagination*, in Banff later this month to hone your leadership skills and learn more about visionary national projects now underway. The field of dental hygiene is full of new opportunities - in academia, research, corporate development, community health, and clinical care. "Change is the law of life. And those who look only to the past or present are certain to miss the future," remarked John Fitzgerald Kennedy.

Let's look forward to embrace change. 🌱



The CDHA welcomes your feedback: president@cdha.ca



Carol-Ann Yakiwchuk,
RDH, DIPDH

Les voies de l'imagination – celles du passé, celles de l'avenir

J'ai assisté récemment au lancement des fêtes du jubilé d'or de la faculté de dentisterie de l'Université du Manitoba. « Souffle du passé, Élan vers l'avenir » a grandement favorisé l'amorce d'une réflexion sur le passé et la création d'un ambitieux projet d'avenir. L'événement comprenait des éléments de capsule témoin pour la célébration du centenaire. Qu'est-ce qu'aurait compris une capsule témoin de 1963, année où les hygiénistes dentaires de l'Université de Toronto créèrent l'Association canadienne des hygiénistes dentaires ? Dans 50 ans, qu'est-ce qui aura marqué le passé des hygiénistes dentaires de 2008 ? Ma collègue et moi avons choisi d'inclure l'éventuelle obsolescence de certains articles comme le dentifrice prophylactique, le détartreur manuel et les gants de latex.

Que réserve l'avenir à la profession d'hygiéniste dentaire ? Le principal changement à survenir dans notre profession n'est pas le fruit du hasard; il résulte d'un processus constant de regards sur le passé puis vers l'avenir suivant les voies de l'imagination. Le conseil d'administration de l'ACHD continue d'orienter le changement dans sa politique d'« Engagement », plan d'action orienté vers l'avenir de l'association. À notre réunion du mois de février, nous nous sommes concentrées sur les 15 prochaines années, prévoyant ce que nous aurons accomplis en l'an 2023. Cet exercice précieux nous a fait voir qu'en plus de passer l'épreuve du temps, les engagements de l'ACHD pourraient aussi se traduire par des changements réels, positifs et stimulants pour l'avenir de la profession. Nous avons aimé ce que nous réserve l'avenir.

Nelson Mandela a dit un jour : « L'éducation est l'arme la plus puissante qu'on peut utiliser pour changer le monde. » En tant qu'hygiénistes dentaires, sommes-nous prêtes à accueillir les changements dans une profession en évolution ? Depuis le temps où l'on considérait l'alcool à friction, le savon et l'eau comme étant ce qu'il y avait de « mieux pour la pratique » à la présente édition du journal qui traite des problèmes courants dans la prévention de l'infection, il est clair que l'intégration des résultats de la recherche aux connaissances acquises devraient nous préparer au changement. Si vous souhaitez modifier votre pratique quotidienne ou votre poste actuel, ou encore changer le monde de l'hygiène dentaire, les nouvelles possibilités de perfectionnement professionnel vous donneront d'excellents moyens d'y parvenir. Je vous encourage donc à participer à la première activité de formation au leadership que l'ACHD tiendra ce mois-ci à Banff sous le thème « Les voies de l'imagination ». Vous y affinerez vos talents et en apprendrez davantage sur les projets visionnaires en cours à l'échelle nationale. Le champ de l'hygiène dentaire offre plein de nouvelles possibilités sur divers plans : enseignement, recherche, création d'entreprise, santé communautaire et soins cliniques. « Le changement est la loi de la vie. Et ceux qui ne regardent que le passé ou le présent manqueront certainement l'avenir », John Fitzgerald Kennedy.

Regardons en avant pour accueillir le changement. 🌱

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Getting unstuck from your fears

He who fears he will suffer, already suffers from his fear.

Michel de Montaigne (1533–1592), French essayist. "Of Experience," *The Essays (Les Essais)*, Bk. III, ch. 13. Abel Langelier, Paris, 1595.

Over the past months I have had the opportunity to speak with many dental hygienists who are contemplating or working through establishing their own businesses. I have also had the opportunity to talk to many service providers who see the entrepreneurial dental hygienist as a client. One service provider transported me back in time to an era where the "little woman" could be cajoled or paternalistically managed. What this provider thought was that the fear of opening a business would be so great that this female dominated profession would be submissively dependent on such services. This interaction with the provider caused me to reflect on the degree of fear surrounding the issue of self initiation.

We have heard stories about and witnessed behaviour unbecoming to professionals with respect to the treatment of dental hygienists by some employers and former employers. This fear based pessimism expressed by some dentists is leading them down a path of self fulfilling prophecies as described by Seligman.¹ Seligman recounts the story of how a young woman changed the whole course of her life, in a negative way, because she looked so pessimistically at the situation that she created the negative picture when she could have chosen a different path. Seligman also notes that the self fulfilling prophecy can also be a positive one where a person leaves his or her fears behind and moves forward with optimism to achieve what they had desired.¹

Within the professional cohort of dental hygienists I have spoken to, I hear a spectrum of emotions from pessimism to optimism, and the perception of fears as debilitating or a nuisance. Shambaugh² provides some advice for people who have felt suppressed by a glass ceiling as the title of her book notes, *It's Not a Glass Ceiling, It's a Sticky Floor*. And yes, sticky floors are possible for both genders. Rather than blame others for our inability to grow we need to see how we are preventing ourselves from growing. We often adopt self defeating behaviours through the making of assumptions based on our beliefs and values.

Shambaugh's advice² is for us to be authentic with ourselves, which means being honest with ourselves and knowing what is in our heart. Her second recommendation is to balance our work and life. The CDHA has created an online course to assist you with this recommendation. Accepting a degree of risk and making the break with what is holding you back are critical to movement forward. This often is a difficult step as we have to move out of our com-

...continued on page 136

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Susan Ziebarth,
BSC, MHA, CHE

Se libérer de ses craintes

Qui craint de souffrir souffre déjà de ce qu'il craint
Michel de Montaigne (1533-1592, essayiste français.
« De l'expérience », *Les Essais*, Livre III, ch. 13, Abel Langelier, Paris, 1595.

Au cours des derniers mois, j'ai eu la chance de m'entretenir avec plusieurs hygiénistes dentaires qui songent à établir leur propre entreprise ou sont en voie de le faire. J'ai eu aussi l'occasion de parler avec plusieurs fournisseurs de services qui considéraient l'hygiéniste dentaire entreprenante comme cliente. Un de ces derniers m'a même ramenée à une époque où la « petite dame » pouvait se faire cajoler ou manœuvrer avec paternalisme. Ce fournisseur pensait que cette profession à prédominance féminine craignait tellement de se lancer en affaires qu'elle deviendrait docilement dépendante de tels services. L'échange avec le fournisseur m'a amenée à réfléchir sur le degré de la crainte qui entoure l'idée de pratique autonome.

Nous avons entendu des histoires et été témoins de comportements indignes de la part de professionnels quant aux traitements infligés à des hygiénistes dentaires par certains employeurs ou d'anciens employeurs. Ce pessimisme fondé sur la crainte exprimée par certains dentistes les a fait descendre sur la voie des prophéties autoréalisatrices que décrit Seligman.¹ Celui-ci raconte comment une jeune femme a changé négativement le cours de sa vie parce qu'elle avait envisagé la situation de façon si pessimiste qu'elle s'en était fait une image négative, alors qu'elle aurait pu choisir une autre voie. Seligman note également que la prophétie autoréalisatrice peut aussi être positive lorsqu'une personne oublie ses craintes et va de l'avant avec optimisme pour réaliser son souhait.¹

Dans mes entretiens avec la cohorte d'hygiénistes dentaires professionnelles que j'ai rencontrées, j'en constaté un éventail d'émotions allant du pessimisme à l'optimisme, mais les craintes étaient perçues comme étant débilitantes ou nuisibles. Shambaugh² donne certains conseils aux personnes qui ont l'impression de plafonner dans leur profession, comme elle le souligne dans son livre au titre imagé : *It's Not a Glass Ceiling, It's a Sticky Floor*. Par ailleurs, le phénomène du « colle au plancher », ou maintien au niveau inférieur, peut affecter les personnes des deux genres. Plutôt que de blâmer les autres pour une incapacité de progresser, il vaut mieux savoir comment on s'empêche soi-même d'avancer. Les comportements autodestructeurs résultent souvent de présomptions fondées sur les croyances et les valeurs personnelles.

Shambaugh conseille de se regarder avec authenticité², c'est-à-dire être honnête avec soi-même et savoir ce qu'on a dans le cœur. Sa deuxième recommandation porte sur l'équilibre entre le travail et la vie. L'ACHD a mis sur Internet un cours qui vous aidera en ce sens. Aller de l'avant exige cependant d'accepter un certain risque et rompre avec ce qui retient. Mais ce n'est pas facile à faire, car il faut quitter sa zone de confort. Shambaugh recommande aussi d'établir un réseau de relations et obtenir de l'aide, ainsi que développer un bon sens politique et l'art de

...suite page 136

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Getting unstuck from your fears

fort zone. Shambaugh² also recommends networking with others and getting their help as well as developing your political savvy and the art of conversation. The CDHA would also like to help you with these aspects as well, by providing you with the opportunities to meet and network with your peers at our many events this year. We also have many resources for you online to draw upon and people to connect with, including the newest member of our staff team Ann Wright, RDH, DipDH, MBA, who will be focusing her work on helping dental hygienists develop successful businesses.

Do not suffer from your fears or be the victim of someone else's fears. Use your CDHA membership to help with your career and business success.

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2. Shambaugh R. *It's Not a Glass Ceiling, It's a Sticky Floor: Free Yourself From the Hidden Behaviors Sabotaging Your Career Success*. McGraw-Hill. 2007 Sept.

Se libérer de ses craintes

la conversation. L'ACHD veut vous aider aussi sur ces aspects et multiplier les occasions de vous rencontrer et d'établir des réseaux avec vos collègues, grâce aux nombreuses activités prévues cette année. Nous avons aussi de nombreuses ressources que vous pouvez consulter en ligne et des personnes avec qui communiquer, y compris notre nouvelle venue dans l'équipe, Ann Wright, RDH, DipDH, MBA, qui aidera particulièrement les hygiénistes dentaires à mettre sur pied avec succès leurs propres entreprises.

Ne souffrez pas de la crainte et ne soyez pas victimes des craintes des autres. Profitez de votre adhésion à l'ACHD pour vous aider dans votre carrière et réussir en affaires.

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2008 DENTAL HYGIENE PROGRAMS RECOGNITION AWARD

PRIX DE RECONNAISSANCE 2008 POUR LES PROGRAMMES EN HYGIÈNE DENTAIRE

Dental Hygiene Programs Recognition Award

The Canadian Dental Hygienists Association is pleased to announce the 2008 Dental Hygiene Programs Recognition Award. This program is designed to recognize dental hygiene programs, whose full-time and part-time faculty members are dental hygienists, achieve 100% membership in the CDHA. A certificate of recognition will be awarded to honour these programs for demonstrating such outstanding commitment to their national association and acting as professional role models for their students. The deadline for submissions is **28 November 2008**. Entry details are available on the CDHA members' website in the "Networking and Recognition" section.

Prix de reconnaissance pour les programmes en hygiène dentaire

L'Association canadienne des hygiénistes dentaires est heureuse d'annoncer la création du Prix de reconnaissance pour les programmes en hygiène dentaire. Ce programme est conçu pour les programmes en hygiène dentaire dont 100 % des hygiénistes dentaires, qui font partie du corps professoral en hygiène dentaire à temps plein et à temps partiel, sont membres de l'ACHD. Un certificat de reconnaissance sera remis pour honorer les programmes dont les membres font preuve d'un engagement exceptionnel envers leur association nationale et jouent un rôle de modèles professionnels pour leurs étudiants et étudiantes. La date butoir pour les inscriptions est le **28 novembre 2008**. Les détails concernant les procédures d'inscription sont affichés sur le site Web réservé aux membres de l'ACHA, à la section "Networking and Recognition".



THE CANADIAN DENTAL
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DES HYGIÉNISTES DENTAIRE

Current issues in infection control practices in dental hygiene - Part II

Judy Lux, MSW

ABSTRACT

This article is a continuation of Infection control practice guidelines—Part 1 (vol.42.2). Part II discusses four current issues including compliance with infection control practices, HIV, HBV and HCV, dental unit water lines, and aerosols. Part II provides recommendations for dental hygienists, educational institutions, several dental hygiene organizations, the National Dental Hygiene Certification Board, the Commission on Dental Accreditation Canada, and researchers.

RÉSUMÉ

Cet article fait suite à la première partie du Guide de prévention des infections dans la pratique de l'hygiène dentaire (vol.42.2). Le deuxième volet qui traite des problèmes courants dans la prévention des infections, se penche sur quatre problèmes actuels, notamment: l'observance des pratiques de prévention, le VIH, le VHB et le VHC, les conduites d'eau des unités dentaires et les aérosols. Le deuxième volet formule des recommandations destinées aux hygiénistes dentaires, aux établissements de formation, à plusieurs organismes d'hygiène dentaire, au Bureau national de la certification en hygiène dentaire, à la Commission d'agrément dentaire du Canada et aux chercheurs.

COMPLIANCE WITH INFECTION CONTROL PRACTICES

Infection control is an aspect of the accreditation requirements for dental hygiene programs in Canada,¹⁵ and the National Dental Hygiene Certification Board¹⁶ has competencies on this topic. Although these documents were not reviewed in detail for the degree of inclusion of infection control issues, their inclusion suggests that dental hygienists are educated to some degree in infection control issues. Although this provides some reassurance that an entry level dental hygienist has some knowledge about infection control, several surveys of oral health professionals indicate that there may be gaps in knowledge and in implementation of infection control. A study in 1999 of 6,444 dentists in Canada indicated several areas of weakness in complying with guidelines for infection control.¹⁷ The study found dentists used gloves, masks, and protective eyewear. However, they were only partially compliant with a number of other guidelines such as hand washing before and after gloving. In addition, compliance with testing for an immune response after HBV immunization ranged from 49 per cent of dentists in Manitoba to 78 per cent in the Northwest Territories. Furthermore, the range of dentists who were flushing dental unit waterlines (DUWL) after each client ranged from 20%-68%. To address these practice gaps, the authors of the study called for mandatory continuing education on infection control.

In 2001, a systematic review of seventy-one poor quality studies¹⁸ showed that oral health care professionals' adherence to guidelines for infection control worldwide had improved over time in such areas of infection control as glove wearing and sterilization of handpieces; however other aspects as vaccination follow up, post-exposure follow up and impression disinfection are measures that remained problematic. The authors made several suggestions for improving knowledge and consistent use of infection control practices, including formal training, certification and an independent body, used by many countries for practice inspections. A study in 2005 in the USA of attitudes and practices of 856 dental hygienists to infection control indicates that there has been an improvement in compliance with guidelines for infection control compared

to an earlier study.¹⁹ However the authors suggest that dental hygienists still have misconceptions regarding infectious diseases and disease transmission.

HUMAN IMMUNODEFICIENCY VIRUS, HEPATITIS B VIRUS AND HEPATITIS C VIRUS

There is a small risk of transmission of Human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) from client to dental hygienists, from dental hygienists to client, or from client to client.¹ The risk of transmission of HBV, HCV and HIV, as a result of a needle-stick or percutaneous injury are approximately 30 per cent for HBV, 1.8 per cent for HCV, and 0.3 per cent HIV.^{20,21} The risk for HIV transmission following a mucous membrane exposure is approximately 0.09 per cent. Although HIV transmission following non intact skin exposure, and fluids and tissue exposure other than blood, have not been quantified, the former is estimated to be less than the risk for mucous membrane exposure; and the later is estimated to be less than for blood exposure.²² Although oral health professionals are at a low risk for occupationally acquired HIV, serological tests indicate that oral health professionals have a ten times greater risk of becoming chronic Hepatitis B carriers than the average citizen.¹⁹

There are various national and international reports of how this risk affects dental hygienists' lives.

