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

CJDH JCHD

CDHA ACHD

QUARTERLY ISSUE · NOVEMBER 2011 VOL. 45, NO. 4

Use of fluoride varnish in elderly in LTC facilities

Halitosis from tonsilloliths

Obstructive sleep apnea and the dental hygienist

Recognizing and reporting child abuse

The Children's Oral Health Initiative Program in action, Duncan, British Columbia, 270

THE OFFICIAL JOURNAL OF THE CANADIAN DENTAL HYGIENISTS ASSOCIATION

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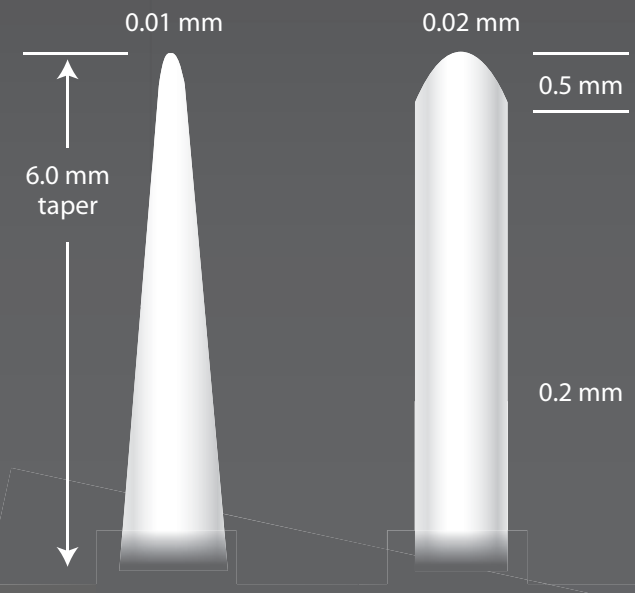

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C11100

A profession on the move

Arlynn Brodie,
MHS, BPE, DipPSM, RDH

This is my first note of communication as President with you, members of CDHA; thank you for your continued support of the profession. It is the dedication of our members that has built CDHA into a strong professional voice. CDHA will be fifty years old in 2013, a significant milestone! We have accomplished many things—the development of provincial associations, self regulation in most provinces and the development of national competencies; a step towards standardization for all dental hygienists across the country. Nationally, we have grown to a membership of 16,500; a strong representation! At this point it seems natural to ponder about what the future holds for CDHA and the profession.

First, what will the next decade of growth look like, and what direction of growth would most benefit the profession? Second, how can CDHA help facilitate the desired direction of growth?

> *The greater danger for most of us is not that our aim is too high and we miss it, but that it is too low and we reach it.* — Michelangelo

For many years CDHA has identified public recognition as an "End", or goal of CDHA, stating that our "member's value is recognized by the Canadian public." I would suggest that today, public recognition of the dental hygiene profession is crucial to the future growth of our profession. Equally important, and in addition to *public* awareness, is recognition of the dental hygiene profession by *other health professions*.

Healthcare delivery is changing; the Canadian Medical Association recently stated, "*A strong primary care foundation and collaboration and communication within and between health professional disciplines along the continuum are essential to achieving patient-centered care*". In order for the dental hygiene profession to be included in the changes and advances in healthcare delivery in Canada, we need to be recognized as an interdisciplinary stakeholder, or "player" in the bigger healthcare picture.

If this is the next direction for our profession, what role does CDHA have to play? I see CDHA's involvement as twofold. First, CDHA's role will be to initiate and support awareness programs targeting the public and other health professionals, highlighting our role as a healthcare provider, specializing in oral health. Second, CDHA will proactively seek interprofessional association with other healthcare providers, championing the dental hygiene profession as an interdisciplinary stakeholder.

Many of you may question how you could contribute to

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CDHA welcomes your feedback: president@cdha.ca

Une profession qui bouge

C'est la première communication que j'adresse en tant que présidente, aux Membres de l'ACHD. Merci du soutien constant que vous apportez à la profession. C'est le dévouement de nos membres qui a fait de l'ACHD une forte voix professionnelle. L'ACHD aura cinquante ans en 2013, une étape importante ! Nous avons accompli beaucoup : le développement des associations provinciales, l'autoréglementation dans la plupart des provinces et le développement de compétences nationales; un pas vers la standardisation de toutes les hygiénistes dentaires dans tout le pays. À l'échelle nationale, nous avons grandi, portant nos adhésions à 16 500 membres; une forte représentation ! Il semble alors naturel de réfléchir à ce que nous l'avenir réserve pour l'ACHD et la profession.

D'abord, à quoi ressemblera la prochaine décennie de croissance et quelle orientation bénéficiera le plus à la profession ? Ensuite, comment l'ACHD facilitera-elle la croissance dans l'orientation désirée ?

Pendant plusieurs années, l'ACHD a considéré la reconnaissance publique comme étant une « Fin », un but de l'ACHD, affirmant que « la population canadienne reconnaît la valeur des membres ». Je vous suggérerais aujourd'hui que la reconnaissance publique de la profession de l'hygiène dentaire est cruciale pour la croissance de notre profession. Également importante, et en outre de la sensibilisation publique, *notons la reconnaissance de la profession de l'hygiène dentaire par les* autres professions de la santé.

> *Le plus grand danger pour la plupart d'entre nous n'est pas que notre but soit trop élevé et que nous le manquions, mais qu'il soit trop bas et que nous l'atteignions.* — Michel-Ange

La prestation des soins de santé évolue; l'Association médicale canadienne disait récemment : Une base solide de soins de santé primaires ainsi que la collaboration et la communication au sein et entre les disciplines professionnelles de la santé dans le continuum des soins sont essentielles pour centrer les soins sur le patient. *Pour inclure la profession de l'hygiène dentaire dans l'évolution et le progrès de la prestation des soins de santé au Canada, nous devons être reconnues comme des parties prenantes, ou « participantes » dans le cadre élargi des soins de santé.*

Si c'est la prochaine orientation que doit suivre notre profession, quel rôle l'ACHD devrait-elle assumer ? Je vois une double implication pour l'ACHD. Premièrement, elle devra initier et soutenir des programmes de sensibilisation à l'intention de la population et des autres professions de la santé, souligner notre rôle de dispensatrices de soins de santé, spécialisées dans les soins buccaux. Deuxièmement, l'ACHD devra chercher avec

…suite page 211

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Editorial contributions to the *CJDH* do not necessarily represent the views of the CDHA, its staff or its board of directors, nor can the CDHA guarantee the authenticity of the reported research. As well, advertisement in or with the journal does not imply endorsement or guarantee by the CDHA of the product, service, manufacturer or provider.

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L'ASSOCIATION CANADIENNE DES HYGIÉNISTES DENTAIRES

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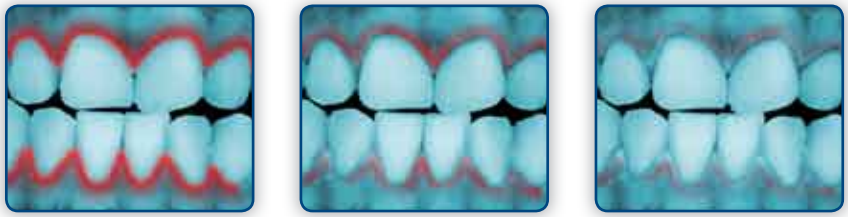

Before using the system: Significant gingivitis

2 weeks of use: Initial improvement of gingivitis

6 weeks of use: Further improvement of gingivitis

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[1] After 6 weeks of use. Compared to a dental prophylaxis and brushing with a regular manual toothbrush and anti-cavity toothpaste.

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Ondina Love, CAE
Executive Director

Dental hygienists as key influencers

I read a very interesting book this summer entitled, *Influencer: The Power to Change Anything*.[1]

This book truly resonated, as I believe dental hygienists are key influencers. Clinical dental hygienists have a tremendous impact and influence on their clients' oral and overall health. Armed with the knowledge and practice of conducting a thorough assessment, dental hygienists are able to identify areas of concern in their clients and possible courses of action. This is where the key role of "influencer" comes into play. Dental hygienists can influence lifestyle changes that can have a very positive and powerful impact on oral and overall health, such as smoking cessation. Dental hygienists can influence clients who are facing social issues, such as elder abuse. Dental hygienists can influence the choice of oral health products to best meet the needs of their clients.

There are many dental hygienists who engage in the role of key influencer, outside of the traditional dental practice. Those working in education exert a powerful influence on the minds of those being educated to join the profession. Members working in research examine important questions in dental hygiene and oral health; through their work and peer reviewed publications, they become key influencers in practice and educational programs. Members who work in public health are key influencers in health promotion and prevention programs and practices. Members working with our industry partners have opportunity to influence the types of products that will improve the oral health of Canadians.

Dental hygienists play a key influencer role in their national professional association—CDHA. Dental hygienists have lobbied government at the federal and provincial levels on important issues for the profession and on Canadians' oral health. These issues include self regulation, funding for public oral health programs, community water fluoridation and more.

Dental hygienists also share their knowledge and expertise through various media channels, thus reaching hundreds of thousands of Canadians with important oral health messages. Members have done this through interviews with newspapers and magazines as well as through such social media channels as Facebook, Twitter and blogs. Dental hygiene leaders serving on provincial and national boards are key influencers on policy decisions. Dental hygienists who volunteer on committees have the "voice" to influence education, research, accreditation, certification and many other aspects of dental hygiene programs and practice.

Each and every CDHA member has the opportunity to

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CDHA welcomes your feedback: info@cdha.ca

L'influence clé des hygiénistes dentaires

J'ai lu récemment un livre fort intéressant, intitulé Influencer : The Power to Change Anything.[1]

Ce livre a vraiment résonné en moi, car je crois en l'influence clé des hygiénistes dentaires. En clinique, celles-ci exercent un impact et une influence sublimes sur la santé buccale et générale de leurs clientèles. Armées de leur savoir et de l'exercice d'une minutieuse évaluation, les hygiénistes dentaires sont en mesure d'identifier les domaines de préoccupation de leurs clientèles et des mesures à prendre. Intervient alors leur rôle d'« influence ». Les hygiénistes dentaires peuvent influer sur l'évolution des modes de vie et exercer un impact puissant sur la santé buccale et générale, comme l'abandon du tabagisme. Elles peuvent aussi influencer leurs clientèles face à des problèmes sociaux, comme le mauvais traitement des aînées. Elles peuvent influencer le choix des produits de santé buccale pour mieux satisfaire les besoins de leurs clientèles.

Beaucoup d'hygiénistes dentaires s'engagent dans l'exercice de l'influence clé, au-delà de la traditionnelle pratique dentaire. Celles qui travaillent en formation ont une puissante influence sur celles et ceux qui se préparent à joindre la profession. Les membres qui font de la recherche examinent les questions importantes d'hygiène dentaire et de santé buccale; par leur travail et leurs publications revues par les pairs, elles deviennent des éléments clés d'influence dans les programmes de pratique et de formation. Les membres qui travaillent en santé publique sont aussi des éléments clés d'influence dans les programmes et pratiques de promotion et de prévention. Celles qui travaillent chez nos partenaires de l'industrie ont l'opportunité d'influer sur les types de produits susceptibles d'améliorer la santé buccale de la population canadienne.

Les hygiénistes dentaires jouent un rôle clé d'influence dans leur association professionnelle nationale – l'ACHD. Les hygiénistes exercent des pressions auprès des gouvernements fédéral et provinciaux sur les problèmes importants pour la profession et la santé buccale de la population canadienne. Leurs préoccupations portent sur la réglementation, le financement des programmes publics de santé buccale, la fluoration de l'eau communautaire et bien d'autres sujets.

Les hygiénistes dentaires partagent aussi leur savoir et leurs expertises par divers canaux médiatiques, atteignant ainsi des centaines de milliers de Canadiens et Canadiennes avec d'importants messages de santé buccale. Les membres le font par le biais d'entrevues dans les journaux et les magazines ainsi que les médias sociaux comme Facebook, Twitter et les blogues informatiques. Les dirigeantes de l'hygiène dentaire qui siègent dans les conseils provinciaux et du conseil national sont des personnages clés influençant les décisions politiques. Par leur « voix », les hygiénistes dentaires qui siègent bénévolement dans les comités influencent la formation, la recherche, l'agrément,

…suite page 213

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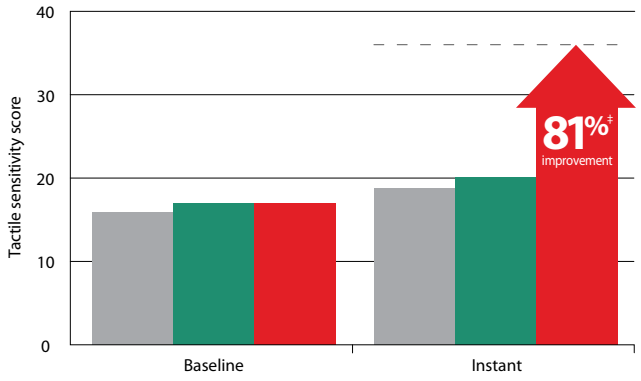

Positive control: Colgate® Sensitive Pro-Relief™/MC toothpaste (8.0% arginine, calcium carbonate, 1450 ppm fluoride)

Test product: Sensodyne® Rapid (8.0% strontium acetate, 1040 ppm fluoride)

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‡In a direct application study, Colgate* Sensitive Pro-Relief™/MC significantly ($p<0.05$) reduced dentin hypersensitivity vs. Sensodyne® Rapid toothpaste by 81%.

References: 1. Li Y et al. Data on file, Colgate-Palmolive Company 2010. **2.** Ayad F et al. J Clin Dent. 2009; 20(Spec Iss):10-16. **3.** Nathoo S et al. *J Clin Dent*. 2009;20(Spec Iss):123-130.

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Revisiting the focus

Dear editor:

The signs "Dental Health" and "Community Dental" in the picture on the cover of the *CJDH* August 2011, Vol. 45 (3), compelled me to write this letter, and initiate a discussion. I appreciate the endeavours of my colleagues and their project. I work with the frail elderly in long term care homes, and see their challenges to access oral care and dental treatment.

The way language is used in society is very important. Language, discourse, and words are crucial to shaping public perception and understanding of the world of oral health.[1]

"Dental" originated from Latin[2] and refers to tooth or teeth. The focus of "dental", in my opinion, is a focus on teeth. A dentist is a person who treats teeth.[2] The term, "dental hygiene", was created as a health educator of the public. Fones[3] states: *It is primarily to this important work of public education that the dental hygienist is called. She must regard herself as the channel through which … mouth hygiene is to be disseminated. The greatest service she can perform is the persistent education of the public in mouth hygiene and the allied branches of general health.*[3]

Dental hygienists' focus should be on 'mouth hygiene' working with individuals and communities to keep the mouth healthy. Reducing gingival inflammation is essential for a healthy mouth. Inflammation presently seems to be the 'key' in the research for oral systemic disease linkage. Too many irritants trigger and confuse the inflammatory process, and can set it haywire. The presence of inflammatory markers in serum has been consistently associated with a higher risk of cardiovascular disease. Periodontal disease is thought to be a contributing factor associated with inflammation, and systemic inflammation could represent an underlying mechanism that links oral health and cardiovascular disease. It is important to keep the tissue clean. If the tissue is clean it will follow that the teeth will be clean, healthy, and functional. If mouth and tissue are not kept clean, dental treatment fails.

We can brush teeth yet never remove the harmful bacteria. In many toothbrush and toothpaste advertisements, the position of the toothbrush in the mouth is nowhere near the bacteria. The bacteria along the gum line wave as the brush goes by. Proper biofilm/plaque removal requires cognitive and physical functions to properly adapt and activate the oral physiotherapy aids.

Oral health is determined by such factors as diet, hygiene, smoking, alcohol use, stress, and trauma. Partnerships with other health professionals who work with the mouth—speech language pathologists, dietitians, nurses—are needed to improve the public's oral health.

So, let us express dental hygiene's origins for "a healthy mouth for healthy living" with such appropriate language as "oral care". If dental hygiene focuses only on teeth and clinical treatment, she will forever be a handmaiden to dentistry.