- Health Canada has reported three known cases of health care workers who are occupationally infected with HIV.²³
- As of June 1999, there were 310 reports of occupationally acquired HIV among health care workers worldwide. Of these, 102 cases were confirmed and of the remainder of the possible cases, 9 were dental workers.²⁴

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- As of 2001 in the USA, there were no dental health care professionals among fifty-seven health care professionals with documented HIV seroconversion following a specific exposure to a known HIV infected source.²¹
- Research from 2001 in the UK estimates that there are twelve needlestick injuries per million hours worked in a dental setting.²⁵
- Researchers from a study in Washington State collected data on workers' compensation claims and found that "out of hospital" percutaneous injuries are a substantial risk to their oral health care workers. During a 7-year period (1995-2001) there were 924 percutaneous injuries reported. Out of these injuries, 894 (97 per cent) were among dental health care workers in non hospital settings, including 66 dentists (7 per cent), 61 dental hygienists (18 per cent) and 667 dental assistants (75 per cent). Causes of these injuries in descending order included syringes, suture needles, and dental instruments. Of the 894 dental health care workers with percutaneous injuries, there was evidence of HBV in six persons, HCV in thirty persons, HIV in three persons and both HBV and HCV in two persons.²⁶

Some researchers identify underreporting of occupational exposure to bloodborne pathogens as a significant problem in the health care workplace.²⁷ In 2006, McCarthy et al.²⁸ reported only three cases of occupationally acquired HIV among health professionals. However, there is a discrepancy between this number and the numbers of self reported exposure by health professionals and the number of confirmed acquired cases of HIV from Workers' Compensation Boards.²⁸

In one study, Canadian dentists report an average of three percutaneous injuries and 1.5 mucous-membrane exposures per year. "In a one-year period, 0.5% of dentists in Canada reported exposure to HIV and an additional 14% were uncertain if the source patient was HIV seropositive; similarly, 0.8% reported exposure to HBV (15% uncertain) and 1.9% reported exposure to the blood of a high-risk patient (17% uncertain)."²¹ A survey conducted in 2000 of 22,000 Canadian dentists, dental hygienists, surgeons and nurses indicates that approximately 1 in 200 dental hygienists reported being exposed to HIV-infected blood in the previous year.²⁸ In addition, the Association of Workers' Compensation Boards of Canada indicates that twenty nurses received compensation for time lost as a result of occupationally acquired HIV infection in 1999 alone.²⁹ These reports indicate that governmental reports may underestimate the number of health professionals who are exposed to HIV. Given the possibility of underreporting, combined with the reports of a lack of compliance with guidelines for infection control, there is a need to examine more seriously the issue of infection control in the dental hygiene practice setting.

Although there is the potential for transmission of HIV, HBV, and HCV from dental hygienist to client, to date there are no reports of this occurring. The following outlines the history of transmission from health practitioner to client and from client to client.

- In 1987, there was a case of HBV transmission from a

US³⁰ dentist to a client, and in 1990, there was an incident of possible transmission of HIV from a dentist in Florida to six clients.²⁴

- In 1997, there was also a case of client to client HIV transmission via contaminated dental instruments.²⁴
- In 1998, a client in France developed HIV following orthopedic surgery, and from 1992 to 1996, 75 clients developed hepatitis B following the placement of subdermal needle electrodes, by an EEG technician who was a carrier of hepatitis B.³¹
- In 2001, there was a report of the only known case of HBV transmission between dental clients in the United States, during routine oral surgery.³⁰

These incidents underscore the need for meticulous infection control measures. A dental hygienist's failure to comply with guidelines for infection control may result in a client developing a serious illness and subsequently taking legal action against the dental hygienist.

Public attitudes and opinions regarding oral health professionals infected with HIV and HBV have not changed over the last ten years. A survey of approximately 2,300 individuals conducted in 2005 indicates 89 per cent wanted to know if their oral health professional was infected with HIV, HBV or HCV.³² In 1991, the Centers for Disease Control and Prevention (CDC) in the USA published guidelines that addressed this public concern.³³ Although the CDC did not recommend mandatory testing of health care workers for HIV antibodies, Hepatitis B surface antigens (HBsAg), and Hepatitis B e Antigens (HBeAg), the CDC recommended that health care workers who perform exposure prone procedures should know their HIV antibody status. And, health care workers who are infected with HIV or HBV should not perform exposure prone procedures unless they have sought counsel from an expert review panel, and been advised under what circumstances, if any, they may continue to perform these procedures. Exposure prone procedures include certain oral procedures and the CDC recommends that dental organizations and institutions, where the procedures are performed, should define these procedures.

In keeping with the CDC's call for an expert review panel, the Interpretation Guidelines section of the Registrants Handbook⁵ of the College of Dental Hygienists of British Columbia (CDHBC) outlines the requirements when a dental hygienist is infected with bloodborne pathogens (Appendix B). To balance public protection with the rights of the dental hygienist to practise, the CDHBC requires that dental hygienists, who are infected with bloodborne pathogens, are obliged to contact the chairperson of the Bloodborne Pathogens Committee for guidance with their practice. The CDHBC maintains confidentiality as dental hygienists make contact with the Chairperson of the committee anonymously. This ensures the fair treatment of dental hygienists, and that they act professionally and safely.

In Canada, there is some indication of regional differences in access to dental hygiene services for individuals with HIV/AIDS. A Canadian study in 2006 found three per cent of dental hygienists in British Columbia, and twelve per cent of dental hygienists in Ontario would refuse to treat people with AIDS/HIV.³⁴ Refusal to treat was also

associated with a two-year diploma program, as opposed to a baccalaureate program. This study also shows that employer's attitudes about treating clients with AIDS/HIV affect dental hygienists' attitudes about treating clients, with 23 per cent of dental hygienists who indicated they would refuse to treat a client with AIDS/HIV also indicated that a dentist who is reluctant to treat HIV clients employed them. Dental hygienists' willingness to treat clients with HIV/AIDS may also be related to knowledge of the disease process, and how to treat clients with communicable disease.³⁵ This is confirmed by a study in the USA in 2003 indicating that only 58.4 per cent of dental hygiene students reported that their studies prepared them to treat patients with communicable disease.³⁶

In 2005, the CDC published new guidelines for the management of occupational exposure to HIV.²² This updates the information from the CDC *Guidelines for Infection Control in Dental Health-Care Settings-2003*. The new guidelines emphasize adherence to HIV post exposure prophylaxis (PEP), expert consultation in management of exposures, follow up of exposed workers to improve adherence to PEP, and monitoring for adverse events, including seroconversion. Emphasis is on the need for urgency in assessment and treatment, which should preferably be given within hours of the exposure. A survey shows that the annual median time to initiation of PEP was two hours, indicating that clinicians are being assessed and treated in a timely manner; however, only 289 of 1,350 health care professionals had a follow up serological test at 4-6 months, (the guidelines recommend testing up to six months) indicating that these individuals did not have up-to-date information regarding their HIV status. The six-month follow up is critical as the guideline indicates that the PEP is not always effective, since there are a total of six documented cases of HIV seroconversion, following a combination HIV PEP.

In September 2006, the CDC issued new recommendations for routine, voluntary HIV screening in health care settings for all persons 13-64 years of age, regardless of risk profile, and annual repeat for individuals with a known risk.³⁷ The rationale for this recommendation includes new research that knowing one's serostatus substantially reduces high risk behaviours. Data indicates screening is cost effective, and evidence that late testing and diagnosis is common. Although this is a recent CDC recommendation, researchers have already started to survey educators to determine attitudes towards screening. A survey of 100 dental educators at forty-six dental schools in the U.S. indicates that one third of respondents would perform HIV testing (using a rapid oral fluid based test), counselling, and referral.³⁸ Educators thought that additional training was needed in promoting health behaviours, particularly HIV prevention. Most educators felt that graduates lacked the skills and willingness to conduct HIV testing.

DENTAL UNIT WATER LINE (DUWL)

Dental unit waterlines are an integral part of dental hygiene equipment, supplying water for high-speed handpieces, ultrasonic scalers and air/water syringes. It is common for DUWLs to be contaminated by many species of microorganisms, including twenty eight species

of bacteria (*Staphylococcus aureus*, *Mycobacterium avium*, *Legionella pneumophila* and *Legionella spp*), five species of fungi, and four species of protozoa.³⁹ The contamination of the line occurs when oral fluids are passively retracted into the waterline, when the equipment is turned off. Water stagnation, high surface to volume area, and intermittent patterns of water use combined with poor waterline management culminate in high numbers of microorganisms.⁴⁰ Some of these microorganisms form biofilm in the lines, which are harder to remove than the free floating microorganisms, since they have a protective extracellular matrix. The biofilm protects the bacteria not only from being washed away by the water flow, but also from many types of antimicrobial water treatment.

Microorganisms in the DUWL could negatively affect the health of dental hygienists due to exposure to aerosols, which may be inhaled, and splattered on the skin. Microorganisms could also result in nosocomial infections in clients, due to contaminated water from the DUWL being flushed into their oral cavity during treatment, or inhalation of the aerosols. There are reports associating waterborne infections with dental water systems with scientific evidence of the potential for transmission of infections and disease from DUWL. However research has not demonstrated a high risk of adverse health among dental hygienists or their clients.⁷ Although there may not be a high risk, the section of the paper entitled, "What is the connection between contaminated DUWLs and respiratory disease in dental hygienists?" provides several lines of evidence suggesting a potential connection between DUWL contamination and respiratory disease transmission. The lack of evidence of a widespread public health problem may be reassuring, however falsely, since the lack of evidence may also reflect the difficulty of establishing epidemiological links between dental care and infections with extended incubation times.³⁹

Given the best available evidence which suggests a potential risk associated with contaminated DUWL, the CDC issued a statement regarding appropriate precautions, "exposing patients or dental health care personnel to water of uncertain microbiological quality, despite the lack of documented adverse health effects, is inconsistent with generally accepted infection control principles."⁷ There are several ways to avoid or minimize the contamination of DUWLs, including running water to flush out microorganisms, rinsing the DUWL with disinfectants, the use of self contained water systems, placement of bacteriological filters in the waterlines to remove microorganisms, and retraction devices.

What is the role of flushing DUWL?

All of the infection control guideline documents reviewed in Table 1 (published in Part I of this document in the previous issue, 42.2) recommend flushing the line in between clients, to physically flush a client's debris that may have entered the waterline from the previous client, in order to maintain water that is ≤ 500 mean colony-forming units per millimetre (CFU/mL). Although the CDC's recommendation for the maximum level of contamination of the waterline is < 500 mean CFU/mL, which is mirrored by the US Environmental Protection Agency in their limits for

heterotrophic bacteria in drinking water,⁴¹ the European Union’s infection control standards call for a higher standard of 100 CFU/mL.⁴² Canadian guidelines for drinking water are:

- 0 per mL for *E.coli*,
- 0 per mL for total coliforms, and
- no numerical guidelines are given for heterotrophic plate count.⁴³

A review of four studies from 2001-03 concludes that flushing waterlines for a few minutes may reduce the concentration of planktonic bacteria; however, flushing is not able to remove the biofilm.⁴⁴ A study in 2006 examined flushing of DUWLs specifically for the removal of protozoa, and *Legionella spp*, a pathogenic agent that has been shown to be transmitted in aerosols.⁴⁵ Studying this patho-

gen is of particular interest, since oral health professionals were found to have substantially higher concentrations of *Legionella* antibodies compared to the general population.⁴⁶ The study found that flushing was relatively ineffective in removing *Legionella spp* and protozoa from the DUWL. It appears that flushing, like microfiltration, removes microbes that have budded off from the mature biofilm, but it is unable to remove the microorganisms present in the biofilm that have adhered to the walls of the waterlines. These studies confirm the importance of the CDC’s guidelines (2003) recommending that flushing alone is not a reliable procedure for improving water quality.⁷ Additional methods to flushing, for example chemical agents, are necessary.

Table 2: Reduction in total viable counts (TVC) of bacteria in the water in DUWL

Disinfectant	Chate, 2006 (46) (W) %	O’Donnell et al. 2006 (47) (W)	Schel et al. 2006 (48) (C) & (D)	Meiller et al. 2004 (49) (D)	McDowell et al. 2004 (50) (D)	Spratt et al. 2004 (51) (I)	Porteous et al. 2004 (39) (W)	Walker et al. 2003 (52) (W) %	Wirthlin et al. 2003 (53) (D)	Montebugnoli et al. 2003 (54) (P)
Alpron (chlorite based)	100		87% of samples <200 CFU/mL (C) **							
Sterilox* Continuous application	100							100		
Sodium hypochlorite	100									
Bio 2000 (ethanol and chlorhexidine)	100							53		
Combizyme								70		
Ozone								65		
Chlorhexidine (CHX)							Reduced to <200 CFU/mL	100	Reduced to <200 CFU/mL	
Tegador								100		
Gigasept Rapid (aldehyde based)								100		
Grotanol (hydroxide based)								100		
Grotanol Flussig (phenol based)								100		
Beta-dine (povidone-iodine based)								100		
Sporkleanz*								100		
Sterilex Ultra*								100		
Dialox								100		

Continued...

Table 2: Reduction in total viable counts (TVC) of bacteria in the water in DUWL

Disinfectant	Chate, 2006 (46) (W) %	O'Donnell et al. 2006 (47) (W)	Schel et al. 2006 (48) (C) & (D)	Meiller et al. 2004 (49) (D)	McDowell et al. 2004 (50) (D)	Spratt et al. 2004 (51) (I)	Porteous et al. 2004 (39) (W)	Walker et al. 2003 (52) (W) %	Wirthlin et al. 2003 (53) (D)	Montebugnoli et al. 2003 (54) (P)
Sanosil*								100		
Oxigenal*			91% of samples <200 CFU/mL (C)					100		
Grotanat Bohrerbad*								100		
Chlorine Dioxide									100%	
Alkaline perioxide									Unacceptable reduction	
Planosil (hydrogen peroxide and silver)		Intitial reading: 15,400 CFU/mL Final reading: 26 CFU/mL								
Planosil Forte (hydrogen peroxide and silver)		Intitial reading: 15,400 CFU/mL End reading: 26 CFU/mL								
Peracetic Acid										Initial reading: >200 CFU/mL Final reading: not detectable
Dentosept			91% of samples <200 CFU/mL ** (C)							
Ster4Spray			60% of samples <200 CFU/mL ** (D)							
BioBlue			Inconsistent effect (D)							
A-dec ICX (sodium percarbonate, silver nitrate and cationic surfactants)				100%	Below detectable limits (3CFU/ mL)					
TAED and sodium perborate						Below detectable limits				

Table legends: (W) Weekly application, (D) Daily application, (P) Prior to each client, (C) Continuous, (I) In-vitro experiment
 ** Occasional high values above 200 CFU/mL were found, * Hydroxide-containing products, TAED Tetraacetythylenediamine

Can the line type affect the level of microorganisms?

There is some preliminary evidence that the line material and the size of the line may help to reduce biofilm formation and reduce bacterial outflow.