Sincerely,
Lynda

LM McKeown, RDH, HBA, MA
E-mail: lmckeown@tbaytel.net
www.oralcare.ca

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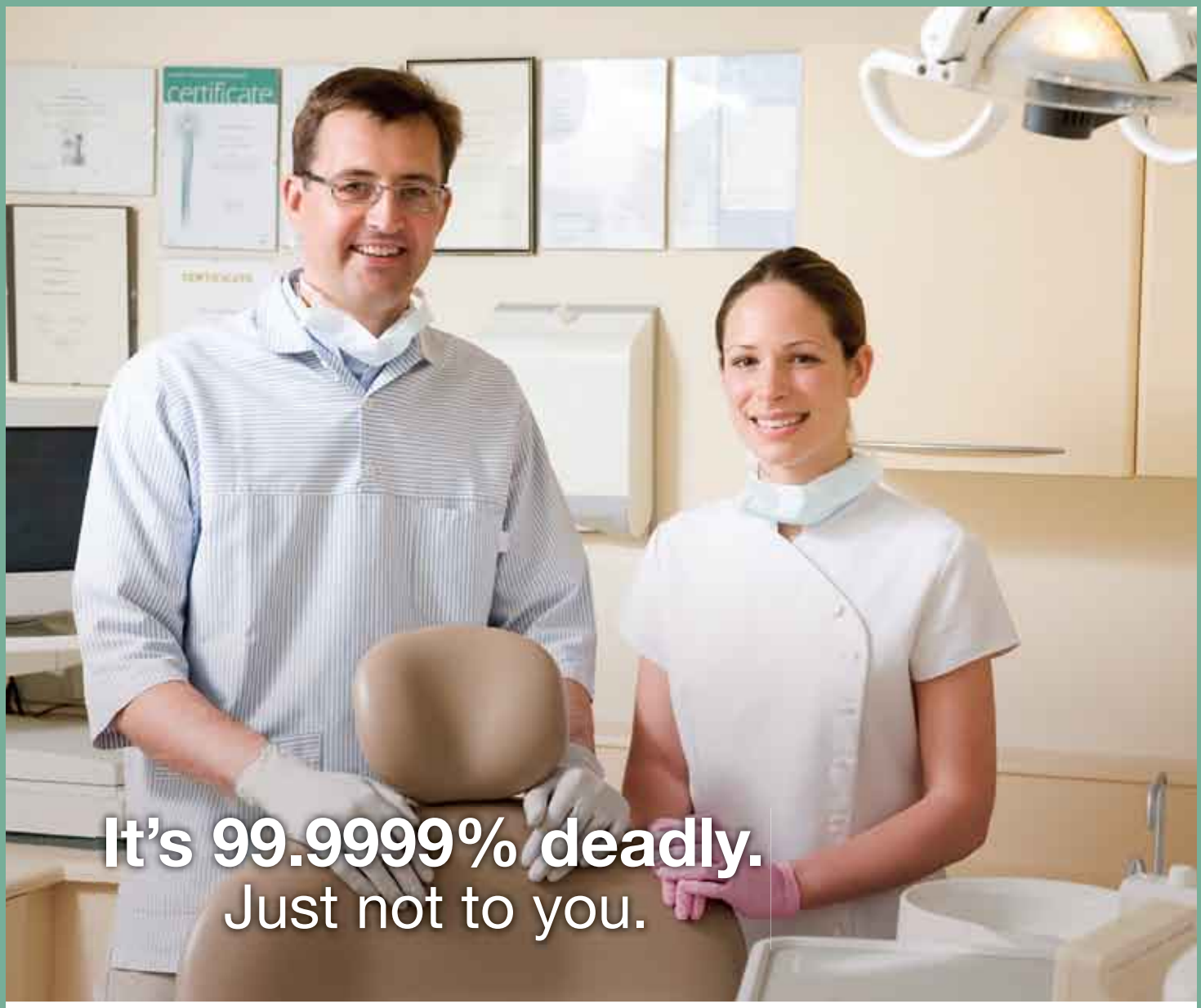
1. Foucault M. *The Birth of the Clinic: An Archaeology of Medical Perception.* New York: Rutledge; 1973.
2. Winston Dictionary. (Eds.) Lewis WD, Canby HS, Brown TK. New York: PF Collier & Son Corp; 1949.
3. Darby ML, Walsh MM. *Dental Hygiene: Theory and Practice.* Missouri USA. Saunders; 2010.



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President's message, *A profession on the move*…continued from 203

the greater healthcare delivery picture. I suggest that many of you are already contributing by interacting with other health professionals such as physicians, social workers, and physiotherapists when creating a comprehensive treatment plan for your clients. Sharing client information between health professionals will enhance the completeness and quality of care we provide. The challenge will be to collaborate further and more often with all health professionals.

In the months to come, I look forward to meeting and engaging in dialogue with colleagues across the country, listening to your ideas and visions for our professional future.

Arlynn Brodie
President©CDHA

Message de la présidente, *Une profession qui bouge*…suite 203

dynamisme à s'associer avec les autres fournisseurs de soins de santé, soutenant que la profession d'hygiène dentaire est une partie prenante interdisciplinaire.

Plusieurs d'entre vous se demandent peut-être comment contribuer à améliorer l'image de la prestation des soins de santé. Je suggère que plusieurs d'entre vous le font déjà, en collaborant avec d'autres professionnels de la santé comme les médecins, les travailleurs sociaux et les physiothérapeutes à la mise au point d'un plan de traitement global pour votre clientèle. Le partage des informations sur le patient entre professionnels de la santé rehaussera la mise au point de soins complets pour vos patients. Le défi sera de collaborer davantage et plus souvent avec tous les professionnels de la santé.

Pour les mois à venir, j'entrevois des réunions et des engagements dans le dialogue avec les collègues dans tout le pays, demeurant à l'écoute de vos idées et perspectives d'avenir de notre profession.

Arlynn Brodie
Présidente©ACHD

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ED's Corner 2011, *Dental hygienists as key influencers*...continued from 207

be a key influencer and lend a voice to the way we serve you, our member. CDHA can support you in your efforts to be a key and powerful influencer. Our webinars on *Elder Abuse*, *Oral Cancer Awareness* and *Tobacco Cessation* are just a few examples of the resources that CDHA has to support you. Our electronic newsletters keep you up-to-date on safety alerts, professional development opportunities, latest news in oral health and more. This journal showcases the current research to better help you help others. The input you provide, via email, phone, surveys, polls or mail—is a primary driver to the types of programs and services that we offer you.

Dental hygienists have the "power to influence". The next time you have the opportunity to interact with a client, student, media personnel or government official, instead of looking in the mirror, try to look through their "window" and see yourself as they see you—a health professional with the knowledge, skills, and attributes to influence and effect change.

Reference

1. *Influencer: The Power to Change Anything*. Patterson, Grenny, Maxfield, McMillan and Switzler. McGraw-Hill. 2007.©CDHA

Le coin 2011 de la DG, *L'influence clé des hygiénistes dentaires* ...suite 207

la certification et plusieurs autres aspects des programmes et de l'exercice de l'hygiène dentaire.

Tous et chacun des membres ont l'occasion d'exercer une influence clé et de prêter leur voix sur la façon de vous servir, nos membres. L'ACHD peut vous soutenir dans vos efforts comme agents d'influence clés et puissants. Nos webinaires sur L'abus des aînés, La sensibilisation au cancer buccal et L'abandon du tabagisme *ne sont que quelques exemples des ressources de l'ACHD pour vous soutenir. Nos bulletins électroniques vous tiennent au courant des alertes de sécurité et mises en garde, des possibilités de perfectionnement professionnel, des dernières nouvelles de santé buccale, et le reste. Ce journal vous présente la recherche en cours pour mieux vous aider à aider les autres. La participation que vous y apportez – par courriels, téléphones, sondages, scrutins ou la poste – est une source fondamentale pour les types de programmes et de services que nous vous offrons.*

Les hygiénistes dentaires ont le « pouvoir d'influencer ». La prochaine fois que vous aurez l'occasion d'interagir avec un client, une étudiante, une personne des médias ou du gouvernement, plutôt que de vous regarder dans le miroir, essayez de paraître dans leur « fenêtre » et de vous regarder comme ils vous voient : une professionnelle de la santé ayant le savoir, le talent et les attributs pour influencer et réaliser le changement.

Référence

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A scoping review of the use of fluoride varnish in elderly people living in long term care facilities

Pamela Raghoonandan,[§] RDH, BSc(DH); Sandra J. Cobban,[*] RDH, MDE; Sharon M. Compton,[Δ] RDH, PhD

ABSTRACT

Elderly people living in long term care facilities are at an increased risk of developing coronal and root caries due to limited mobility, side effects of medications, denture wearing and other factors. Fluoride varnish may be effective in preventing and arresting coronal and root caries in this population. **Objective:** The purpose of this paper is to examine the literature on the use of fluoride varnish in elderly people living in long term care facilities. **Methods:** Six key electronic databases were searched (Medline, EMBASE, CINAHL, Cochrane, BioMed Central and health-evidence.ca), and the titles and abstracts were screened. Those that met inclusion criteria were retrieved and key findings were extracted. **Results:** Seven hundred and ninety-nine citations were identified, and 10 papers, six clinical trials, and four systematic reviews met the inclusion criteria for the review. Data regarding effectiveness of fluoride varnish applications were extracted into tables. The application of fluoride varnish in elderly people living in long term care facilities who receive regular professional prophylaxis has demonstrated effectiveness in controlling coronal and root caries; however, it is less efficient in those with poor oral hygiene. **Conclusion:** Further research needs to be focused on ways of improving the oral hygiene of elderly in long term care facilities so that fluoride varnish can be effective in the reduction of coronal and root caries. Collaboration between long term care facilities and oral health professionals is necessary to achieve maximum benefit from fluoride varnish and for improved oral health of residents.

RÉSUMÉ

Les personnes âgées demeurant dans les établissements de soins prolongés risquent davantage de développer des caries de la couronne ou de la racine à cause d'une mobilité réduite, des effets secondaires des médicaments, du port d'un dentier et d'autres facteurs. Le vernis fluoré peut être efficace pour prévenir et arrêter les caries de la couronne ou de la racine chez cette population. **Objet :** Examen de la littérature sur l'utilisation du vernis fluoré chez les personnes âgées dans les établissements de soins prolongés. **Méthodes :** Recherche dans six bases de données clés (*Medline, EMBASE, CINAHAL, Cochrane, BioMed Central et health-evidence.ca*), vérification des titres et résumés, retenue des bases de données qui répondaient aux critères d'inclusion et extrait des données clés. **Résultats :** Sept cent quatre-vingt-dix-neuf citations ont été relevées et 10 articles, six essais cliniques et quatre examens systématiques répondaient aux critères d'inclusion pour l'étude. Les données portant sur l'efficacité du vernis fluoré ont été extraites sous forme de tableaux. L'application du vernis fluoré chez les personnes âgées des établissements de soins prolongés, qui recevaient une prophylaxie professionnelle régulière, s'est avérée efficace pour maîtriser les caries de la couronne et de la racine; toutefois, elle était moins efficace chez les personnes qui avaient une pauvre hygiène buccale. **Conclusion :** D'autres recherches seront nécessaires pour cibler les façons d'améliorer l'hygiène buccale des personnes âgées des établissements de soins prolongés et/w réduire les caries de la couronne et de la racine. La collaboration entre les établissements de soins prolongés et les autres professionnels des soins buccaux s'avère nécessaire pour obtenir le meilleur résultat possible du vernis fluoré et améliorer la santé buccale des résidents.

Key words: long term care, aged, fluoride varnishes, dental caries prevention and control

BACKGROUND

The elderly population is increasing worldwide, and it is estimated that by 2036, the number of people aged 65 and over is expected to double to reach 10.4 million.[1] Caries is a dental disease that affects all individuals, but studies show that elderly people living in long term care (LTC) facilities have a higher incidence of caries compared to elderly living at home.[2] Fluoride varnish has demonstrated positive results in caries reduction with other age groups and further research on the use of fluoride varnish on elderly people living in LTC facilities is needed, given the complexity of the problem, the high incidence of caries in this population, and the limited research currently available.

Due to better dental health care, elderly people are experiencing a greater retention of teeth, which implies an increased number of exposed root surfaces that are susceptible to caries.[3] The cause of coronal and root caries is multifactorial and includes such contributing factors as dietary habits, microbial plaque, long term medications, and xerostomia.[4,5] Studies also indicate that with age, the oral microflora changes can possibly be linked to impaired immune function, increased yeast colonization, and denture wearing.[3] Root caries lesions are often very difficult to restore due to location, problems with moisture control, and proximity to the pulp, and are therefore prone to high recurrence.[5]

There is a high incidence of caries in elderly people living in LTC facilities. Saub and Evans[6] found that 46 per cent

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of elderly residents in a LTC facility required at least one restoration for coronal caries and 30 per cent required at least one restoration for root caries. Hand, Hunt and Beck[2] compared the incidence of caries among school aged children to elderly people, and to that of elderly people living in LTC facilities. Their study found that school aged children had an average annual caries increment of no more than one surface per year, compared to 1.44 surfaces per year found in the elderly population, and compared to 1.90 surfaces per year in institutionalized elderly persons.[2]

Currently there is not much research on the use of fluoride varnish with elderly LTC residents. It has been demonstrated that the use of fluoride varnishes decreases the acidic environment caused by plaque, reverses early decay, and may promote the remineralization of tooth enamel and decrease tooth sensitivity.[7] These studies have been primarily conducted on children and adults, but due to the difference in factors such as lifestyle, medications, immune function, and so on, the findings cannot be directly transferred to elderly patients in general, and especially not to those living in LTC facilities.[3,4,7]

Elderly people living in LTC facilities are retaining their natural teeth, and studies have shown that caries is the major cause of tooth loss in elderly individuals with physical and mental disabilities.[8,9] About six per cent of the population older than 65 years in most Western countries live in LTC facilities.[10] These individuals are more prone to caries compared to elderly individuals who live independently.[9] In one Canadian study, almost three quarters of the elderly participants living in LTC facilities developed one or more carious lesions compared to about two-thirds of those who lived independently.[9]

The reason for the high prevalence of dental caries in this population is usually associated with many factors such as an increase in health problems, disability, and limited dexterity which makes oral hygiene difficult and indirectly influences caries resistance factors.[8,11] When this is coupled with low compliance, excessive consumption of sugar, and side effects of medications such as xerostomia, the levels of cariogenic bacteria increases, and increases their risk for coronal and root caries, as well as periodontal disease.[10–12] Denture wearing has also been shown to increase the number of microorganisms in healthy individuals.[12]

Caries in any age group can impact nutritional habits and overall comfort, but it can be particularly damaging to the systemic health of frail elders.[10] In many cases, elderly people may have dental pulp tissue that is calcified due the deposition of secondary dentin, which can prevent pain signals from being felt when there is an active carious lesion.[9] This may cause the lesion to go unnoticed, allowing it to extend over the entire coronal and/or root surface, causing extensive structural damage.[9] When many teeth are affected, the restoration and replacement of teeth may not always be an option due to limited access to dental services and financial constraints; resulting in chewing difficulties and facial disfigurement.[9,11] In many cases, teeth are extracted due to extensive caries progression which can have a great impact on appearance, speech, and overall well being.[9] It is therefore critical that treatment strategies are based on the prevention and remineralization of incipient caries, and are not dependent on high patient compliance due to limited dexterity and low motivation.[11] Based on studies performed on this population, fluoride varnish may be one of the solutions.[11]

Many studies have shown the benefits of fluoride, "which has a caries inhibiting effect on enamel, dentin and root surfaces, and retards demineralization and promotes remineralization of enamel, dentin and cementum".[11] Fluoride varnish has been shown to be more successful in the prevention of coronal and root caries compared to other topical fluorides.[11]

The need for research on the outcomes of using of fluoride varnish on elderly individuals living in LTC facilities is critical. The growing number of individuals who reside in LTC facilities is increasing and many have retained much of their existing dentition, yet little research has been conducted on how to control the high incidence of dental caries in this population.[2,7]

Review question

Caries is a common dental disease among elderly people living in LTC facilities, and to date, there is a lack of research showing the effects of using fluoride varnish to reduce coronal and root caries in this population. Our review sought to examine what is known about the effectiveness of fluoride varnish in the prevention of coronal and root caries in elderly people living in LTC facilities.

METHODS

This scoping review involved searching six key databases, Medline, EMBASE, CINAHL, Cochrane Database of Systematic Reviews (DSR), BioMed Central, and Health-Evidence.ca. The six databases were searched using MeSH (Medical Subject Headings) and key terms in the following ways:

Search terms

- fluoride varnish AND oral health OR oral hygiene
- oral care, mouth hygiene, oral hygiene care
- carie* AND home aged
- elder* AND nursing home*, long*term care
- fluoride varnish AND dental health OR oral health AND elderly AND nursing homes
- fluoride varnish AND caries

Limiters

- 65+ years
- fluoride varnish NOT child*
- limit "all aged (65 and over)"
- infirm patients, oral hygiene
- fluoride varnish nursing home NOT child*
- fluoride varnish AND institutionaliz* OR long term OR nurs* home OR residential facility AND oral dental AND carie* AND elderly

The MeSH terms and subheadings, truncations, and mapping were adapted as appropriate for the various databases. See Table 1.

The titles of the studies retrieved from this search underwent a preliminary review in order to identify

which articles met inclusion criteria. Papers were selected based on whether the combination of words appeared in the title or anywhere in the paper. Our inclusion criteria related to the effects of fluoride varnish in people living in LTC facilities, articles that did not pertain to this topic were excluded, with the exception of two high quality systematic reviews[13,14] that provided useful information about the effects of fluoride varnish compared to other forms of fluoride.

Titles resulting from the database searches were screened by the first author and this process was reviewed by one of the co authors. Once abstracts were reviewed, articles meeting inclusion criteria were retrieved and read. Data relating to author, date of publication, country of study setting, study population and setting, intervention(s), and results were extracted into two tables according to research method, namely clinical trials and systematic reviews. Data extraction was completed by the first author, and reviewed and verified by the co authors. Since this is a scoping review, quality assessment was not performed.

RESULTS

From the 799 citations originally retrieved, 173 titles remained once duplicates were removed. These titles were screened and sixteen were selected for abstract review.[2,4,6,8–20] Once abstracts were reviewed and compared to inclusion criteria, twelve articles were retrieved and read, with ten articles remaining in the final set—six clinical trials[8,10–12,15,16] and four systematic reviews.[13,14,17,18] See the flow chart in Figure 1. Data were extracted into two tables corresponding to research method, namely clinical trials and systematic reviews. Data extracted are presented below with characteristics of author, date of publication, country of study setting, study population and setting, intervention(s), and results (Tables 2 and 3).

A systematic review by Marinho[13] on children and adolescents evaluating the effect of adding topical fluoride therapy in the form of mouthrinses, gels, or varnishes in conjunction with the use of fluoride toothpaste, found that there was a decrease in caries rate by 10% on average. When comparing which topical fluoride had the greatest caries reduction (mouthrinses, gels, or varnishes), fluoride varnish had a greater effect in caries prevention.[13] Studies by Persson[12] and Potter[15] conducted on institutionalized elders found that neither 0.068% sodium fluoride gel nor 0.4% SnF_2 rinse was effective in neutralizing dental plaque.