- A study in 1988 found that polytetrafluorethylene (PTFE) tubes had negligible microbial growth compared to polyethelene (PE tubes).⁴⁴
- In addition, a study conducted in 2005 found that tubes made from fluoridated resins were effective in inhibiting biofilm formation and in reducing bacterial outflow.⁴⁷
- A study conducted in 2007 compared two waterline materials and two sizes of lines and found that lines made from PTFE compared to lines made from PE and the larger sized lines, 4 mm compared to 1.6 mm, had less bacteria. However, the level of microorganisms was still not within acceptable limits.⁴⁴ This study was important in showing that the PTFE line did not contain any *pseudomonas aeruginosa* and the authors suggest that the PTFE line may have inhibited the growth of this type of bacteria.

How does the type of line cleaner impact on the level of microorganisms?

The CDC's guidelines on infection control state: "Dental unit water that remains untreated or unfiltered is unlikely to meet drinking water standards. Commercial devices and procedures designed to improve the quality of water used in dental treatment are available; methods demonstrated to be effective include self-contained water systems combined with chemical treatment, in-line micro filters, and combinations of these treatments. Removal or inactivation of dental waterline biofilm requires use of chemical germicides."⁷⁷

Dental hygienists use disinfectants or line cleaners to flush dental unit water lines to minimize odour, remove solid waste particles, remove biofilm, and maintain low microbial counts in the DUWL. Several studies have been conducted recently examining the impact of line cleaners on the level of microorganisms. Information from ten controlled studies is arranged in evidence tables 2 and 3. Table 2 shows reduction in total viable counts (TVC) of bacteria in the water from the DUWL and table 3 shows reduction of biofilm coverage within the DUWL.

Table 3: Percentage reduction of biofilm coverage within the DUWL

Disinfectant	Chate, 2006 (46) (W) %	O'Donnell et al. 2006 (47) (W)	Schel et al. 2006 (48) (C) & (D)	Meiller et al. 2004 (49) (D)	McDowell et al. 2004 (50) (D)	Spratt et al. 2004 (51) (I)	Porteous et al. 2004 (39) (W)	Walker et al. 2003 (52) (W) %	Wirthlin et al. 2003 (53) (D)	Montebugnoli et al. 2003 (54) (P) %
Alpron	100									
Sterilox	99							95		
Sodium hypochlorite	94									
Bio 2000 (ethanol and chlorhexidine)	53									
Combizyme								70		
Ozone								65		
Chlorhexidine (CDX)								31		
Tegador								33		
Gigasept Rapid (aldehyde based)								34		
Grotanol (hydroxide based)								64.9		
Grotanol Flussig (phenol based)										
Beta-dine (povidone-iodine based)										
Beta-dine (povidone-iodine based)										
Sporkleanz*								95		

Continued...

Table 3: Percentage reduction of biofilm coverage within the DUWL

Disinfectant	Chate, 2006 (46) (W) %	O'Donnell et al. 2006 (47) (W)	Schel et al. 2006 (48) (C) & (D)	Meiller et al. 2004 (49) (D)	McDowell et al. 2004 (50) (D)	Spratt et al. 2004 (51) (I)	Porteous et al. 2004 (39) (W)	Walker et al. 2003 (52) (W) %	Wirthlin et al. 2003 (53) (D)	Montebugnoli et al. 2003 (54) (P) %
Sterilex Ultra*								95		
Dialox								95		
Sanosil*								95		
Oxigenal*								95		
Grotanat Bohrerbad*								95		
Chlorine Dioxide										
Alkaline perioxide										
Planosil (hydrogen peroxide & silver)										
Planosil Forte (hydrogen peroxide and silver)										
Peracetic Acid										100
Dentosept										
Ster4Spray										
BioBlue										
A-dec ICX (sodium percarbonate, silver nitrate and cationic surfactants)				100 (new lines only)	No evidence of biofilm formation					
TAED						Below detectable limits				

Table legends: (W) Weekly application, (D) Daily application, (P) Prior to each client, (C) Continuous, (I) In-vitro experiment, TAED Tetraacetylenediamine

What is the best way to monitor the DUWL?

DUWL monitoring is required in order to determine the level of microorganism contamination in the line. The CDC recommends consulting with the manufacturer of the DUWL to determine the best method for maintaining acceptable water quality and frequency of monitoring. The CDC also suggests monitoring with an in-office self-contained test kit or commercial water-testing laboratories to determine TVC.⁷

Research contributing to this topic comes from three studies examining different types of monitoring systems and one study examining transportation methods and time delay in laboratory testing. In 2004, a study investigated an easy to use chairside assay as an alternative to TVC.⁴² TVC is the normal method of measuring bacterial contamination in a lab; however, it is time consuming, labour intensive

and has a time delay element. The study determined that measures of total adenosine triphosphate (ATP) concentrations in DUWLs samples were too insensitive and did not correlate with TVC data, and were therefore not reliable methods of testing DUWLs. The researchers found an endotoxin assay method was relatively expensive, and required specialist expertise and equipment. Therefore, it may not be practical for use in a dental hygiene practice. In 2005, another study found that the measurement of the total cultivable mesophilic flora (TCF), a parameter commonly used to monitor water quality in DUWL is not an effective predictor for the presence of oral streptococci (OS).⁴⁸ Although the authors suggest caution in the interpretation of the study owing to low power of statistical analysis, they suggest measuring the OS in addition to TCF.

In 2006, a study examined the validity of two in-office

water test kits — the HPC Dental Sampler and the Clearline Water Test Kit compared to the gold standard dehydrated culture medium R2A agar for monitoring DUWLs.⁴¹ The researchers, Bartolini and colleagues, processed 351 split samples and found that the in-office kits generally underestimated the bacteria levels and their accuracy ranged from 25%-69%, compared with the R2A agar. Therefore, use of these kits could lead to a lack of compliance with the guidelines for infection control. This study confirms some earlier work by Smith and colleagues,⁴⁹ who also found that the HPC Dental Sampler failed to grow some bacteria. Karpay and colleagues studied the HPC Dental Sampler and found that it agreed with the R2A agar 92 per cent of the time.⁵⁰ Bartolini and colleagues point out that the difference may partly be accounted for by the fact that Karpay used a more efficient DUWL cleaner that may have increased the accuracy of the tests. These results suggest a need to conduct more research on this topic in order to determine an effective method for testing DUWLs that yields high quality data.

In 2005, a study examined different transportation methods and measured the effects of delayed culturing on DUWL specimens.⁵¹ The specimens were collected from high-speed handpiece service lines. The handpieces were removed before the water was collected. Delaying specimen culturing even one day at ambient temperatures, and exposing specimens to a variety of environmental conditions resulted in unreliable bacterial counts. Analyzing the specimens immediately or sending them by express mail, with a cooling element that remains intact upon arrival at the laboratory produced reliable results.

What is the connection between contaminated DUWLs and respiratory disease in dental hygienists?

DUWLs that are contaminated with microorganisms can result in the contamination of aerosols. The microorganisms in aerosols contain endotoxins, such as lipopolysaccharides, which may have a negative impact on the health of dental hygienists and their clients. The previously mentioned high count of *Legionella* antibodies among oral health professionals may be subclinical infections which are most likely due to chronic exposure to *Legionella* contaminated aerosols from DUWL,³⁹ although respiratory infection transfer may result from three modes of transmission, including large droplets, or direct contact with secretions which occur when the health professional has direct contact with the client, and also through aerosols. A review of aerosol transmission indicates that these three modes are not mutually exclusive and that aerosol transmission of influenza can be an important mode of transmission.⁵² The evidence of several modes of transmission and a lack of compliance with guidelines for infection control underscore the need to improve infection control within dental hygiene practices.

Epidemiological information and research studies show mixed evidence on the connection between contaminated DUWLs and respiratory disease; however, the broader medical research which follows, shows a connection between airborne bacteria and poor health. Epidemiological information from a Finnish occupational health registry indicates that respiratory illness in dental health

professionals accounts for 6.4 per cent of occupational disorders.⁴⁰ A study in 2005, in London, England, and Northern Ireland, found that the onset of asthma in dentists may be associated with occupational exposure to contaminated DUWL.⁴⁰ This study found that in a population of 266 randomly selected dentists 14 per cent reported suffering from asthma, and that higher aerobic counts (>200 CFU/mL) in the DUWL were associated with the onset of asthma. A study in the USA in 2005 contradicts this study and reports that asthma rate in the dental/dental hygiene student/graduate population is lower than the Northern Ireland/London, England study. Prevalence rates of 1.7%-5.5% were reported for 817 American dental students and post-graduate residents, and 26 dental hygiene students.⁵³ The authors of this study conclude that there is no statistically significant association between dental school attendance and respiratory disease.

Other evidence on this topic comes from studies that do not specifically examine oral health professionals. Three other studies in the medical literature conducted between 1995 and 2000 also show a significant association between prevalence and severity of asthma and raised concentration of airborne bacteria in the indoor environment.⁴⁰ Further support for this association comes from a review of the epidemiological studies on occupational airway disease in agricultural and textile workers, demonstrating that the concentration of bacteria in the working environment is the major predictor of this disease.⁵⁴

AEROSOLS AND SPATTER

Aerosols are not droplets, they are invisible particles, less than 10 microns in diameter, which float on air currents.⁵⁵ Aerosols are produced in a dental hygiene practice from rotary instruments, air abrasion, air-water syringes, ultrasonic scalers, and during air polishing. The material in the aerosol, which is contaminated with microorganisms, originates from the treatment site and the DUWL. The use of personal barrier protection, sterilization of instruments and treatment of DUWLs will eliminate much of the risk of transmission from aerosols.⁵⁶ Although there are no known cases of transmission of a bloodborne pathogen by aerosols in a clinical setting⁵⁵, the small particles of an aerosol may contaminate environmental surfaces, or enter the lungs and create the potential for transmitting infections.⁵⁶

Spatter droplets can be defined as airborne particles larger than 50 µm in diameter.⁵⁶ These particles are too large to become suspended in the air and are airborne only briefly. The CDC recommends barrier precautions such as face shields, masks, gowns to prevent contact with airborne particles. Some of the diseases known to be spread by droplets or aerosols include pneumonic plague, tuberculosis, influenza, Legionnaires' disease, and SARS.⁵⁶

The CDC's infection control guidelines recommend that dental hygienists wear masks during procedures and client care, when such activities are likely to generate splashes or sprays of blood or body fluids.⁷ However some preliminary research shows that protection may be needed not only during the procedure, but also for a period following the procedure, to reduce the risk of coming into contact with aerosols that remain in the room air for a period. One study on this topic shows that aerosols may be present in the op-

eratory for up to 30 minutes after a procedure.⁵⁷ While this study is important in improving our understanding of flow of aerosols in the operator, it was not designed to show a link between aerosols and increased infection related to aerosols.

A review of the literature in 2004 on reducing airborne contamination identifies several methods for reducing airborne contamination.⁵⁷ Two studies indicate that a reduction in aerosol contamination can be obtained with the use of a 0.1 per cent chlorhexidine or essential oil-containing mouthwash for one minute before a dental procedure. However, this will only act on free floating oral bacteria, not those adhering to mucous membranes or in biofilm. The use of a rubber dam will also reduce the contamination arising from saliva or blood. However, a rubber dam is not suitable for dental hygiene procedures such as root planning, and routine prophylaxis. The use of a high efficiency particulate air filter, or HEPA filter and the use of ultraviolet, or UV chambers in the ventilation system can reduce airborne contamination. However, this equipment may be rather expensive and it may take an extended period for the air in the treatment room to cycle through the ventilation system. Five studies were identified which indicate that the use of a high volume evacuator (HVE) may reduce the contamination arising from the operative site by more than 90 per cent. A saliva ejector does not classify as a HVE, since it does not remove a sufficient volume of air. The CDC supports the use of a rubber dam where possible, and the routine use of HVEs for reducing contaminated spatter.⁵⁸

Several studies show that the area contaminated by aerosols is much larger than previously thought:

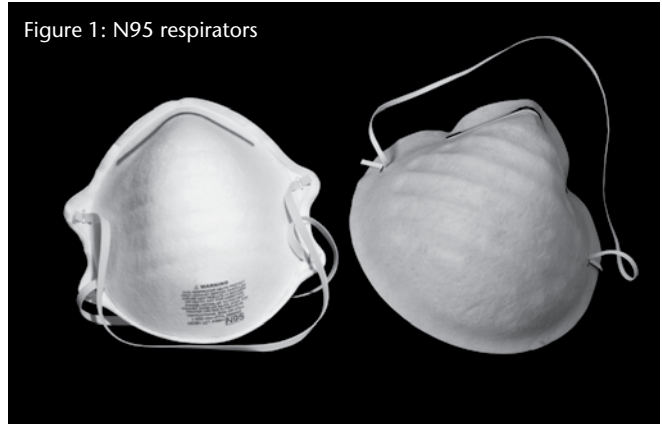
- A study in 2005 found particulate concentrations of bacteria at a reach of nearly eight feet.⁵⁹
- This large area of bacterial aerosol contamination is also confirmed by a study in 2006, which found that the area contaminated by aerosols was 1–1.5 metres from the client's mouth and bacterial counts were generally higher in the more remote sampling points.⁶⁰ Based on these findings, the authors suggest that the only items on the dental operator counters should be the items for ongoing treatment, and other items should be stored in closed cupboards.

The risk from aerosols has also come to the forefront in recent public health pandemic planning.

- In May 2007, the CDC issued a recommendation that people should wear an N95 respirator (in the context of an overall respiratory protection program) if they expect to be in close contact with people who are known or thought to be sick with pandemic flu.⁶¹
- In addition, the PHAC indicates that when performing or assisting with aerosol generating procedures, on a patient with a known or suspected influenza caused by the pandemic influenza strain, all health care workers in the room should wear a sub-micron particulate respirator, such as the N95.⁶²

An N95 respirator as shown in figure 1 provides more protection than a surgical mask in providing a barrier against viruses. The N95 respirator screens out 95 per cent of the particles that are 0.3 microns and larger. Like surgical masks, the respirators are for single use only.

Figure 1: N95 respirators



DISCUSSION AND CONCLUSIONS

The CDC's *Guidelines for Infection Control in Dental Health-Care Settings* is a comprehensive document that is supported by research and expert opinion. Infection control is a complex topic and the CDC's guidelines are lengthy and cannot be distilled into a simple one-page synopsis. These guidelines do not describe all dental hygiene settings or all situations that occur in dental hygiene practice. Therefore, dental hygienists should incorporate relevant components of the CDC's guidelines into their practice and make decisions about specific procedures, based on their knowledge of the principles of infection control.

There are instances when more stringent guidelines must be followed when, for example, institutional or office policies supersede the CDC's guidelines. In addition, dental hygienists should incorporate into practice the more stringent guidelines, identified in Appendix A (published in Part I of this document in the previous issue, 42.2). If the provincial or territorial statutory infection control requirements set by the government or regulatory bodies conflict with the CDC's guidelines, then dental hygienists are required to follow the statutory requirements. Self audits can assist in determining how practices adhere to or deviate from the CDC's guidelines.

There may be instances when dental hygienists may work in practice settings with less rigorous guidelines for infection control or policies on treating clients with AIDS/HIV that conflict with human rights legislation. In these instances, it is up to the dental hygienist to assess the office policy and determine if it meets the guidelines set out by their regulatory body and the federal/provincial legislation. With an increasing number of dental hygienists establishing private dental hygiene practices, and an increase in self regulation, it will become increasingly easier to promote infection control standards with safety and fairness for dental hygienists and the public.

The discriminatory practice of refusing to treat clients with AIDS/HIV is associated with a lower level of education, employers upholding the same practice, as well as geographical location (Ontario's dental hygienists were most likely to refuse while dental hygienists in British Columbia were least likely to refuse to treat clients). The differences between educational groups and provinces may be due to a gap in knowledge about infection control principles and the disease's process. It is important that dental hygienists have adequate knowledge of these topics since they have

an ethical responsibility to treat HIV-positive clients and not doing so can result in charges of discrimination from professional, human rights organizations, or the client.