Many studies have evaluated the benefits of professional tooth prophylaxis, whether performed with a mechanical handpiece or a toothbrush, and the addition of fluoride varnish. Ekstrand[16] found that there was a decrease in caries incidence in institutionalized elders who received help brushing with toothpaste containing 5000 ppm fluoride twice a day and received Duraphat varnish applications once a month compared to twice a day brushing with a 5000 ppm fluoride toothpaste alone without any fluoride varnish. In a different study, similar results were also found, where caries reduction was also noticed with the application of fluoride varnish (Duraphat) and the use of normal strength toothpaste (1000 ppm to 1450 ppm).[16,18,19] Johnson[11] also found that caries incidence was decreased with professional tooth prophylaxis and the application of fluoride varnish compared to professional prophylaxis alone.

However, these studies suggest that in disabled and infirm patients, regular professional prophylaxis, whether performed with a toothbrush or a prophylaxis cup, and the application of fluoride varnish is beneficial. Many institutionalized elders do not receive aid in brushing or regular dental hygiene therapy. Two studies concluded that the application of varnish did not reduce gingivitis in institutionalized elderly people with poor oral hygiene.[8,17] This supports that the main mechanism of action for fluoride varnish is as an anticariogenic agent.

Table 1. Search strategy and results.

Database	# Citations
Medline	8
EMBASE	16
CINAHL	519
Cochrane DSR	256
BioMed Central	0
health-evidence.ca	0
TOTAL	**799**

Figure 1. Search and retrieval process flow chart.

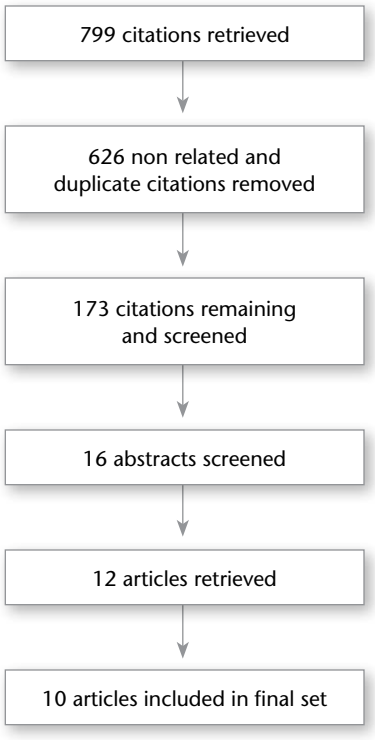

Table 2. Clinical trials.

Author and country	Study population and setting	Intervention	Results
Clavero et al. (2006)[9] Spain	Age: 65–93 years Experimental n=27 Control n=29 Long term care (LTC) facility	Experimental group: Cervitec varnish (a CHX-thymol varnish) application twice in the first week, a month later, and then every three months for six months. Control group: Placebo fluoride varnish application twice in the first week, a month later, and then every three months for six months.	Chlorhexidine applied in a varnish form in high concentrations has been shown to control effectively *streptococci mutans* and dental caries. In this clinical trial, treatment with Cervitec varnish had significant effect overtime on gingival index scores ($p = 0.029$), but not on plaque index scores ($p = 0.651$). Both groups did not significantly differ in reductions in plaque or gingival index scores between baseline and one, three, or six months.
Ekstrand et al. (2008)[17] Denmark	Age: >= 75 years (mean age 81.6 years) Group 1: n=71 Group 2: n=64 Group 3: n=54 Living at home	Group 1: Tooth brushing performed by a dental hygienist using a 1450 ppm toothpaste and Duraphat varnish application on active root caries for 8 months. Group 2: Brushed with a 5000 ppm fluoridated toothpaste twice a day themselves for eight months. Group 3: Brushed with a 1450 ppm toothpaste twice a day themselves for eight months.	Groups 1 and 2 improved significantly when compared with group 3 ($p < 0.02$). No significant difference was observed between groups 1 and 2 ($p = 0.14$). On average, only three out of 10 participants showed root caries progression in group 1 and 2 compared to five out of 10 in group 3.
Johnson et al. (2003)[12] Sweden	Age: 45–89 years (mean age 69 years) Group 1: n=5 Group 2: n=6 Group 3: n=4 Day care centre in a hospital	Group 1: Professional tooth cleaning and the application of tap water flavored with eucalyptus oil. Group 2: Professional tooth cleaning and application of 1% chlorhexidine/thymol varnish. Group 3: Professional tooth cleaning and application of Cervitec, followed by application of a varnish containing 0.1% fluoride. Professional tooth cleaning included the use of prophylaxis paste containing 0.2% NaF and interproximal cleaning with interdental brush. Treatment was carried out at three-month intervals for 18 months.	No significant differences could be demonstrated among the three treatment groups, sample sizes were too small. However, this study suggests that regular professional dental cleanings with a fluoride containing paste, with or without supplementary fluoride varnish can prevent progression of existing superficial root caries lesions in disabled and infirm patients.
Persson et al. (2007)[13] Sweden	Age: 61–90 years (mean age 76.6 years) Group 1: n=11 Group 2: n=11 Group 3: n=11 (the same subjects were used in each test session) LTC facility	Group 1: Application of fluoride gel (0.068% sodium). Group 2: Placebo. Group 3: Water rinse. Each treatment period lasted for 16 days and the test sessions were separated by a two week wash out period. The fluoride gel, placebo, and water wash were performed four times a day during the test period.	Frequent application of gels did not result in an improved neutralizing effect in the elderly. This may have been due to many factors, such as xerostomia, low solubility, high viscosity, and low release. Instead, an increase in plaque acidogenicity was noted.
Potter et al. (1984)[16] USA	Age: 60–87 years (mean age 78 years) Group 1: n=7 Group 2: n=7 LTC facility	Group 1: Rinsed with a 0.4% SnF_2 mouthwash twice a day for two minutes for a 9 week period. Group 2: Rinsed with a SnF_2 free rinse (placebo) mouthwash twice a day for two minutes for a period of 9 weeks.	There was no change in the total colony forming units (CFU) in the group rinsing with 0.4% SnF_2 from the group rinsing with the placebo. However, SnF_2 was effective in selectively reducing the cariogenic microorganism *S. mutans* by 75 times.
Wyatt et al. (2004)[11] Canada	Age: 54–101 years (mean 83 years) Group 1: n=41 Group 2: n=39 Group 3: n=36 LTC facility	Group 1: Rinsed daily with a 0.12% chlorhexidine (CHX) rinse. Group 2: Rinsed daily with a 0.2% neutral sodium fluoride (NaF) rinse. Group 3: Placebo rinse. Clinical trial was carried out over a two year period.	The prevalence of caries and the dental status of the groups were similar at baseline and after two years. Each group on average lost less than one tooth per person, but the fluoride group compared with the other group had significantly less caries and significantly more reversals from carious to sound tooth surfaces at the end of the trial. A daily oral rinse with 15ml of 0.2% neutral NaF solution by elderly residents in LTC facilities has shown to reduce significantly the number of carious lesions compared to either a 0.12% of CHX solution or a placebo.

Table 3. Systematic reviews.

Author	Study population and settings	Intervention	Results
Innes et al. (2009)[19]	Age: 59–90 years Dental hospitals and long term care (LTC) facilities	Searching of key databases for clinical trials and reviews on the comparison of: a) high concentration (>1450 ppm fluoride) toothpaste compared with standard concentration (1000–1450 ppm fluoride) toothpaste, and b) biannual application of 22,6000 ppm fluoride varnish compared to no application of fluoride varnish	Evidence supports the use of tooth brushing with a 5000 ppm fluoride toothpaste and 22,000 ppm fluoride varnish application twice a year in reducing caries in an elderly population living in resident care homes.
McGrath et al. (2009)[18]	Age: >=60 years Clinic settings, nursing home and community	Searching of four databases using key word for articles relating to the "effectiveness of oral health promotion activities among elderly people". Seventeen articles were identified as effective; 13 randomized controlled tests, three quasi-experimental, and one pre-/post-single group study intervention study. Each study was then scored for quality and data were extracted into tables.	No significant difference in caries increment between elderly using 0.12% chlorhexidine (CHX) rinse and a placebo rinse. A decrease in caries rate when rinsing with a 0.05% NaF solution twice a day and brushing with a 0.32% NaF toothpaste than those brushing with toothpaste alone. A lower prevalence of secondary coronal and root caries experience in individuals who received a comprehensive oral health program compared to those who only received treatment on request. Those who received intraoral prevention experienced less tooth loss. CHX-thymol varnish (Cervitec) did not prove effective in reducing GI and PI scores.
Marinho et al. (2004)[14]	Age: <=16 years Multiple settings	Searching of several databases, as well as hand searching journals, reference lists of articles, and contact with manufacturers.	Topical fluorides (mouthrinses, gels, or varnishes) in addition to fluoride toothpaste achieved a modest reduction in caries compared to toothpaste used alone. The combination of fluoride varnish and fluoride toothpaste had a greater effect in caries reduction than the combination of fluoride toothpaste and mouthrinses or gels.
Marinho et al. (2004)[15]	Age: <=16 years Multiple settings	Searching of several databases, as well as hand searching journals, reference lists of articles, and contact with manufacturers.	Topical fluorides such as mouthrinses and gels do not appear to be more effective at reducing tooth decay in children and adolescents than fluoride toothpaste.