The research on infection control reviewed in this paper highlights some gaps in dental hygienists' knowledge about infection control, and some gaps between knowledge and practice. The strength of this research is increased with the large quantity of studies and sample size. Although some of the studies include dentists, the results may closely reflect dental hygiene practices since dentists employ the majority of dental hygienists, and they may be following office infection control procedures established by dentists. The weight of the evidence indicates gaps in knowledge and practice and justifies a call for closing and monitoring the gaps.

An impetus for change in knowledge, attitudes and behaviour may need to originate from multiple sources, including the Commission on Dental Accreditation, the National Dental Hygiene Certification Board, dental hygiene organizations, education institutions, and regulatory bodies. There may be a need to revise curriculum to include several new and timely issues — infection control pertaining to private dental hygiene practices, including mobile practices, for example, what is the best method for soaking instruments prior to sterilization when there is no stationary sterilization room to place them? Curriculum can also address informal reports that busy practices sometimes stop sterilization cycles prior to completion of the dry cycle. There is an emerging trend for educational institutions to take leadership in the area of infection control, by requiring mandatory immunization and follow up testing for HBV for dental hygiene students. Dental hygiene regulatory bodies could improve their existing leadership role by following the CDC's recommendations to establish expert review panels to provide counselling to dental hygienists who are infected with HIV or HBV, and to determine under what circumstances they may continue to perform exposure prone procedures. There may also be a need to nurture a culture of infection control within dental hygiene, with assistance from infection control champions to promote implementation in practice settings.

It may be timely for the dental hygiene profession to consider the merits and setbacks of implementing voluntary screening for HIV in dental hygiene settings, particularly given the CDC's call for routine screening in health care settings. The benefits include its cost effectiveness and an opportunity for dental hygienists to make an important contribution to public health by assisting with early identification and reducing high-risk behaviours. However, incorporation of this topic into curriculum may require careful planning, since curriculum may need to include the biological aspects of AIDS/HIV, and the psychosocial aspect of discussing this topic with clients. There is also a need to consider how best to incorporate this into clinical practice, for instance, if consent for HIV testing be obtained with general consent for oral care, how would the referral to a physician be made (the accuracy for the rapid oral testing for HIV is high, but it must be confirmed with traditional testing), and how would a dental hygienist deal with client opposition to the testing or prevention counselling?

The research on DUWL clearly shows a high degree

of contamination of and the need to decontaminate the lines with an antimicrobial. Maintaining contamination free lines is important for the health of dental hygienists and their clients, and it may become increasingly important as the population ages and services are provided to a larger number of medically compromised clients. This is particularly important, given that waterlines have been found to contain *Staphylococcus aureus*, which causes an infection, and is resistant to several common antibiotics. The evidence of the high degree of contamination in water lines, and the concerns regarding a lack of compliance with guidelines for infection control raise a considerable degree of concern and point to the need for ongoing education and monitoring of compliance. There is also a need for further research to determine the degree of risk for dental hygienists when they use an ultrasonic scaler.

Preliminary research on DUWL suggests that the size and type of waterline material may affect bacterial growth; however, further research is needed on this topic to confidently recommend these types of lines. Evidence tables 2 and 3 show that although many disinfectants achieve a sufficient reduction in TVC they may not necessarily remove unwanted biofilm from the tubing surfaces, which means that the biofilm will continue to grow and microorganisms will continue to be released into the water. Therefore, it is important to choose a line cleaner that meets two criteria: ability to kill bacteria in the water phase and ability to kill biofilm bacteria.

Out of twenty eight line cleaners, only thirteen reduced both the TVC and the biofilm coverage to a low level (reduction by approximately 94 per cent or greater). These cleaners and the application schedule used in the research are as follows:

- Weekly – Alpron, Sterilox, sodium hypochlorite, Sporkleanz*, Sterilex Ultra*, Dialox, Sanosil*, Oxigenal*, Grotanat Bohrerbad* (*hydroxide-containing products).
- Daily – A-dec ICX (sodium percarbonate, silver nitrate and cationic surfactants).
- Between clients – peracetic acid; and in vitro TAED.

A further study in 2005 concluded that between-client line disinfection is the only way to ensure complete eradication of any microorganisms.⁶³ Further research on this topic is warranted to determine the most cost effective line cleaner and an appropriate schedule for use.

The research reviewed in this paper did not find a satisfactory in-office kit for testing waterlines. Dental hygienists may need to work together with product manufacturers to develop monitoring kits, solutions for decontaminating the lines, and more clearly define maintenance protocols. The research also indicates that timing and temperature of samples affects reliability of the laboratory analysis. Furthermore, research indicates that waterline samples should be sent to external laboratories immediately following collection by express mail, with a cooling element.

There is some evidence of the link between exposure to airborne bacteria and respiratory disease. However, the evidence from studies on oral health professionals is contradictory. There is insufficient evidence to estimate the risk for dental hygienists who are exposed on an ongoing basis to airborne bacteria. Therefore, further research is

needed on the link between contaminated DUWL and respiratory disease.

Infection control education should provide a clear understanding of the different ways in which organisms are transmitted via aerosols and spatter, and the corresponding prevention strategies for each. Routine treatment of DUWL is needed to minimize or eliminate airborne contamination from the DUWL. Research on HVE, efficacy for reducing spatter is strong and supports their use in dental hygiene practices. Clinical education can assist dental hygienists to become familiar with the devices and techniques that will allow for HVE operation without an assistant. Operators can hold the instrument in one hand and the HVE in the other hand, or use an HVE device that attaches to the operating instrument, such as the ultrasonic scaler, and various "dry field devices" that attach to an HVE.⁵⁶

The exposure to aerosols from clients with pandemic flu is clearly a risk for dental hygienists, as both the CDC and the PHAC have issued directives indicating that if a health practitioner expects to be in close contact (CDC) or performing or assisting with aerosol generating procedures (PHAC) with people who are known or thought to be sick with pandemic flu an N95 respirator should be worn, in the context of an overall respiratory protection program. Dental hygienists may need to discuss the practicality of implementing this directive in their practices. A simplified approach is to defer the clients' appointment if they are thought to be sick with pandemic flu.

There is a need to conduct additional research on aerosols, since there is some indication that they may be present in the operatory for a longer period of time than initially thought — possibly up to 30 minutes following a procedure, and they contaminate a larger surface area than initially thought. Wearing a mask following a procedure for a period of time, and using a client mouthwash prior to treatment are two possible solutions; however, these suggestions require more research to obtain stronger confirmation of their efficacy.

There are several other areas where further research is required. A number of the documents on infection control guidelines reviewed in this paper identify a lack of strong scientific evidence from clinical trials to support infection control procedures. In the absence of clinical trials, the evidence for the recommendations in the guidelines is drawn from respected authorities on the basis of clinical experience, descriptive studies, or reports of expert committees. This research gap underlines the need to conduct rigorous research on the effectiveness and cost effectiveness of infection control. In addition, research suggests that health professionals may be underreporting occupational exposure to HIV and that there may be a discrepancy between Health Canada's reports and Workers Compensation Board reports of occupational acquired HIV. Research in this area is preliminary and there is a need to confirm this information through epidemiological studies.

Infection control should be given high priority in dental hygiene practice, since we live in an age where SARS, avian flu and multiresistant bacteria have international attention. In order to ensure a safe practice, dental hygienists should ensure their infection control practices are current by monitoring changes in infection control practices, en-

gaging in continuing professional development, reading newly published research, and applying evidence based measures. Dental hygienists have a responsibility to keep themselves informed on all infection control topics, and monitor newly published research. Other topics of importance which were not reviewed in this paper and warrant consideration include surgical gloves, latex allergies, hand hygiene, sterilization, environmental disinfection, and disinfection of dental impressions.

RECOMMENDATIONS

Dental hygienists are urged to consider:

- Implementing the CDC's *Guidelines for Infection Control in Dental Health-care settings* (2003). In addition to the CDC's guidelines, it is suggested that dental hygienists follow more stringent guidelines identified in recent literature and in such other guidelines for infection control as the CDC's *Guidelines for the management of occupational exposure to Human Immunodeficiency virus (HIV)-2005*.
- Ensuring their infection control practices are current, by monitoring changes to infection control practices, engaging in continuing education, reading newly published research, and applying evidence based measures.
- Working together with manufacturers to determine cost effective means for testing and maintaining appropriate water standards.
- Choosing a line cleaner (disinfectant solution) that can kill bacteria in the water and bacteria in the bio-film matrix.
- Sending DUWL samples to the laboratory immediately upon collection when using laboratory water testing, by express mail, with a cooling element.

Dental hygiene educational institutions are urged to consider:

- Promoting a culture of infection control.
- Examining curriculum to ensure students receive adequate didactic and clinical experience in infection control, including disease transmission and communicable diseases.
- Informing potential applicants and students in clinical practice that during the course of their clinical education:
 - students will be required to treat patients with infectious diseases (including HIV, HBV and HCV),
 - students with an infectious disease will be required to inform the appropriate authority in their education institution to receive appropriate counselling and specific recommendations.
- Exploring the benefits of modifying curriculum to include HIV screening using rapid oral testing.

Provincial or territorial dental hygiene regulatory bodies are urged to consider:

- Developing standards of practice on infection control.
- Exploring the benefits of mandatory continuing professional development in infection control and practice inspections to assess the level of compliance with guidelines for infection control.

- Establishing expert review panels to provide counselling to dental hygienists who are infected with HIV or HBV, and to determine under what circumstances they may continue to perform exposure prone procedures.
- Conducting ongoing studies to determine if, over time, the gaps between knowledge and practice have narrowed.
- Developing and offering continuing education programs on infection control to increase knowledge and compliance with guidelines for infection control.

CDHA is urged to consider:

- Articulating the ethical responsibility of dental hygienists to treat clients with AIDS/HIV, within the CDHA's *Code of Ethics*.
- Promoting a culture of infection control.
- Developing and offering continuing professional development programs on infection control to increase knowledge and compliance with guidelines for infection control.

The National Dental Hygiene Certification Board and the Commission on Dental Accreditation Canada are urged to consider:

- Examining their role in strengthening the infection control culture within the dental hygiene profession.

Researchers are urged to consider conducting:

- Research to determine the effectiveness and cost-effectiveness of infection control.

- Research on dental hygienists' knowledge of and attitudes towards infection control, and their compliance with guidelines.
- Epidemiological studies to determine more precisely the risk of transmission of bloodborne infections between dental hygienists and clients, and between clients.
- Research on DUWL, including accurate ways for chairside monitoring of bacterial levels in DUWLs, and how the size and type of waterline material impacts on microorganism growth.
- Research to examine work-related risk to dental hygienists' health from a potential long term exposure to *Legionella* and other microorganisms in aerosols.
- Research to determine the degree of risk when using an ultrasonic scaler.

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APPENDIX B

DENTAL HYGIENISTS INFECTED WITH BLOODBORNE PATHOGENS^{*, ‡}

Purpose

This policy[‡] has been developed to:

- Balance the College's mandate of public protection with the rights of dental hygienists infected with bloodborne pathogens to provide dental hygiene care,
- Guide the College's Bloodborne Pathogen and Inquiry Committees,
- Assist an infected registrant with practice modifications or restrictions.

Introduction

Dental hygienists perform invasive "exposure-prone procedures" that present the opportunity for the client to be exposed to the health care worker's blood.[§] Through the strict use of universal infection control precautions, however, the risk of transmission is virtually zero.

Confidentiality

This policy is designed to ensure confidentiality. The identity of an infected registrant need not be known. If known, his/her name will be deleted from documents reviewed by College committees according to current College policies, provided that the infected dental hy-

gienist does not present a risk of harm to the client and is following all recommendations, knowledge of the registrant's identity is not required.

The College's Bloodborne Pathogen Committee will consist of a dental hygienist and other experts, which may include a local public health specialist, an occupational health specialist, an infection control expert, an infectious diseases specialist, and/or an expert in risk assessment, ethics or policy.[§]

Obligations

The College's obligations:

- Establish a Bloodborne Pathogen Committee to make recommendations on and monitor the practice of infected registrants.
- Inform registrants of this policy and encourage all registrants to know their own HIV, HBV and HCV status.
- Strongly encourage all registrants to obtain vaccination against HBV.

Registrant's obligation

A registrant who knows he/she is infected is obliged to contact the Chair of the College's Bloodborne Pathogen

Committee for guidance with his/her practice of dental hygiene. This contact may be in person or anonymously through an advocate or colleague.

Guidelines

1. When a registrant who is infected with a blood-borne pathogen contacts the Committee, the Committee will:

- a) Consult with the registrant to:
 - confirm the type of dental hygiene being practised, and
 - obtain an assessment of the registrant's own infection control standards.
- b) Ask the registrant to consult with his/her physician or pertinent health care worker on a regular basis.
- c) Recommend practice modifications, if necessary, to help the registrant continue practising.
- d) Set up a consultative system with the registrant's health care worker(s) to:
 - share information about procedures performed by the registrant and any practice modifications recommended by the Committee,
 - share information on the registrant's health status and ability to comply with universal infection control measures.
- e) In consultation with the registrant or advocate, select a person as a long term liaison between the registrant and the College. The liaison selected will be a health professional who is familiar with dental hygiene standards of care and practice complexities.
- f) Ask the registrant's liaison to:
 - encourage stringent standards of care,
 - observe the registrant practicing from time to time, to ensure that universal infection control

- standards are being practiced,
 - advise the Committee on the registrant's infection control procedures,
 - help the registrant obtain updated infection control information as it becomes available.
- g) Establish a regular reporting schedule with the registrant's liaison and advise the Committee on:
 - actions the registrant is taking to minimize the risk of transmission,
 - any difficulties the registrant is having complying with universal infection control standards,
 - details of any exposure incidents.
 - h) Monitor the registrant's practice of dental hygiene.
 - i) Monitor any exposure incidents to ensure that recommended infection control protocols are followed to limit the transmission of bloodborne diseases.

2. If the registrant or the liaison becomes aware that the registrant is no longer able to comply with the guidelines, or is no longer able to consistently provide dental hygiene care with a high standard of infection control, or may otherwise be putting his/her clients at risk, the registrant or the liaison will inform the Registrar immediately.

* Bloodborne pathogens include the human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV).

‡ The College of Dental Hygienists of British Columbia. *Registrants Handbook*. 2004.

§ Proceedings of the Consensus Conference on Infected Health Care Workers: *Risk of Transmission of Bloodborne Pathogens*, Health Canada, Health Protection Branch – Laboratory Centre for Disease Control, Canada Communicable Disease Report – Supplement, Vol. 24S4, July 15, 1998.

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Tobacco use as a risk indicator for periodontal disease in a sample of northwestern Ontario residents

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ABSTRACT

Background: The primary objective of the present study was to investigate the relationship between periodontal health, oral hygiene practices, and tobacco use in a cross-sectional study of adults in an urban community in Northwest Ontario. **Methods:** One hundred individuals between the ages of 19 and 80 participated. The sample consisted of 48% non smokers, 20% current smokers, and 32% former smokers. All participants were given a comprehensive periodontal examination, which included plaque score, calculus score, bleeding on probing, probing depth, and clinical attachment level on all teeth present. A brief medical history and information regarding oral hygiene practices and smoking behaviours were obtained through a questionnaire. Of the participants, 42% had moderate amounts of plaque, with only 26% having a light amount of plaque. Periodontal examinations revealed the following percentages among participants: 28% gingivitis, 36% slight periodontitis, 27% moderate periodontitis, and 9% advanced periodontitis. The average probing depth was 2.42 mm and the average clinical attachment level was 4.37 mm. **Results:** Advanced periodontal disease among individuals that ever smoked (henceforth referred to as 'ever smokers'), current smokers, and former smokers was twice that of non smokers. Ever smokers were more than twice as likely to present moderate to heavy amounts of calculus and plaque compared to non smokers. **Conclusion:** The sample showed an observable prevalence of periodontal disease as well as a strong association between cigarette smoking and the risk of periodontal disease among northwestern Ontario residents.

RÉSUMÉ

Contexte : La présente étude a pour objet principal d'examiner les rapports entre l'état de santé du parodonte, les pratiques d'hygiène buccale et le tabagisme dans le cadre d'une recherche transversale menée auprès d'adultes d'une communauté urbaine du nord-est de l'Ontario. **Méthodes :** Cent personnes, dont l'âge variait entre 19 et 80 ans, ont participé à l'étude. L'échantillonnage comprenait 48 pour cent de non-fumeurs, 20 pour cent de fumeurs et 32 pour cent d'anciens fumeurs. Les participants ont tous subi un examen parodontal complet, comprenant l'accumulation de la plaque, l'accumulation du tartre, le saignement au sondage, la profondeur de sondage et le niveau d'attache clinique à toutes les dents. Un bref questionnaire a permis de recueillir l'anamnèse et l'information sur les pratiques d'hygiène buccale. Les examens ont donné les résultats suivants : 28 pour cent de gingivites, 36 pour cent de parodontites légères, 27 pour cent de parodontites modérées et 9 pour cent de parodontites avancées. La profondeur moyenne de sondage était de 4,37 mm. **Résultats :** Il y a deux fois plus de maladies parodontales avancées chez les gens qui ont toujours fumé (« fumeurs invétérés ») et les fumeurs actuels et anciens que chez les non-fumeurs. Les anciens fumeurs avaient au moins deux fois plus tendance que les non-fumeurs à développer d'importantes quantités de tartre et de plaque. **Conclusion :** L'échantillonnage a montré la prévalence des maladies parodontales ainsi qu'une forte association entre le tabagisme et le risque de maladie parodontale chez les résidents du nord-ouest de l'Ontario.

Key words: periodontal diseases, smoking, periodontal attachment loss

INTRODUCTION

In addition to the many known cardiovascular and respiratory disease conditions both directly and indirectly associated with smoking and the use of tobacco products, research has also demonstrated that tobacco use is a significant risk factor for the development and progression of periodontal disease.¹⁻⁴ Although there is a large variability in association, smokers are 2-14 times more likely to develop periodontal disease than non smokers.^{5,6}

Although general acceptance of a common definition of periodontal disease does not exist, oral health continues to be studied with a variety of demarcation points that differentiate disease from non disease. The definition of the periodontal disease is an important factor that can be expected to contribute to the variation in the magnitude of risk estimates.⁷ Typically, oral health is evaluated using clinical and radiographic variables that are useful in providing estimates of prevalence and severity of periodontal disease.⁸ Commonly used variables include alveolar bone height, number of missing teeth, oral hygiene, clinical attachment level (CAL), probing pocket depth, gingival recession, tooth mobility, bleeding on probing (BOP), plaque index (PI), and the amount and location of calculus.^{8,9} The effects of smoking on such variables as BOP, amount

of plaque and/or calculus, probing depth (PD), clinical attachment loss and gingival recession are inconsistent. For example, while many studies reported comparable plaque levels among smokers versus non smokers, other researchers reported higher plaque levels among smokers.¹⁰⁻¹⁵ Likewise, the specific effects of tobacco smoking on severity of both supra- and sub-gingival calculus have received little research attention except for a single study in which supra- and sub-gingival calculus was reported to be higher.¹⁶

Although there have been many improvements in oral health behaviours by the general patient population, periodontal disease has remained prevalent and shows little sign of a decline in severity.¹⁷ National clinical epidemiological studies from developed countries have repeatedly estimated that over 90 per cent of the general population has some form of periodontal disease,^{18,19} while between

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10%-20% of the population has a severe form of periodontal disease.^{20,21} The prevalence of periodontal disease indicators among adults and the association between tobacco use and periodontal disease in Canadian cohorts is lacking.²²⁻²⁵

The primary objective of the present study was to investigate the relationship between periodontal health, oral hygiene practices, and tobacco use in a cross-sectional study of adults in an urban community in Northwest Ontario. A secondary objective was to determine prevalence of periodontal disease within the entire sample, regardless of smoking status.

METHODS

Participants:

The sample consisted of 100 adults recruited from a community college dental clinic, Confederation College Dental Clinic, Thunder Bay, Ontario, Canada. The sample size was based on a 95 per cent confidence interval with 10 per cent error from a reference population of 82,110.²⁶ An attempt was made to use a randomized approach to select subjects from individuals who visited the clinic; however, the actual subject group represents a convenience sample. Participants were included in the study if they were at least 19 years of age. There were no specific exclusion criteria. All participants received a comprehensive periodontal examination described below. The researcher distributed a questionnaire in the waiting room to collect demographic data as well as information about the patient's medical history, oral health behaviours, and tobacco use using binary, ordinal, and open-ended questions. The socioeconomic status of the sample was not identified to reduce the chance of non-responding. Prior to participation in the study, the participants signed the consent form outlining the study and enabling the researcher to access their dental records. The Lakehead University Research Ethics Board approved this study according to the ethical standards of the *Tri-Council Policy Statement for Ethical Conduct for Research Involving Humans 1998*.

Periodontal Examination:

The subjects were assessed over a three-month period. All data were collected at a single visit during a regular scheduled dental appointment. Clinical assessments of the patients were conducted by a group of fifteen dental hygiene students. To ensure accuracy, four different trained and experienced dental hygiene clinical instructors (two dentists and two hygienists) remeasured PDs and reevaluated the classification of disease for each patient in an attempt to establish the validity of the initial measures. However, no inter-rater reliability estimates were established between the clinicians, which may be considered a limitation in the generalizability of these estimates. A mouth mirror and Williams probe no. 6 with black markings (Hu-Friedy) were used for all examinations. A Nabers probe (Hu-Friedy) was used to measure furcations. The teeth were dried with compressed air and isolated as necessary.

All teeth present were examined; specifically six sites were examined for PD and BOP. These sites included mesial, mid, and distal of the buccal and lingual aspects. Gingival recession was measured on two sites of each tooth

the midbuccal and midlingual sites. All teeth in each of the four quadrants were examined, but third molars were excluded in the analysis. Periodontal examinations included number of teeth, plaque score, sub- and supra-gingival calculus scores using an ordinal scale for calculus as none, light, moderate, or heavy, assigned by visual inspection, gingival status characteristics (colour, consistency, texture, marginal and papillary contours), periodontal case type (based on standard criteria of the 1999 Workshop of Classification of Periodontal Diseases and Conditions), number of teeth mobile, furcation involvement, presence of suppuration, BOP percentage (classified as absent or present for each tooth), PD, and gingival recession.

Plaque was scored using the Silness and Løe Plaque Index for all teeth. Patients were classified as demonstrating light (< 10% covered with plaque), moderate (10%-30%) or heavy (> 30%) plaque scores. The same classification system was used for calculus scoring. The periodontal examination involved the measurement of pocket depths, recorded as the distance from the free gingival margin to the base of the pocket, measured at six sites on all teeth. These sites are the mesial, mid- and distal of the buccal and lingual aspects. Gingival recession was measured on two sites of each tooth; the midbuccal and midlingual sites. Recession was measured as the distance from the cemento-enamel junction to the height of the free gingival margin. CAL was calculated as the sum of the gingival recession and PD, BOP, mobility, and furcation involvement was not given a grade; instead, each variable was calculated as a dichotomous variable. The number of BOP sites was recorded and tabulated as a percentage ($[\text{number of bleeding sites} \div \text{number of sites probed}] \times 100$). Severe periodontal disease was classified as having a mean clinical attachment loss > 4.5 mm consistent with the recommendations of the 1999 Workshop of Classification of Periodontal Disease and Conditions.²⁷

Smoking Status Assessment:

Smoking status was assessed by a self reported questionnaire. Participants were asked to estimate the number of cigarettes consumed per day and the number of years they smoked. Current smokers were individuals who were smoking at the time of the examination. Former smokers were individuals who had quit smoking at the time of the examination. Former smokers were also asked to report time since quitting, as well as number of years using tobacco and frequency of use; however, the researchers did not confirm the participants' responses using external validation. The type of tobacco product used for example, cigarette, pipe, or cigar was recorded. Smoking exposure was expressed in terms of "pack year", which is the division of the number of cigarettes smoked per day by the multiplication of the number of cigarettes in a pack, the number of days in a year, and the number of years smoked.

Data Processing and Statistical Analysis:

Three electronic databases were created for data entry. Clinical variables including, number of teeth, average PD, and average CAL were computed for each subject and averaged for the groups of tobacco users versus non users. Descriptive statistics, which included means, vari-

Table 1: Characteristics of study sample (n=100)

Characteristic	%
Gender	
Male	48
Female	52
Age (years)	
≤ 40 (range 19-40)	60
41-60	22
>60 (range 61-80)	18
Under the care of a physician	23
Currently taking a medication	43
Smoking Status	
Current smokers	20
Former smokers	32
Non smokers	48
Visits to dentist	
Regularly	50
Not regularly	50
Frequency of professional dental cleaning (months)	
> 3 < 6	4
6-12	40
12-24	34
> 24	19
Never	3
Frequency of brushing	
More than 1x/day	73
1 x/day	22
<1/day	5
<1/week	0
Never	0
Frequency of flossing	
More than 1x/day	8
1x/day	34
<1x/day	21
<1x/week	27
Never	10
Bleeding of gingiva when brush/floss	
Bleeding	41
No bleeding	59
Case type	
Gingivitis (Case I)	28
Slight Periodontitis (Case II)	36
Moderate Periodontitis (Case III)	27
Advanced Periodontitis (Case IV)	9
Refractory (Case V)	0
Plaque	
Light	26
Moderate	42
Heavy	32

ances, and frequencies, were computed for oral hygiene and smoking behaviours measured via the patient questionnaire. Frequency distributions were used to evaluate amount of plaque, case type, and characteristic variables, which describe gingival characteristics. Comparisons between continuous variables were analyzed using ANOVA ($\alpha = 0.05$), while chi-square goodness of fit analyses were used to evaluate categorical data. Linear regression was used to measure significance when evaluating the accuracy of the assessment performed by the clinical team. For many of the analyses, both current and former smokers were grouped together and termed *ever smokers* to enable a sufficient number of subjects within each analysis subgroup.

RESULTS

All participants completed both the questionnaire and the periodontal examination. Demographic characteristics, self reported oral hygiene practices, and periodontal status of the subjects are shown in Table 1. The average age (\pm standard deviation) of the sample was 40 ± 17 years.

Chi-square goodness of fit analysis ($p > 0.05$) showed that there was no association between mean clinical attachment loss and the use of prescribed medications; or between mean clinical attachment loss and the presence of one or more medical conditions.

Prevalence of tobacco use:

Although nearly 80 per cent of the participants in this study self classified as non smokers, categorizing the smokers by gender showed an equal proportion of current and former smokers among males; however, there were more former smokers among females ($n = 6$ current smokers). Smokers were on average younger than non smokers [average age smokers \pm standard deviation (SD) = 36.6 ± 15.1 , average age non smokers \pm SD = 43.7 ± 18.77]. The majority of former tobacco users indicated they smoked cigarettes, with one individual indicating he/she used both smokeless tobacco and smoked cigarettes; only one participant reported using a pipe for tobacco smoking.

Oral hygiene of the sample:

Almost 60 per cent of the sample reported having a standard dental hygiene visit every 6-24 months. Ninety-five per cent of the sample reported that they brushed at least daily, with only 42 per cent flossing daily. An inconsistency between the reported practices and the evaluated plaque scores was apparent; 74 per cent of the sample had moderate or heavy amounts of plaque.

Periodontal status of sample:

It is important to note that all participants had, at a minimum, a mean value of > 2.5 mm clinical attachment loss. Age did not predict PD or CAL. When categorized by case type based on the standard criteria of the 1999 Workshop of Classification of Periodontal Disease and Conditions, the percentage of individuals were equal between case type I (gingivitis), II (slight periodontitis), and III (moderate periodontitis), with slightly more participants presenting with slight periodontitis.

Table 2: Tobacco use variables by gender (Mean \pm SD)

Variable	Former smoker		Current smoker	
	Male (n=14)	Female (n=18)	Male (n=11)	Female (n=6)
Average years since quit	12.5 \pm 14.1	10.3 \pm 9.95	-	-
Duration (years)	9.14 \pm 7.4	5.8 \pm 5.5	14.9 \pm 12.3	11.0 \pm 2.4
No. of cigarettes/day	13.8 \pm 11.0	9.7 \pm 8.3	12.0 \pm 8.2	9.3 \pm 3.2
Age of initiation (years)	-	-	15.9 \pm 4.1	16.3 \pm 3.7
No. of last 30 days smoked (days)	-	-	27.5 \pm 7.5	28.5 \pm 3.2

Tobacco consumption:

Questions about tobacco use comprised the majority of the questionnaire. Table 2 illustrates the variables examined with regard to tobacco use and gender. Chi square goodness of fit analysis showed no significant difference between CAL and either amount or duration of smoking, or between PD and "pack years" within the cohort of current smokers (n = 20). Former and current male tobacco users were users longer and reported higher volumes of tobacco per day compared to females. Former smokers reported using higher volumes of tobacco than current smokers. The age of initiation in both the male and female cohorts was, on average, 16 years.

Of the current cigar users (n = 7), the average number of cigars smoked per day was 1.3 \pm 0.75 over an average of 5.7 \pm 4.2 years. One current chewing tobacco user indicated that he/she used chewing tobacco every day for the past 10 years, and one participant reported occasionally smoking 1 pipe per day for the past 10 years.

Smoking status and periodontal status:

As shown in Table 3, periodontal related variables were assessed in relationship to smoking status. Current smokers had deeper mean PDs, compared to former and non smokers. Former smokers had greater mean clinical attachment loss than both current and non smokers. Clinical

Table 3: Periodontal variables according to smoking status (Mean \pm SD)

Variable	Current smokers	Former smokers	Non smokers	Entire sample
Mean PD (mm)	2.44 \pm 0.45	2.43 \pm 0.37	2.41 \pm 0.40	2.42 \pm 0.42
Mean CAL (mm)†	4.38 \pm 0.82	4.48 \pm 0.78	4.28 \pm 0.91	4.367 \pm 0.85
	Smokers (current + former)		Non smokers	Entire sample
No. of teeth	26.71 \pm 2.8		26.35 \pm 4.15	26.5 \pm 3.5
B.O.P (%)	11.06 \pm 9.5		9.32 \pm 12.0	-
Case type (%)				
Case I	15 (28%)		13 (27%)	28
Case II	16 (30%)		20 (42%)	36
Case III+IV	21 (42%)		15 (31%)	36
Supra-gingival calculus amounts ‡				
None-light	31 (60%)		37 (77%)	-
Moderate-Heavy	21 (40%)		11 (23%)	-
Plaque *				
Light	9 (17%)		17 (35%)	26
Moderate-Heavy	43 (83%)		31 (65%)	74

† Important difference between smokers (current and former) and non smokers when categorized using chi-square analysis ($p < 0.066$, $df = 3$)

‡ Important difference between groups using chi-square analysis ($p = 0.06$)

* Significant difference between groups using chi-square analysis ($p < 0.05$; $df = 1$)

attachment loss was grouped into 4 categories as follows, ≤ 3.5 mm, $> 3.5 \leq 4.5$ mm, $> 4.5 \leq 5.5$ mm, and > 5.5 mm. The results of the goodness of fit test applied to the association between CAL and smoking status was not significant ($p < 0.066$), however, the difference should be further investigated as a higher prevalence of clinical attachment loss was observed among the ever smokers compared to the non smokers.