DISCUSSION

Elderly people living in LTC facilities are at a high risk of developing coronal and root caries. The application of fluoride varnish in this population could be recommended based on their high rate of caries incidence and studies showing the benefits of topical fluoride varnish compared to other topical fluorides, although, further research is needed to fill the gaps in literature.

Coronal and root caries is a common dental disease among elderly people living in LTC facilities, but unfortunately many of them do not have the access nor the economic means to receive treatment. This may lead to numerous caries lesions with large structural damage, resulting in tooth loss. Research has shown that fluoride varnish is very effective in preventing and arresting caries, more so than other topical fluoride treatments such as mouthrinses and gels. Due to the limited dexterity of elderly people, caregivers are important in the daily maintenance of oral hygiene. Greater benefits of fluoride varnish uptake have been shown when elderly individuals receive help with tooth brushing in combination with frequent applications of fluoride varnish. New research needs to be conducted so that appropriate measures can be taken to help control the high caries rate in this population.

Many elderly individuals do not receive help with oral care, nor do they receive regular dental prophylaxis by dental professionals; therefore, many have poor oral health. One possible way to address this issue is by dental professionals and LTC facilities collaborating with one another. This may include the training of caregivers by dental professionals on how to assist the elderly with oral care, and monthly visits by a dental professional for oral health promotion activities and the application of fluoride varnish.

This scoping review is based on randomized clinical trials (RCTs) and systematic reviews (SRs) that were available in key databases. Due to the limited research on the effectiveness of fluoride varnish in elderly people living in LTC facilities, the conclusions from this scoping review may not be complete. Some of the limitations of this scoping review include:

i. limited information that directly deals with fluoride varnish and elderly in LTC facilities,
ii. quality assessment was not performed on included RCTs but had been performed as part of the process of the SRs,
iii. incomplete findings due to a limited number of databases, and

iv. a limited time frame of three months to complete this scoping review.

Additional databases and further searching reference sections may have identified additional citations.

CONCLUSION

Based on the findings of this review, the application of fluoride varnish has demonstrated effectiveness in preventing coronal and root caries in individuals living in LTC facilities; however, these findings are shown in elderly people who receive assistance with oral hygiene. Many of the research studies performed on the efficacy of fluoride varnish have been performed on children and adolescents. Due to the many differences in oral environment, physical abilities, mental status, and motivation to perform oral healthcare, findings from children and adolescents may not be appropriate for elderly people living in these facilities.[10,21] To date, there are limited studies showing the benefits of fluoride varnish in elderly people in LTC facilities. There is a need for greater research evaluating the effectiveness of fluoride varnish application in this population to reduce the high rate of caries incidence in this underserved population. Our scoping review suggests that this holds great promise.

There are gaps in the literature. More research needs to be done specifically on institutionalized elders and chemotherapeutic mechanisms to reduce caries based on residents' abilities and limitations. We suggest that our findings demonstrate the necessity of collaboration between dental professionals and caregivers in residential settings.

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Halitosis from tonsilloliths: Literature review for oral healthcare providers

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ABSTRACT

Introduction: Although tonsillolith derived halitosis may affect a significant number of individuals, little attention has been given to increase the awareness of this condition to oral healthcare providers. Because these are the professionals who are primarily consulted by clients suffering from halitosis, it is crucial that such individuals possess knowledge of what the current literature provides concerning tonsilloliths and its relationship to halitosis. **Methods:** A literature review was performed to analyze the link between tonsilloliths and halitosis, as well as to investigate if any efforts had yet been done to increase this awareness to oral healthcare providers. A total of six papers were found which supported this link and were retrieved from CINAHL and PubMed databases. **Results:** Tonsilloliths not only emit a foul odour, but also contain obligate anaerobic bacteria that can produce volatile sulfur compounds associated with halitosis. Seventy five per cent of people who had tonsilloliths presented with abnormal halitometry, whereas only 6% of people presented with normal halitometry. Dycotomic logistic regression indicated that the presence of a tonsillolith represents a tenfold risk factor for halitosis, and case reports confirmed that the absence of halitosis was achieved upon tonsillolith removal and/or tonsillectomies. **Conclusion:** No papers addressed the need to increase the awareness of tonsillolith derived halitosis to oral healthcare providers. A proposal to implement this concept in the curriculum of dental educational institutions as well as to develop continuing education courses for oral healthcare providers addressing this condition is suggested.

RESUMÉ

Introduction : Bien que l'halitose découlant de l'amygdalolithe puisse affecter un nombre important de personnes, peu d'attention a été accordée au besoin de sensibiliser davantage à ce problème les fournisseurs de soins de santé buccale. Comme ceux-ci sont les professionnels les plus consultés par les patients atteints d'halitose, il est essentiel que ces professionnels se renseignent davantage sur ce que diffuse la littérature actuelle à propos des amygdalolithes et de leurs relations avec l'halitose. **Méthode :** Un examen de la littérature a permis d'analyser le lien entre les amygdalolithes et les halitoses, ainsi que d'investiguer tous les efforts visant à accroître la sensibilisation des fournisseurs de soins de santé buccale. On a ainsi trouvé six articles qui soutiennent ce lien, dans CINAHL et des bases de données de PubMed. **Résultats :** On a trouvé que les amygdalolithes non seulement émettent des composés de soufre volatile associé avec l'halitose. Soixante-quinze pour cent de gens atteints d'amygdalolithe présentaient une halitométrie anormale, alors que seulement 6 % présentaient une halitométrie normale. Une régression logistique dycotomique indiquant que la présence d'une amygdalolithe comportait un facteur décuplé de risque d'halitose, et certains comptes-rendus confirmaient qu'on obtenait une absence d'halitose par le retrait de l'amygdalolithe et/ou la tonsillectomie. **Conclusion :** Aucun article ne signalait le besoin d'accroître la sensibilisation des fournisseurs de soins buccaux pour l'halitose due à l'amygdalolithe. La suggestion porte sur l'introduction de cette notion dans le curriculum des institutions de formation dentaire, ainsi que sur l'élaboration de cours sur ce problème dans les programmes de perfectionnement continu pour les préposées aux soins buccaux.

Key words: caseous tonsillitis, cryptic tonsillitis, tonsil stones, tonsilloliths, caseum, tonsillar calculi, chronic fetid tonsillitis, halitosis, oral healthcare providers, education

INTRODUCTION

Halitosis, defined as the condition of having stale or foul smelling breath,[1] is a subject of concern for many people. Individuals suffering from halitosis may avoid circumstances such as social interaction that would possibly expose their condition, thus negatively impacting their quality of life. Because 80–90% of cases of halitosis are odontogenic related,[2] the population is often primarily instructed by an oral healthcare provider to adopt a proper oral hygiene care regimen. There are, however, systemically healthy people who suffer from halitosis while presenting with an excellent oral hygiene status.[2]

A condition that has been associated with halitosis is cryptic tonsillitis, more commonly known as tonsil stones. It has been referred in the literature as tonsilloliths, caseous tonsillitis,[3] tonsil caseous,[4] tonsillar calculi[5] and chronic fetid tonsillitis.[6] These stones form within the crypts of the tonsils—an area that promotes the ideal anaerobic condition for this formation to take place—and vary in size, consistency and degree of odour.[6] The emphasis on the link of tonsilloliths to halitosis has not been appropriately made to oral healthcare providers. The lack of awareness of this relationship has possibly led to overlooking this condition when attempting to diagnose the origin of halitosis in clients in the clinical setting.[2,7] Although research has already established a possible relationship between tonsilloliths and halitosis, a single review of all the studies that support this correlation has not yet taken place.

The purpose of this paper is to increase the familiarity of tonsilloliths as a possible factor in the manifestation

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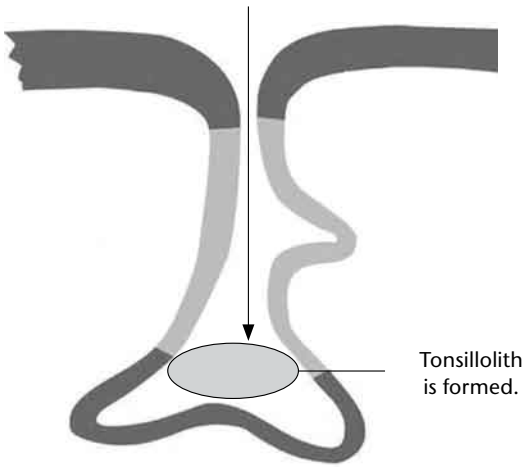
Figure 1. Scheme of tonsillar crypt.