The proportion of subjects with gingivitis, slight periodontitis, or moderate to severe periodontitis was assessed. The results showed that moderate to severe periodontitis was more frequent in the cohort of ever smokers.

Odds ratios were used to determine the degree of association between smoking status and CAL, plaque score, and calculus amount (supra- and sub-gingival). The computation showed that the odds of developing severe periodontal disease (CAL > 4.5 mm) were twice as likely (2.08) for ever smokers versus non smokers. The results also showed that ever smokers were 2.62 and 2.38 times more likely to demonstrate moderate to heavy amounts of plaque and calculus, respectively, compared to those who did not smoke. A significant difference was found when comparing smoking status and supra-gingival calculus amounts and plaque scores.

Linear regression between CAL and periodontal case type was used to validate the estimation of the clinical team. The statistically significant association ($p < 0.0001$) confirmed that the clinical team was accurate and reliable in their CAL assessment and categorizing each patient appropriately.

DISCUSSION

The results of this study support previous research demonstrating that smokers are at greater risk of developing severe periodontal disease than non smokers.^{2,9-11} In this study, we evaluated various aspects of periodontal status. Severe periodontal disease was classified as having a mean CAL of > 4.5 mm. The overall periodontal status included PD and CAL among other assessments. Consistent with other research, the present study found that individuals were twice as likely to develop severe periodontal disease if they smoked. Generally, assessment of risk in other studies showed that smoking was associated with a 2- to 7-fold increase and even up to 11.8-fold increase in risk for having periodontal tissue loss.^{2,6,9,11,23,28,29} The large variability in this risk estimate differs across study type and most importantly, the different case definitions of periodontal disease. A narrower definition of periodontal disease could result in higher risk estimates.²³

When examining the group by smoking status, the non smokers had the lowest average CAL score; whereas former smokers had a higher average CAL than current smokers. This suggests that smoking may have an effect on CAL that appears after prolonged exposure to tobacco and may not be reestablished despite removing exposure. However, the trend in periodontal PDs (which is a determinant of CAL) showed that former smokers had deeper PDs than non smokers but not deeper than current smokers. Therefore, while overall CAL may not recover from smoking cessation, PD may improve from smoking cessation. This study did not focus on how long after cessation oral health ben-

efits can be observed; however, the benefits of cessation outweigh the harmful effects of smoking on periodontal health.

Reported oral hygiene behaviours, specifically, the frequency of visiting a dental professional for dental hygiene maintenance and the frequency of brushing more than once a day was higher than that which was reported by Al-Shammari et al.,³⁰ but more consistent with the behaviours reported by Payne and Locker.³¹ Based on the self reported responses, one might be led to believe that this cohort had good oral hygiene behaviours, and were therefore minimally at risk with regard to their access or awareness of dental care. However, as with most dental patients, it should be noted that the technique of brushing and flossing may be mechanically incorrect and more important, that the frequency of preventive dental behaviours was over reported among participants in this sample. The results of PD and clinical attachment measurements support the notion that while participants believed that their behaviours were adequate and appropriate, the specific measures demonstrate that these individuals were all at risk for periodontal disease.

The study also showed that self reported oral hygiene behaviours were not considerably different between ever smokers and non smokers. While this finding is important alone, the odds ratios demonstrated that ever smokers were more than twice as likely to show higher levels of plaque as well as both supra- and sub-gingival calculus, noted precursors of gingival inflammation leading to periodontal disease. Despite the best intentions of smokers to maintain good oral health through subscribing to regular dental visits and practices, periodontal disease and its related sequelae continue to develop. The results of the present study which demonstrate higher levels of plaque and calculus among smokers cannot be easily discerned, but may be either the consequence of tobacco exposure or could be attributed to poor brushing and flossing techniques.

Consistent with the Van der Weijden et al. study,³² no differences in bleeding tendency were detected between ever smokers and non smokers. However, Dietrich³³ reported smokers having less bleeding on probing than non smokers, which has been explained by the vasoconstrictive effects of nicotine on peripheral blood vessels. Conversely, one study, consisting of a cohort of individuals ages 19 to 40, reported smokers having more bleeding.²⁸

In the present study, the average CAL of slightly more than 4 mm suggests a higher than expected score, especially in a sample of individuals visiting an urban community dental clinic. Moreover, the reported clinical attachment score suggests that more individuals were experiencing severe periodontal disease than previously reported in other studies. For example, two relevant Canadian research studies^{22,23} reported 2.95 mm and 3.89 mm CALs respectively, when considering the entire sample. As well, another study of similar age distribution reported lower average CALs.³⁴

Although half of the participants reported ever using a tobacco product, even fewer indicated that they were current smokers. The prevalence of smokers within the present study (20 per cent) is consistent with the provincial estimate of 20.9 per cent and slightly below the regional estimate of 26.6 per cent.³⁵

Although the study demonstrated the residual effects of smoking on periodontal disease, the relatively small number of current smokers may have had a direct influence on several comparisons. In bivariate analyses, several variables were associated with clinical attachment loss. However, some variables were not significant under the ANOVA and/or Chi-Square tests. For example, a dose-response relationship was not found when "pack years" and mean PDs were compared. The interpretation of this finding, along with others, needs to be treated with caution, as the absence of a significant association may reflect the fact that the number of individuals who reported to be current smokers was too small for a relationship to be assessed.

Socio-economic status has also been reported to be related to smoking habits.¹¹ Since the socio-economic status of the sample was not identified, these factors may have exerted a confounding influence on the outcome variables implicitly and thus influenced the results.

The specific limitations of this study were related to issues of design, sample size, and reliability of self reported data. The cross sectional design may be considered a limitation because it collected data at a single episode in time, and yet using CAL as a main outcome variable, the researchers were able to demonstrate cumulative periodontal destruction over time.³⁶ The reliability of self reported data is also a limitation of the study. A measure of external validity was not used in the study to confirm the actual exposures to nicotine or tobacco related products. Thus, the reports of nicotine exposure may be suspect for some individuals who may have been less accurate in their estimates of tobacco product exposure.

The term consumption referred to tobacco product use at the time of the study and did not take into account changes over time or possible intervals when the individual was not smoking. The sample size of 100 respondents was reasonable, although the number of participants that reported tobacco use was consistent with the provincial estimates of smokers in a selected community.

CONCLUSION

This study was intended to be a survey of periodontal health exploring the association between smoking behaviours and periodontal health outcomes in a sample of individuals from Northwest Ontario. To date, few Canadian studies have been published on this topic, and no studies have been reported at the local level pertaining to the effects of tobacco on the periodontium. The current study is useful in that the findings reported here support the suggestion that a relationship exists between smoking and poor periodontal health. Yet most important, these findings suggest that the periodontal health outcomes demonstrated by smokers are observed even after quitting, and may not be reestablished simply by improving oral hygiene practices.

The clinical measurements complemented the information collected from the questionnaire to form a clinical data set in Northwest Ontario that did not previously exist. The research methods used in the present study may be used to initiate ongoing data collection of adults within the area. It is anticipated that this study may be of assistance to dental professionals, researchers and epidemiologists in learning

more about the tobacco-periodontal association as well as contributing to the current surveillance of the oral health profile of individuals in the area. This study confirms the need to identify tobacco users within the dental patient cohort. Thus, introducing counselling as a tobacco cessation intervention to prevent periodontal disease should include proper oral hygiene behaviours.

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1. **Page de titre** : Le titre doit désigner clairement le contenu de la soumission en 12 mots. Il devrait être suivi du nom de chacune des auteurs (prénom, initiale et nom de famille) ainsi que leurs titres universitaires et leurs institutions. Nom de l'auteure correspondante, adresse postale et courriel. Toutes les auteures doivent avoir participé suffisamment à l'ouvrage pour en assumer le contenu.
2. **Résumé** : Il ne doit contenir ni références ni titres de section. En voici les formats typiques :
 - a. **Compte-rendu d'étude et de recherche** : Contexte (question à l'étude, problème traité et raisons); Méthodes (comment l'étude a été effectuée); Résultats (principales données statistiques); Examen et conclusion (ce que les auteures ont tiré des résultats).
 - b. **Revue de la littérature** : Contexte (sujet ou procédure examinés); Méthodes (stratégie suivie, avec données de base); Résultats et discussion (constatations et analyse de la documentation); Conclusion (ce que les auteures ont tiré de l'analyse).
 - c. **Exposé de principe** : (même structure que la précédente)
 - d. **Observation**: Introduction (nature générale de la condition ou du programme); Description du cas (avec données); Discussion (du cas fondée sur la documentation), Conclusion.
3. **Mots clés** : Fournir une liste de 6 mots clés tout au plus ou de courtes phrases extraites du texte aux fins d'indexation. On utilisera de préférence les termes de la liste *Index Medicus* du *Medical Subject Headings* (MeSH).
4. **Texte**
 - a. **Compte-rendu d'étude et de recherche** : Travail original d'exploration sur les questions faisant l'objet de la recherche. La présentation de l'étude variera selon le type de recherche. **Introduction** : Énoncé concis du contexte et des raisons de l'étude. Elle devrait comprendre l'objet de l'étude et sa pertinence pour la pratique et la profession. Un bref aperçu des principaux thèmes tirés de la littérature courante indiquera le contexte permettant de comprendre l'objet de la recherche. **Méthodes** : Description claire de la méthodologie, y compris au besoin l'information afférente (nom et adresse du fabricant; ville-État-province-pays). Le plan de recherche doit être clair et approprié au sujet traité. **Approbation déontologique** : Toute recherche utilisant des êtres humains ou des animaux doit, selon le cas, s'accompagner d'une déclaration explicite attestant l'examen et

l'approbation de chaque étude par un comité de déontologie, conformément à l'*Énoncé de politique des trois Conseils : Éthique de la recherche*, 1998 (avec les modifications de 2005) ou la Déclaration d'Helsinki. Les éditeurs se réservent le droit de refuser un article s'ils doutent que la procédure appropriée ait été suivie. **Résultats** : Suite logique selon la méthode utilisée. Les données tabulaires devraient comprendre les statistiques des tests pertinents fondés sur les tests statistiques utilisés. **Discussion** : Interprétation des travaux à la lumière des autres travaux déjà publiés dans l'aire de recherche. Elle devrait souligner la contribution de l'étude à la pratique de l'hygiène dentaire ainsi que ses limites. **Conclusions** : Tirées de l'ensemble de l'étude originale dans le contexte de la littérature sur le thème étudié. On peut aussi souligner d'autres aires de recherches futures pour soutenir le développement des connaissances dans le secteur.

- b. **Revue de la littérature** : Synthèse des travaux publiés dans une aire de recherche particulière. Sa structure peut varier, allant de la revue systématique à un survol moins organisé de la documentation. Elle doit cependant être organisée logiquement. L'on encourage l'utilisation de tableaux, d'illustrations et de photographies. **Objet** : Énoncé concis du contexte et raisons de l'investigation. Il devrait en comprendre l'intention et la pertinence à la pratique et à la profession. **Méthodes** : Brève description des stratégies de recherche utilisées, notamment les bases de données consultées et les mots-clés utilisés dans les recherches. L'on documentera aussi les critères d'inclusion et d'exclusion, le cas échéant. **Résultats et discussion** : Résultats de la revue de la littérature, comparaisons et contrastes, ainsi qu'un relevé des écarts entre les résultats. **Conclusion** : Implications de l'enquête pour la pratique et la profession. La conclusion doit se fonder sur la littérature analysée.
- c. **Exposé de principe** : L'organisme soutenant l'énoncé doit être indiqué visiblement. Structure ouverte avec sous-titres selon la pertinence au sujet traité.
- d. **Observations** : Présentation de cas qui apportent un éclairage particulier pour la prise de décision face aux problèmes de la pratique. Le cas en question devrait différer dans une certaine mesure de ce que l'on considère comme étant un problème commun rencontré dans la pratique. Par exemple, il pourrait s'agir d'une perspective ou d'un défi unique en matière de diagnostic ou de traitement. Ce peut être aussi une question relevant d'un programme ou d'une intervention unique et de ses résultats. Les auteurs doivent présenter le consentement écrit de la clientèle identifiée dans le texte ou toute illustration au moment de la soumission du manuscrit, sans lequel celui-ci ne serait pas considéré. **Introduction** : S'il s'agit d'un cas clinique, énoncé du problème en question et bref aperçu de la maladie ou de la condition. S'il s'agit d'un cas de santé ou d'éducation affectant une collectivité ou une population, il faut décrire le problème ou la situation qui fait l'objet de l'étude. Quel avantage tirera-t-on de sa lecture? **Description du cas** : Caractère démographique de la clientèle ou population étudiée, avec intervention(s) cliniques ou autres. Si la prise en charge de la clientèle ou de la situation a impliqué la participation d'une équipe, décrire brièvement le rôle de chaque professionnel de la santé et donner les résultats des actions ou interventions. **Discussion** : Appréciation des résultats en regard de la documentation. À quoi devrait-on s'attendre particulièrement dans ce cas ou dans une situation semblable? **Conclusions** : Implications de l'étude pour la pratique clinique, les soins communautaires ou l'éducation publique. La conclusion doit se fonder sur le ou les cas présentés.

e. **Tribune libre** : Discussion ou expression équilibrée d'opinions sur les questions d'actualité soulevées dans la profession d'hygiéniste dentaire, ou réactions à des articles déjà publiés dans le journal dans les 6 mois précédents. La directrice de l'édition se réserve le droit de réviser les textes à des fins de clarté, mais le courrier ne sera pas soumis à l'évaluation par les pairs.

5. **Remerciements** : Reconnaissance de l'aide ou du soutien apporté par les personnes, organisations, institutions ou entreprises. Les personnes ou organismes mentionnés doivent avoir consenti, document à l'appui, à la publication de leurs noms, vu que cela peut laisser entendre qu'elles adhèrent au contenu, aux données ou aux conclusions de l'article.
6. **Maquette** : Elle comprend les illustrations, figures, photos, graphiques et toute autre expression graphique qui soutiennent ou rehaussent le texte dans le format de leurs fichiers originaux (fichiers sources).
- Sont acceptables les formats de fichier .eps, .pdf, .tif, .jpg, .ai, .cdr haute résolution, prêts à imprimer :
 - i. minimum de 300 dpi pour les gammes de gris et les demi-teintes couleurs,
 - ii. 600 dpi pour les dessins au trait,
 - iii. 1 000 dpi au minimum pour les maquettes pixelisées.
 - Les illustrations en couleur doivent toutes être en mode couleur CMYK (et non en RGB).
 - Elles devraient être numérotées à la suite les unes des autres et indiquées dans le texte.
 - Les auteurs doivent présenter une attestation par écrit du consentement de la source pour toute reproduction documentaire et en faire état dans la légende.
 - La rédaction se réserve le droit de reporter la publication d'un manuscrit accepté s'il survient des retards dans l'obtention des documents d'impression dont elle doute de la qualité.
7. **Données et tableaux** : Présentation en format Excel ou Word. Ces tableaux et données peuvent aussi être inclus à la fin du document Word.
8. **Abréviations et unités** : Elles doivent être conformes au Système international d'unités (SI). On peut utiliser les symboles SI et les symboles des éléments chimiques sans les définir dans le corps de l'article. Les abréviations doivent être indiquées entre parenthèses après la première mention de l'expression concernée dans le texte; ne pas dresser de liste d'abréviations.
9. **Information supplémentaire** : Toute information supplémentaire doit être fournie dans son format définitif, car elle ne sera pas corrigée et paraîtra en ligne exactement comme elle aura été présentée. Veuillez vous renseigner auprès de la Rédaction avant d'envoyer des fichiers de plus de 1 Mbit.

L'information supplémentaire est une matière évaluée par les pairs, qui a directement rapport avec les conclusions de l'article mais qui ne peut être incluse dans la version imprimée à cause des contraintes d'espace ou de format. Elle est affichée dans le site Web du journal et rattachée à l'article quand celui-ci est publié et peut comprendre du texte additionnel, des illustrations, des vidéos ou des tables exhaustives. Les sources d'information supplémentaire doivent être indiquées dans le texte et l'on doit faire parvenir à la Rédaction l'autorisation de s'en servir en même temps que la soumission.

10. **Style des références et citations** : La présentation des références s'inspire du style Vancouver, le préféré des journaux médicaux. Le style Vancouver est ainsi appelé parce qu'il a été mis au point par un groupe de travail qui avait tenu sa première réunion à Vancouver en 1978 et qui est devenu par la suite le Comité international d'éditeurs de journaux médicaux (CIEJM).

Les références devraient être numérotées dans l'ordre où elles sont citées dans le texte. Une référence citée plus d'une fois dans un même texte conservera toujours son numéro et l'auteur en fera rappel en utilisant des adverbes ou abréviations telles que *op cit*, *ibidem* ou *ibid*. On utilisera des chiffres arabes en exposant pour identifier les références dans le texte (e.g. ^{1,2} ou ³⁻⁶). La liste de la section Références suivra l'ordre numérique paraissant dans le texte.

Le style a été mis au point par la *US National Library of Medicine (NLM)* et adopté par le CIEJM dans le cadre de ses 'uniform requirements for manuscripts submitted to biomedical journals' (exigences d'uniformité pour les manuscrits soumis aux journaux biomédicaux) : < http://www.nlm.nih.gov/bsd/uniform_requirements.html >.

Samples

Journal articles

Standard article

Orban B, Manella VB. A macroscopic and microscopic study of instruments designed for root planing. *J Periodontol*. 1956;27:120-35.

Volume with supplement

Orban B, Manella VB. A macroscopic and microscopic study of instruments designed for root planing. *J Periodontol*. 1956;27 Suppl 7:S6-12.

Conference proceedings – abstract

Austin C, Hamilton JC, Austin TL. Factors affecting the efficacy of air abrasion [abstract]. *J Dent Res*. 2001;80(Special issue):37.

Organization as author

Canadian Dental Hygienists Association. Policy framework for dental hygiene education in Canada. *Probe*. 1998;32(3):105-7.

Books and other monographs

Personal authors

Hooyman NR, Kiyak HA. *Social gerontology: a multidisciplinary perspective*. 6th ed. Boston: Allyn & Bacon; 2002.

Editors as authors

Cairns, J Jr, Niederlehner BR, Orvosm DR, editors. *Predicting ecosystem risk*. Princeton (NJ): Princeton Scientific Publications; 1992.

No author

What is your role in the profession [editorial]? *J Dent Topics*. 1999;43:16-7.

Chapter in book

Weinstein L, Swartz MN. Pathological properties of invading

organisms. In: Soderman WA Jr, Soderman WA, editors. *Pathological physiology: mechanisms of disease*. Philadelphia: WB Saunders; 1974;457-72.

Conference paper

Calder BL, Sawatzky J. A team approach: providing off-campus baccalaureate programs for nurses. In: Doe AA, Smith BB, editors. *Proceedings of the 9th Annual Conference on Distance Teaching and Learning*; 1993 Sep 13-15; Ann Arbor, MI. Madison (WI): Ann Arbor Publishers; 1993;23-26.

Scientific or technical report

Murray J, Zelmer M, Antia Z. *International financial crises and flexible exchange rates*. Ottawa: Bank of Canada; 2000 Apr. Technical Report No. 88.

Personal communication

These should be cited in parentheses in the body of the text. The author should obtain permission from the source to cite the communication.

Other publications

Newspaper article

Rensberger B, Specter B. CFCs may be destroyed by natural process. *Globe and Mail*. 1989 Aug 7;Sect. B:24.

Audiovisual

Wood RM, editor. *New horizons in esthetic dentistry* (videocassette). Chicago: Chicago Dental Society; 1989.

Unpublished material

Smith A, Jones B. The whitening phenomenon. *J Nat Dent*. (Forthcoming 2004)

Electronic material

Monograph on Internet

National Library of Canada. *Canadiana quick reference* [monograph on the Internet]. Ottawa: The Library; 2000 [cited 2003 Nov 30]. Available from: www.nlc-bnc.ca/8/11/index-e.html

Journal on Internet

Walsh MM. Improving health and saving lives. *Dimensions Dent Hyg* [serial on Internet] 2003 Nov/Dec [cited 2004 Jan 12]:[about 7 p.]. Available from: www.dimensionsofdentalhygiene.com/nov_dec/saving_lives.htm









Homepage/web site

Canadian Dental Hygienists Association [homepage on the Internet]. Ottawa: CDHA; c1995 – [cited 2003 Nov 20]. Available from: www.cdha.ca

(Révisée novembre 2007)

CDHA Dental Hygiene Recognition Program

The CDHA is pleased to announce the 2008 Dental Hygiene Recognition Program. This program, made possible through the contributions of CDHA Corporate Partners, is designed to recognize distinctive accomplishments of CDHA members, including both practising and student dental hygienists. Entry details are available on the CDHA members' website, in the "Networking and Recognition" section.






		PRIZE CATEGORIES
		<p>Crest Oral-B/CDHA Dental Hygiene Baccalaureate Student Prize</p> <ul style="list-style-type: none"> • One \$1,500 prize to be awarded to a dental hygiene student for contributing to the advancement of the profession in the context of educational and volunteer activities, and to be used towards education expenses.
		<p>Crest Oral-B/CDHA Dental Hygiene Diploma Student Prize</p> <ul style="list-style-type: none"> • One \$1,000 prize to be awarded to a dental hygiene student for contributing to the advancement of the profession in the context of educational and volunteer activities, and to be used towards education expenses.
		<p>Crest Oral-B/CDHA Health Promotion Prizes</p> <ul style="list-style-type: none"> • These three prizes are awarded for the creative promotion of dental hygiene, including community impact, education, and innovative partnerships and include: <ol style="list-style-type: none"> 1. Individual prize of \$1,000 2. Clinic Team prize of \$2,000 3. Dental Hygiene Schools prize of \$2,000 <p>* Half of each health promotion prize will be shared with the local dental hygiene society.</p>
		<p>Dentsply/CDHA Leadership Prize</p> <ul style="list-style-type: none"> • One \$2,500 prize to be awarded in recognition of a significant contribution to the local, academic or professional dental hygiene community through involvement and leadership.
	Meloche Monnex Insurance for professionals and alumni	<p>TD Meloche Monnex/CDHA Visionary Prize</p> <ul style="list-style-type: none"> • One \$2,000 prize awarded to a student in a masters or doctoral program in dental hygiene in recognition of a vision for advancing the dental hygiene profession.

Get involved and you could win!

Application deadline is **November 28, 2008**. The CDHA will make a public announcement of the prize winners in April 2009, during National Oral Health Month.

Programme de reconnaissance en hygiène dentaire de l'ACHD

L'ACHD est heureuse de présenter le programme de reconnaissance en hygiène dentaire pour l'année 2008. Ce programme, rendu possible grâce aux dons des entreprises partenaires de l'ACHD, est conçu pour reconnaître les réalisations distinctives des hygiénistes dentaires et des étudiantes et étudiants en hygiène dentaire membres de l'ACHD. Les détails concernant les procédures d'inscription sont affichés sur le site Web réservé aux membres de l'ACHA, à la section "Networking and Recognition". La date butoir pour soumettre les demandes d'inscription aux différents prix est le **28 novembre 2008**.

CATÉGORIES DE PRIX	
	<p>Prix de Crest Oral-B/ACHD destiné aux étudiantes et étudiants bacheliers en hygiène dentaire</p> <ul style="list-style-type: none"> Un prix de 1 500 \$ offert à une étudiante ou un étudiant en hygiène dentaire au niveau du baccalauréat pour sa contribution à l'avancement de la profession dans le cadre d'activités éducatives et d'activités de bénévolat.
	<p>Prix de Crest Oral-B/ACHD destiné aux étudiantes et étudiants diplômés en hygiène dentaire</p> <ul style="list-style-type: none"> Un prix de 1 000 \$ offert à un étudiant ou une étudiante, inscrit(e) dans un programme en hygiène dentaire menant à un diplôme, pour sa contribution à l'avancement de la profession dans le cadre d'activités éducatives et d'activités de bénévolat.
	<p>Prix Promotion de la santé de Crest Oral-B/ACHD</p> <ul style="list-style-type: none"> Les trois prix suivants sont offerts pour la promotion créative de la profession de l'hygiène dentaire. Les inscriptions seront jugées 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 : <ol style="list-style-type: none"> Prix individuel de 1 000 \$ Prix d'équipe clinique de 2 000 \$ Prix d'école d'hygiène dentaire de 2 000 \$ <p>* La moitié de chaque prix accordé pour la promotion de la santé sera partagée avec le chapitre local de l'association d'hygiène dentaire des gagnantes et gagnants.</p>
	<p>Prix Leadership Dentsply/ACHD</p> <ul style="list-style-type: none"> Un prix de 2 500 \$ offert à un étudiant ou une étudiante, inscrit(e) dans un programme en hygiène dentaire, en reconnaissance d'une contribution significative à la communauté locale académique ou professionnelle de l'hygiène dentaire par son engagement et son leadership.
	<p>Prix Visionnaire de TD Meloche Monnex/ACHD</p> <ul style="list-style-type: none"> Un prix de 2 000 \$ offert à un étudiant ou une étudiante, actuellement inscrit(e) dans un programme de maîtrise ou de doctorat lié à l'hygiène dentaire, en reconnaissance de sa vision de l'avenir pour l'avancement de la profession de l'hygiène dentaire.



Independent
Practice Success

*Interested in having your own
independent dental hygiene practice?*

Then you won't want to miss this
information-packed, **one-day workshop:**

Tools for an
**Independent
Practice**

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If you think you might be ready to go out
on your own, but don't know where to
start, this workshop is for you.

- Learn from **knowledgeable experts** in the fields of both dental hygiene and regulated health practices.
- Listen to the **experiences of dental hygienists** who already have their own dental hygiene businesses.
- Find out about everything from **equipment and facility needs, timelines and financial projections to risk management and liability.**

Space is limited!

For more information, visit
www.cdha.ca/independentpractice



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

Highlights of Board meeting

The CDHA Board of Directors held its biannual meeting at its national headquarters in Ottawa, February 28-March 1, 2008. The meeting successfully drew together the Board's signature visionary governance to integrate its business transactions and professional education. The Board elected Anna Maria Cuzzolini of Quebec as President-Elect for the term 2008-2009, and her fellow members extend their congratulations on her appointment.

The Board reviewed many documents and reports in its environmental scan of the professional environment of dental hygiene, including provincial reports and an update on the changes for dental hygienists in the Canadian Armed Forces. Mandatory provincial licensing is now required for dental hygienists practising within the Canadian Forces Dental Services. Other areas of interest in the professional landscape included the report on the dissolution of the Dental Hygiene Educators of Canada (DHEC), with the incorporation of an education mandate into CDHA member services. The creation and launch of several new online continuing education programs on the CDHA website were also discussed, including *Self Initiation for Dental Hygienists* and the certificate program, *Independent Practice for Dental Hygienists*.

The Board continues to identify and seek educational opportunities to assist in its visionary leadership role of the association. Executive Director, Susan Ziebarth, provid-

ed an overview on the insurance industry and its impact on dental hygiene practice in Canada. Susan Ziebarth explained the issue of dental hygiene claims and unique provider numbers as well as the continuing developments in CDHA's relationship with the insurance industry. Anna Maria Cuzzolini, President-Elect, delivered an informative overview of the practice of dental hygiene in her province, Quebec.

In a commitment to reach out to its membership, CDHA has adopted more diverse delivery opportunities of annual events, moving away from a single national conference. The Board participated in a facilitator training workshop, delivered by Dr. Sandy Kolberg, to assist in its role at the upcoming CDHA Leadership Invitational taking place from 26-28 May in Banff, Alberta. Two Student Summits are also planned in Toronto and Vancouver this year. CDHA invites its members to attend *Product Showcase Goes Live* in Toronto this June, an event that offers an opportunity to access first hand information on oral health products and equipment.

The Board has undertaken a research project to learn more of the culture of dental hygiene in Canada. The results of this study will assist the Board and CDHA to communicate more effectively with its members and to tailor materials and educational curricula to members' identified areas of interest.

Other news items

New sources for public health information

Beginning 1 April 2008, Canadians will have access to timely, easy-to-use and credible public health information through the Public Health Agency of Canada's (PHAC) website: <http://www.phac-aspc.gc.ca>. The Agency invites you to subscribe to a new e-alert feature. Please visit <http://www.phac-aspc.gc.ca/chn-rcs/e-alert-eng.php> to be added to the distribution list.

The Canadian Public Health Association (CPHA) has also launched a content-rich infectious disease web portal <http://www.cpha.ca/en/portals/IDP.aspx> that promises to be an information gateway that your clients, family, staff, or colleagues can use. You will find helpful web links and a comprehensive range of resources to help your communities remain healthy and safe, including:

- Immunization posters and influenza season resources
- Pandemic planning tools
- HIV/AIDS booklets, posters and best practices
- Brochures and posters on keeping a home healthy
- Information on a full range of CPHA projects

Put up a poster, print off a handout or pass on the link. Small steps make a big difference.

Oral Health in Long-term Care Facilities – CIHI data now available

As part of CDHA's mandate to help you access data for dental hygiene care and policy research, we are working with the Canadian Institute for Health Information (CIHI) to bring you data on the oral health of residents in long-term care facilities in Ontario, British Columbia and a few locations in Nova Scotia. CIHI presently has over half a million records from these three geographical locations in its Continuing Care Reporting System (CCRS). The assessment form contains information pertaining to the following issues:

- How a resident maintains personal hygiene, including brushing teeth.
- Oral problems, including chewing, swallowing, and mouth pain.
- Oral status and disease prevention, including dentures, natural teeth, broken, loose or carious teeth, inflamed gums, swollen or bleeding gums, oral abscesses, and daily mouth care.

CIHI can create an aggregate data file, or they may also be able to look at some specific parameters that you are interested in. To learn more about CIHI and how to request data, please visit www.cihi.ca and click on "Research & Reports". To contact the CCRS team for more information about data that might be available for your dental hygiene research, please contact ccrs@cihi.ca.

Not all evidence is created equal

CDHA staff

The philosophical roots of evidence based practice (EBP) can be traced to Pierre Charles Alexander Louis (1787-1872) of the Hospital of Paris, France.¹ He was the founder of the “numerical method”, or in current terminology “biostatistics”, which is one of the cornerstones of scientific inquiry.

*EBP is an approach to decision making in which the clinician uses the best evidence available, in consultation with the patient, to decide upon the treatment option that suits the patient best.*²

More recently, the term “evidence based medicine” was coined at McMaster Medical School in Hamilton, Ontario, in the 1980s to identify a health care strategy that follows four steps:

1. Formulating a clinical question based on the client’s problem.
2. Searching scientific journals for relevant literature.
3. Appraising information for its validity and usefulness.
4. Implementing relevant findings in clinical practice.