Modified figure from source.[3]

of halitosis to oral healthcare providers. By implementing this knowledge into the curriculum of dental educational institutions and by developing continuing education dental courses focusing on this relationship, oral healthcare providers will be more aware of the nature of tonsilloliths and its link to halitosis. In addition, oral healthcare providers will be better able to assist clients who present with tonsillolith derived halitosis in the clinical setting.

A review of the literature on the nature of tonsilloliths, the causes of halitosis, and its diagnostic methods will be addressed in this paper. A relationship between tonsilloliths and halitosis will be investigated and reported. Recommendations for both the educational and the clinical settings as a means of increasing the awareness of tonsillolith derived halitosis to oral healthcare providers are discussed.

BACKGROUND

What are tonsilloliths?

Tonsilloliths are defined as structures that develop in the crypts of the tonsils that act as a localized concentration of both aerobic and anaerobic bacteria, progressing in calcification from soft gels to hard stones[8] (Figure 1). They are often associated with tonsillar inflammation or tonsillitis,[9] believed to be due to the suitable environment that the tonsillar crypts promote for the activity of anaerobic bacteria in the upper airway system.[6] A mixture of retained exfoliated epithelium cells, keratin debris, and foreign particles, is accumulated, and eventual caseum formation takes place. Chronic caseous tonsillitis (CCT) has been reported to be a common disease, although the exact statistical prevalence is unknown.[3]

Diagnosis of tonsilloliths can be made clinically, based on symptoms and physical examination. Small tonsilloliths are asymptomatic; however, large concretions may produce several symptoms such as halitosis, sensation of a foreign body, and frequent irritation of the throat which causes inflammatory tonsillitis.[10] In a case study, a 56 year-old female presenting with a giant tonsillolith complained of dysphagia, sore throat, right otalgia and swelling in the right tonsillar fossa.[11] At times, imaging techniques may be warranted to identify the extent of the lesion and the exact location. Radiographs may reveal an opaque mass. Computed tomography may reveal non specific calcified images.[12]

Treatment options

For clients with CCT, tonsilloliths are a common occurrence. It cannot be prevented since the inflammation of the tonsils enhances crypt depth, inducing the formation of tonsilloliths. The methods of treatment are the same methods of prevention of *further* tonsilloliths' formation.

The treatment options for tonsilloliths include tonsillectomy and laser cryptolysis. A study analyzed a mouthwash that has been developed for the treatment and prevention of tonsilloliths.[4] The mouthwash treatment is based on studies which have identified tonsilloliths to be composed of biofilm structures similar to dental biofilm.[9] A combination of both oxygenating and antiseptic properties of this mouthwash effectively destroys anaerobic bacteria that is linked to halitosis and biofilm formation. It was shown, however, that the mere act of gargling and swishing with a placebo mouthwash was also effective in decreasing the incidence of tonsilloliths.[4]

Upon realization of its importance in the immunological function of the body, tonsillectomy is no longer the common procedure that it once was. It is generally only recommended to undergo an invasive procedure like tonsillectomy if all other treatment options fail. CO_2 laser cryptolysis is a less invasive procedure used to reduce tonsillar crypt depth, thus decreasing the retention of tonsilloliths.[10] This method preserves the immunological function of the tonsils, and is virtually painless, well tolerated, and can be performed in an office setting under topical anesthesia, permitting patients to return soon after to their activities.[6] Patients with a strong gag reflex are not usually able to undergo this procedure.[6]

Halitosis

Volatile sulfur compounds (VSC) such as hydrogen sulfide, methyl mercaptan and dimethyl sulfide are most often the culprits in halitosis, with hydrogen sulfide and methyl mercaptan accounting for about 90% of the total content of VSC.[2,13] Most of these compounds are derived from the degradation of sulfur containing substrates—leucocytes, epithelial cells and food debris—by microorganisms. Most adults suffer only occasionally from transient halitosis that may be caused by fasting for long periods of time, or by ingesting foods with strong odours such as garlic and onions. An estimated 10–30% of the population, however, suffers from true halitosis, which persists continuously.[2] The main methods of diagnosing the degree of halitosis include using the organoleptic test (OLT), the gas chromatography (GC) and the sulfide monitoring. Studies show that using a combination of two or more of these methods may provide more accurate results.[14]

Organoleptic test

The OLT is the simplest approach to measure halitosis, performed by directly smelling the breath of a person. The degree of oral malodour is classified on a scale from 0–5, from no odour to extremely foul odour.[2] Researchers differ on the reliability and reproducibility of the method; some believe it is a problematic system of measuring halitosis due to its subjectivity, as it relies on the clinician's own opinion of the degree of malodour present.[2,3,7] On the other hand, some argue that because the degree of oral malodour a person has is subjective in itself, the use of the OLT may be considered valid.[15] Research is being conducted to improve the method by incorporating techniques that prevent embarrassment for the clinician and the client, and to acquire a more concentrated mouth air.[2,15] Other researchers claim that the OLT is the gold standard for the measurement of halitosis because of its significant correlation with the GC and the sulfide monitor.[16–19]

Gas chromatography

Gas chromatography is used in analytic chemistry for separating and analyzing compounds that can be vapourized without decomposition.[20] GC analysis has been considered the gold standard for measuring halitosis by some researchers,[18,21] because of its accuracy in quantification and its specificity for VSC. GC has been considered to be highly objective, reproducible and reliable.[22] However, GC analysis is costly, requires a skillful operator and an elaborate and sophisticated facility to adapt for its large size. Thus, this method may be impractical for oral healthcare providers to operate in their dental offices.

Sulfide monitoring

Sulfide monitoring identifies the quantity of volatile sulfur compounds present in the oral cavity by generating a signal using an electrochemical voltammetric sensor. The results are displayed and recorded on a digital screen in expired air parts per billion (ppb).[3] This method of measuring halitosis is frequently employed due to its objectivity, as it is based on the amount of VSC present in a client's mouth. In addition, its small size, price, and simplicity of use make it a popular and accessible tool in most dental offices. One reported limitation with this method is that important odours that may be related to halitosis are not detected.[2] This means that clients may produce normal sulfide monitor measurements, but still present with halitosis related to other compounds which this method does not detect—volatile short chain fatty acids, polyamines, alcohols, phenyl compounds, alkanes, ketones, and nitrogen containing compounds.

MATERIALS AND METHODS

A review of the literature was performed to analyze previous studies associating tonsilloliths to halitosis, and to investigate for efforts attempted to increase the awareness level of oral healthcare providers to this relationship. The first step in the investigation was to develop a PICO question (**P**atient/**P**opulation; **I**ntervention: **C**omparison: **O**utcome), followed by a literature search and this report. The PICO question:

Could the increased familiarity and knowledge of tonsillolith assist oral healthcare providers to properly identify its relationship to patients suffering from halitosis?

The literature search was performed from September 2009 to November 2009. The search included the following databases: CINAHL, PubMed, Cochrane and MeSH; the Cochrane database produced no literature pertaining to tonsilloliths as a halitosis inducing factor or to education of oral healthcare providers on this issue. The following key words were used: caseous tonsillitis, cryptic tonsillitis, tonsil stones, tonsilloliths, caseum, tonsillar calculi, chronic fetid tonsillitis, halitosis, oral healthcare providers and education. The literature search was limited to the English language, and focused on papers published from 2004 to 2009. Papers were selected for retrieval based on their relevance to the possible relationship between halitosis and tonsilloliths. These papers were critically analyzed for quality and evidence based methods of research. Only peer reviewed and indexed published studies were used in the formation of this paper. Articles retrieved as background information for this paper focused on current methods of diagnosing halitosis, the nature of tonsilloliths and treatment options available for this condition.

RESULTS

The earliest report found in the literature which correlates tonsilloliths to halitosis is dated to 1988.[23] It was not until almost two decades later that this relationship was investigated again.[6,10] Tsuneishi et al.[24] conducted a study to analyze the composition of the bacteria flora of tonsilloliths. The objective was to examine if the tonsilloliths shared VSC producing bacteria with the tongue and periodontal pocket. All tonsilloliths examined were reported to emit a foul odour when crushed. From the six tonsilloliths samples, a total of 273 clones were produced, and all were identified as known species or phylotypes. The number of species/phylotypes detected in each tonsillolith ranged from 9 to 17.[24]

When comparing samples, neither a common type of species/phylotypes, nor a predominant type of bacteria was identified. However, all samples included at least one bacterial species that is known to produce VSC or to be associated with halitosis. Bacteria belonging to the genus *Prevotella* were also found in all tonsillolith samples. Results of scanning electron microscopy showed cocci being more common than rods on the surface of the tonsilloliths, while rods and filamentous microorganisms predominated inside the tonsillolith. Except for one sample, all tonsilloliths presented with more anaerobes (over 50%) than aerobes.[24] The malodour produced when the tonsilloliths are crushed occurs due to the release of VSC from these obligate anaerobic bacteria. The authors proposed the need for further DNA sequencing to determine accurately the level of bacterial diversity, and to identify novel phylotypes in tonsilloliths using a phylogenic tree.[24] Only a small number of clones were evaluated in this study.[24] Suggestions are made for further studies to address an objective data on intact levels of VSC before they are crushed because a subjective method was employed after samples were crushed.[24] Since hydrogen sulfide and

Table 1. Summary of studies associating tonsilloliths to halitosis.