Table 1: Categories of periodicals

Criteria	Scholarly or refereed journals	Professional or trade journals	Popular periodic magazines
Purpose of publication	Report original research and share in-depth analysis of issues.	Provide career information and current research in a specific discipline.	Entertain and inform in a story format without in-depth analysis.
Intended audience	Researchers, scholars, students.	Professionals in the field, researchers, students.	General public.
Physical appearance	Lengthy articles with abstracts, graphs, tables, citations; usually plain black print on white paper.	Some research articles; do not necessarily follow a specific format; some photographs or graphics.	Short articles illustrated with many photographs; extensive advertising.
Article characteristics	Longer and structured; will include literature review, methodology, results, conclusion plus bibliography in standard format.	Length varies; bibliography and footnotes may be provided.	Brief, bibliography usually not provided, references may be cited in text.
Author information	Experts or noted professionals, most often affiliated with an academic institution; authors’ credentials included.	Practitioners, educators or specialists in the profession.	Reporters, magazine staff, freelance writers.
Bibliography	References in standard format included at the end of each article.	May be provided.	Rarely included.
Peer review policy	A formal review process by experts or authors’ peers.	May include some peer-reviews; most are reviewed by professional editors.	No formal process; reviewed by staff editors.
Language	Words specific to discipline, higher level language.	Language specific to profession, technical jargon.	Non-technical; simple language can be understood by anyone.

Reliable access to appropriate and scientifically sound information is essential for the provision of evidence based health care. Are you adhering to professional standards and keeping up with research evidence in order to make the best practice decisions? There are three options on gathering information available to the dental hygiene practitioner:

1. Do nothing...and quickly become “out of date”.
2. Depend completely on courses or conferences.
3. Select the main academic and professional journals and read issues from cover to cover.

In previous issues of the *CJDH* we explored the use of web based resources; in this column and issue we compare the various categories of periodicals in order to help you make the important distinction between scholarly or “refereed” publications, professional/trade journals and popular magazines. When you select articles for practice research, you need to differentiate between scientific and popular material. The following descriptions in Table 1 are only general rules; there are exceptions and many grey areas. While the physical appearance of the publication provides clues, it is also necessary to evaluate content for credibility. Do not base your decision as to the usefulness and validity of the information on only one or two criteria.

Remember to incorporate these elements when formulating your question about clinical practice:

- Patient: e.g. age, sex, general health status, ethnicity.
- Intervention: e.g. diagnostics, care plan, self-care.
- Comparison Intervention: e.g. another therapy, placebo.
- Outcome: e.g. anticipated and actual effects of care.

By conscientious use of the appropriate resources you can bridge the gap between research evidence and clinical decisions and procedures. It is critical to select the best available evidence to support your professional experience and judgment and ensure that your clients receive optimum care.

REFERENCES

1. Cassedy, J. *American Medicine and Statistical Thinking, 1800-1860*. Cambridge: Harvard University Press. 1984.
2. Muir Gray, J.A. *Evidence-based Healthcare: How to Make Health Policy and Management Decisions*. London: Churchill Livingstone. 1997.

The CDHA welcomes your feedback: library@cdha.ca

Information management

In a previous issue of *CJDH*, the News column featured an excerpt "Work stress among health care providers". As new opportunities open to dental hygienists to set up independent practice in certain provinces, the dental hygienist is likely to be subjected to information overload and stress in the quest to establishing herself as an entrepreneur. Setting up an independent practice and abiding with the governmental regulations of small business ventures, developing business skills to manage independent practice and human resource skills to hire the right staff, the need to keep abreast of current research and evidence-based practices, the necessity of learning about the diverse cultural competencies in order to optimize client care, managing finances to run an independent practice, using competition to your advantage... too much to absorb too quickly. The Net need not be a hostile cyber entity if you know where to look and to apportion your time to channels of information that directly benefit you. Put together are some worthwhile avenues of information for you to explore.

Canadian Dental Hygienists Association (CDHA) online courses: specifically designed to suit dental hygienists.

www.cdha.ca/content/continuing_education/ce_home.asp

OR

www.cdha.ca/members/content/continuing_education/ce_home.asp

a. Self-Initiation for dental hygienists

The objective of Dental Hygiene Regulatory Authorities across Canada is to offer assurance to the public that dental hygienists are fully competent to provide safe and effective care. The course *Self-Initiation*, available bilingually, for dental hygienists will ensure registrants have comprehensive knowledge of the dental hygiene process of care which forms the framework within which dental hygiene therapy is conducted. This course is an excellent quality assurance review for all dental hygienists. It consists of 8 sections:



Section 1: Introduction
 Section 2: DH Process of Care – Assessment
 Section 3: DH Process of Care – Diagnosis and Planning
 Section 4: DH Process of Care – Implementation
 Section 5: DH Process of Care – Evaluation
 Section 6: Clients with Special Needs
 Section 7: Jurisprudence and Record Keeping
 Section 8: Health and Safety

b. Certificate program: Independent Practice for Dental Hygienists

consists of a series of five online courses. These informative and practical courses will provide the necessary knowledge and tools for dental hygienist entrepreneurs to move forward with their dream of establishing and operating their own practices.



The CDHA welcomes your feedback: journal@cdha.ca

The certificate program includes:

- Course 1: Your Vision of a Dental Hygiene Practice
- Course 2: Preparing Your Financial Business Plan
- Course 3: Your Marketing and Communication
- Course 4: Your Role as Manager
- Course 5: Bringing Your Dream to Reality

Canada Revenue Agency (CRA) on seminars for small businesses

These popular in-house tax seminars give you important information about starting a small business, registering for a GST/HST account, payroll requirements, T4 slip preparation, and more. Pre-registration is required as seminars are booked well in advance. Resources from the CRA website are:

<http://www.cra-arc.gc.ca/events/menu-e.html>

<http://www.cra-arc.gc.ca/E/pub/tg/t4069/t4069-e.pdf> -
 Module I: Government Services

<http://www.cra-arc.gc.ca/E/pub/tg/t4072/t4072-e.pdf> -
 Module III: Income Tax

Ottawa Centre for Research and Innovation (OCRI) Entrepreneurship Centre

http://www.entrepreneurship.com/online_media/

The Business Tutorials are online training modules designed to help you learn the fundamentals of important business subjects. The modules include valuable content taught by subject matter experts. In addition, each program has links to other sources of relevant information in the "Resources" sections of the module.

Among other in-house sessions, here are a few to interest you: make your website your best employee, book keeping, and business planning basics. These sessions require personal attendance, but the website offers a wealth of information on business practices and online tutorials. OCRI also recommends the following as good sources of information:

- www.bdc.ca – Business Development Bank of Canada
- www.cobsc.org – Canada-Ontario Business Service Centre
- www.strategis.ic.gc.ca – Industry Canada
- www.bplans.com – Business Plans
- <http://bizpal.ca/entrepreneurs.shtml> – BizPaL

Email overload

Manage your time spent on emails both at work and at home. The Harvard Business School Working Knowledge has some tips on mastering email overload.

<http://hbswk.hbs.edu/archive/4438.html>


Business plans: why you need one and how to write one. Download this 55 page document from the OCRI Entrepreneurship Centre website.

<http://www.entrepreneurship.com/tools/pdf/businessPlanWorkbook.pdf>

Western Economic Diversification Canada

http://www.wd.gc.ca/7127_ENG_ASP.asp


Banks too have online help to guide you with your business plans http://www.scotiabank.com/cda/content/0,1608,CID6577_LIDen,00.html



Guidelines for authors

Canadian Journal of Dental Hygiene

What does it take to submit a paper to this journal? Read the journal's *Guidelines for authors* or *Instructions aux auteures* available online at <http://www.cdha.ca/content/resources/journal.asp>



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

Aider vos clients à améliorer leur santé est maintenant simplifié.



La recherche confirme chaque jour le lien direct entre une bouche en santé et un corps en santé. Maladies pulmonaires, maladies du cœur, diabète... Ce que vos clients ignorent peut nuire à leur santé.

Vous leur en parlez, mais parfois vos paroles n'ont pas toute la portée souhaitée.

Dans le but de vous aider à rendre votre message plus percutant, l'Association canadienne des hygiénistes dentaires a produit à votre intention un jeu de nouvelles ressources éducatives. « *Une bouche en santé, c'est un corps en santé* » comprend quatre dépliants, deux feuillets d'information et une affiche.

Pour obtenir un bon de commande et connaître le prix de ces ressources, rendez-vous dans la section réservée aux membres du site de l'ACHD à www.cdha.ca.


N'attendez pas! De quelques clics, commandez ces ressources afin d'assurer à vos clients une meilleure santé buccale et un corps en bonne santé.

www.cdha.ca



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

Helping your clients achieve better health just got easier.



The direct connection between oral health and overall health is becoming increasingly clear. Lung disease, heart disease, diabetes—what your clients don't know *can* hurt them.


You talk to them but sometimes, talk just isn't enough.

Now you can reinforce your message with a new series of educational resources available exclusively from the Canadian Dental Hygienists Association. *A healthier mouth for a healthier you!* includes a set of four brochures, two fact sheets and a poster.

For pricing information and an order form, visit the CDHA website at www.cdha.ca and log into the members-only section.

Order now! Your clients may be just a few clicks away from better oral—and overall—health.

www.cdha.ca



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

CLASSIFIED ADVERTISING

CDHA and *CJDH* are not responsible for classified advertising, including compliance with any applicable federal and provincial or territorial legislation.

ALBERTA

LLOYDMINSTER *Company/practice name:* Azhr Dental. *Position available:* General Dentistry – Dental Hygienist. Full time. *Position description:* Great opportunity for experienced and new graduates. Located in the growing city of Lloydminster, AB, our progressive practice has four newly renovated, fully equipped digital operatories. Only 2.5 hours from Edmonton, Lloyd is an ideal community to build a career in and raise a family. Large patient pool. Immediate start. Competitive pay. *Contact:* Individuals committed to delivering the highest level of patient care and customer service contact Sara: **780-815-0905**. Email: azhrdental@gmail.com

MEDICINE HAT *Company/practice name:* River Centre Dental Clinic. *Position description:* Dental Hygienist, full time. Our computerized group dental practice may be the answer if you are looking for a change. We are a progressive family oriented practice, with a team offering services in all areas of dentistry. Our practice is seeking a friendly, compassionate, progressive hygienist with excellent communication skills for a full time position beginning immediately. *Contact:* Please forward your resume including references to: Val Leitch, River Centre Dental Clinic, 378 First Street SE, Medicine Hat, AB T1A 0A6. Fax: **403-529-9043**. Email: rivercentre@thehat.ca Telephone: **403-526-5991**.

PEACE RIVER *Company/practice name:* West Hill Dental. *Position:* Registered Dental Hygienist. *Term:* 1 Sept 2008, one year. *Description:* Cosmetic Practice. Solo dentist team of RDA IIs. Dentrax. Schick Digital Xray.Laser Dentistry. Continuing Education at Las Vegas Institute Travel Stipend for Continuing Education with 12 month contract. RDA II assistance. Propy jet, Cavitron, Zoom 2 Bleaching. Working interview and tour of town a must! WalMart 2008 summer and Tim Hortons. Join us on our next course in Vegas with annual contract commitment. Hourly wage from \$50.00-\$65.00/hour, depending on qualifications and experience. *Qualifications:* At least one year experience. Local Anaesthetic Module. Assisting background. Reception background. Experience managing Hygiene patient pool. Experience with Dentrax. *Contact:* Telephone: **780-624-2004**. Fax: **780-624-8596**. Email: whdental@telus.net

NEW BRUNSWICK

FREDERICTON *Position description:* Hygienist position available. Busy two-dentist practice requires full-time hygienist starting 16 June 2008. Efficient hygiene program developed. Our practice is looking for an enthusiastic, self-motivated individual. Two-chair hygiene bay with modern equipment. Competitive salary with attractive working hours. *Contact:* Please forward resume to Dr. Deborah Stymiest / Dr. Joseph Cairns, 200 Main Street, Fredericton, NB E3A 1C8. Telephone: **506-458-9583** or Fax: **506-458-9481**. *Qualifications:* Current New Brunswick Dental Hygienist licence.

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NOVA SCOTIA

TRURO *Company/practice name:* Pleasant Street Dental Centre Inc. *Position available:* Dental Hygienist. Part time. *Position description:* One to two days per week. To work for a maternity leave cover. Busy family practice in downtown Truro, Nova Scotia. Start mid-March 2008. *Contact:* Reply to Imoyles@eastlink.ca or telephone **902-893-0134**, and ask for Linda.

PRINCE EDWARD ISLAND

O'LEARY *Company/practice name:* Dr. James A. Hanson Professional Corp. *Position available:* Hygienist. Full time. *About O'Leary:* O'Leary, P.E.I. is a vibrant community of 1,000 people, 56 kms. from Summerside, P.E.Island's second largest city. This practice is in the centre of Prince County, and serves a population of 15,000 people. Experience beautiful Prince Edward Island, top wages, and a low cost of living. We are close to World Class beaches and golfing, and are only minutes to curling and hockey rinks, schools and a regional hospital. *Qualifications:* Registered Dental Hygiene Diploma. *Position description:* Work 4 days per week with friendly, dedicated staff. *Contact:* Please contact Dr. James A. Hanson, Box 159, O'Leary, PEI COB 1V0. Telephone **902-859-2366** or fax **902-859-1521**.

INTERNATIONAL

GERMANY Munich, Lake Constance, Stuttgart. *Company/practice name:* EMCdent *Position description:* Dental Hygienist. Positions available in state of the art Dental-offices in periodontally aware, U.S. trained, multi-specialist practices. Full time position with excellent salary and benefits. Knowledge of German requested. *Contact:* Elke Mehrfeld, Neue Str.54, 70186 Stuttgart, Germany. Telephone: **011-49-711-2201-300**. Email: info@emcdent.de

OMAN Muscat, the beachfront capital of Oman. *Company/practice name:* American Dental Center *Position description:* Opportunity for full time hygienist. Practice quality dentistry in an exclusive facility along with our clinical team: General dentist, oral surgeon, orthodontist, endodontist. Interact with many nationalities and friendly, hospitable local population. Must be interested to explore and eager to travel. Compensated at 40% of production. Health and malpractice insurance. *Contact:* Serious applicants email CV info@adcoman.com or fax **011-968-2469-5433**.

CDHA classifieds

CDHA classified advertisements are listed primarily on the CDHA website (www.cdha.ca) in the Career Centre of the "Members only" section. Online advertisers can list their advertising in the *Canadian Journal of Dental Hygiene* for an additional fee. For pricing details, visit http://www.cdha.ca/content/corporate_opportunities/hire_a_hygienist.asp

CDHA classified advertising reaches more than 11,000 members across Canada, ensuring that your message gets to a target audience of dental hygienists in a prompt and effective manner. Contact CDHA at info@cdha.ca or 613-224-5515 for more information.

ABOUT THE COVER

People through the ages did spend time trying to take care of their teeth and dental hygiene.

The front covers of Volume 42 feature herbs used as remedies in dental treatments during the Renaissance period, and this note provides a historical perspective of their traditional use in oral or dental care, and hygiene.

Volume 42.3, May-June 2008

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Inset of cornflower/©iStockphoto.com/milansys.



Centaurea cyanus: also known as bluebottle, cornflower, hurtsickle, bachelor's button, basket flower, boutonniere flower. It grew in fields, and often blunted the edge of a farmers sickle. An infusion of bluebottle flowers was used as an oral remedy. "The juice is very effectual to heal all ulcers and sores of the mouth".

Nicholas Culpepper, *The Complete Herbal and the English Physician*. H. Sales, 1981; 26-27. Reproduced from an original edition J. Gleave, Manchester, 1826.