Study	Design	Results
2009 Stoodley et al.[19]	Observers. N=16	• Fusiform morphology and corncob structures found suggested that *F. nucleatum* was present in tonsilloliths.
2007 Rio et al.[3]	Observers, parallel group. N=49	• Kappa coefficient test = a tonsillolith was present in 75% of the patients with abnormal halitometry and in only 6% of the patients with normal halitometry. • Student's t-test = halitometry values were statistically higher in patients with a tonsillolith at the time of VSC analysis. • Dycotomic logistic regression = the presence of a tonsillolith represents a tenfold risk factor for halitosis.
2006 Tsuneishi et al.[23]	Observers. N=6	• All tonsilloliths produced foul odour when crushed. • Bacteria belonging to the genus *Prevotella* were found in all tonsillolith samples. • All tonsillolith samples included at least one bacterial species that is known to produce VSC or to be associated with halitosis.
2006 Myers et al.[24]	Case report. N=1	• Extreme halitosis disappeared upon adenotonsillectomy in an 11 year old girl with multiple bilateral tonsilloliths.
2005 Ansai and Takehara[7]	Case report. N=1	• Removal of tonsilloliths reduced concentration of hydrogen sulfide in the breath of a man from HgS 1.2 ng/10 ml, Grade 2 OLT to HgS 0.3 ng/10, Grade 0 OLT.
1988 Fletcher and Blair[22]	Case report. N=1	• Tonsillectomy was effective in treating halitosis.

methyl mercaptan are considered the major components of halitosis, and because all tonsilloliths carried at least one anaerobic bacterial species producing these products, it was concluded that tonsilloliths may contribute to halitosis.[24]

Another study was conducted by Stoodley et al.[9] to analyze the morphology and activity of tonsilloliths with a hypothesis that tonsilloliths were capable of metabolic activity consistent with dental biofilms. Histological analysis confirmed that tonsilloliths contained corncob structures, filaments, and cocci, and were therefore, assimilated to dental biofilms. Although unconfirmed by the authors, the fusiform morphology and corncob structures analyzed in the study suggested that *F. nucleatum* was present, which is an obligate anaerobe that can produce VSC associated with halitosis. Based on the results, the authors of both of the studies described above[9,24] suggest that obligate anaerobes that can produce VSC associated with halitosis are present in tonsilloliths.

Another study in 2007 evaluated the relationship between the presence of a tonsillolith and an abnormal halitometry in a population with chronic caseous tonsillitis (CCT).[3] The normal halitometry value for this study was considered to be less than 150 ppb of VSC. Forty-nine subjects, 17 male and 32 female, and ranging in age from 14–57 years were used in this study. The main criterion was that clients needed to have CCT. The percentage of people with CCT who had halitosis was 77%.

Participants answered a survey related to food debris, oral hygiene, medical history, and use of medications. The exclusion criteria included smokers (any tobacco product, either daily or occasionally), heavy alcoholic drinkers (more than 30 g alcohol/day), drug users, pregnant women, clients with tooth and gum diseases (specific conditions listed), and those taking any kind of regular medication. In addition, clients with periodontal diseases (specific methods of measuring the diseases are mentioned), and clients with a thick tongue coat (plaque, food debris) were also excluded from the study. Clients with gastrointestinal, pulmonary, and other systemic metabolic disorders were also excluded. Except for CCT, all clients had a normal medical background.

The instrument, Interscan Halimeter, was used to detect the amount of VSC present. The average value of three measurements taken for each subject during testing was used to analyze data. The subjects were divided into two groups based on halitometry profile—Group A: normal halitometry, and Group B: abnormal halitometry. The correlation between the presence of a tonsillolith and abnormal halitometry, and whether the presence of a tonsillolith was a predicting factor for the abnormal halitometry were studied using different tests. The Kappa coefficient test showed that a tonsillolith was present in 75% of the clients with abnormal halitometry, and in only 6% of the clients with normal halitometry. Student's t-test demonstrated that halitometry values were statistically higher in clients with a tonsillolith at the time of VSC analysis. Dycotomic logistic regression showed that the presence of a tonsillolith was a risk factor for abnormal halitometry. The results indicated that the presence of a tonsillolith at the moment of the physical examination represented a relative increased risk for abnormal halitometry of 10.3 times.

The difference in halitometry between Groups A and B is shown to be significant. Group B (abnormal halitometry) presented with much higher VSC levels than Group A (normal halitometry) when compared—285.2 ppb versus 53.9 ppb respectively. What makes this significant is the fact that 75 per cent of clients in Group B had a tonsillolith present in the mouth at the time of testing, whereas only 6 per cent of Group A presented with the tonsillolith at time of testing. As for the remaining 25 per cent (two subjects)

from Group B who did not present with a tonsillolith at the time of the testing, they were later reassessed and the presence of abundant exudative, non purulent secretion was detected by pressing the tonsils, indicating the presence of non visible tonsilloliths. No information was given to indicate when or how long after the testing these subjects were reassessed, but it was suggested that the non visible tonsilloliths were the cause of the abnormal halitometry in these subjects.

Because 94 per cent of the clients in Group A did not have a tonsillolith at the time of testing and had normal halitometry results, it is conclusive that when a tonsillolith is absent VSC levels tend to be normal. In other words, the presence of a tonsillolith suggests a great probability that VSC levels are high.

Although an objective method of measuring halitosis was employed, the Interscan Halimeter only measures VSC, thus excluding other smells that are offensive to the human olfaction. In addition, only a small number of subjects actually presented with abnormal VSC levels (16.3%), perhaps because halitosis can occur in only certain periods of the day (when a person wakes up for example), and because the measurement was only done at a given time, there exists a possibility that the subjects were not exhaling VSC at the time of analysis.

Information lacking in this study were:

- no indication of blindness to assess for possible bias and/or accuracy.
- details of the questionnaire for participants, and
- oral health status that was vaguely described as "no signs of gingival inflammation", without a reference to the use of plaque scores or bleeding indexes.
- whether the subjects were instructed to incorporate a proper oral hygiene home care procedure prior to the study.

Without the survey questions and the lack of plaque and bleeding scores, plus the great quantity of people (n=49) "without gingivitis", there may be some room for skepticism. Additionally, the student's t-test demonstrated that halitometry values were statistically higher in clients with a tonsillolith at the time of VSC analysis, but without any numerical values to indicate by how much higher. Despite the lack of information on these particular issues, a variety of tests and accuracy methods were used to confirm the hypothesis that a relationship between tonsilloliths and halitosis exists.

Another study that examined tonsilloliths as a halitosis inducing factor was performed by Ansai and Takehara.[7] The case report is of a 25 year old Japanese male student who presented at a breath odour clinic complaining that he felt like something had caught in his throat which he also considered to be the cause of breath odour. During oral examination, two tonsilloliths were clinically observed. Both the GC and the OLT were used to test the degree of halitosis present. Before the tonsilloliths were removed, the hydrogen sulfide measurement was HgS 1.2 ng/10 ml. Three trained dentists performed the OLT, which was determined to be Grade 2—slight, but clearly noticeable odour. Immediately after the removal of a total of four tonsilloliths, another GC was performed giving a result of HgS 0.4 ng/10 ml—one third of the value from first test. The reliability of the GC is shown to have a standard deviation lower than HgS 0.1ng/10 ml, therefore, the reduction of 0.8 is considered significant. The test was performed again the following day, and HgS 0.3 ng/10 ml was detected and OLT score was recorded as 0. The rationale for acquiring these measurements only a day later and not immediately after testing, is unknown. The patient's opinion on whether he thought his halitosis had disappeared is also not provided. Despite the lack of information on these particular topics, the choice of using the GC as a form of testing in this study is plausible. As previously addressed, the GC has been shown to be a highly accurate form of diagnosing halitosis, suggesting that the significant results given to link tonsilloliths with halitosis are valid.

The authors claim their study to be the first report to link tonsilloliths to halitosis. However, an article written in 1988 had already attempted to establish this relationship.[23] This incident may be considered evidence to support the notion that a higher degree of awareness of the tonsillolith–halitosis connection is needed among oral healthcare providers.

Myers et al.[12] reported a case where an 11 year old female presented with a history of chronic tonsillitis causing the retention of food debris to occur several times per week. The patient reported having extreme halitosis, and as a result, she would often avoid talking to people due to embarrassment. After attempting several unsuccessful methods to prevent debris from forming such as gargling with salt water, using mouthwash, and frequent tooth brushing, she desired to undergo adenotonsillectomy. Multiple bilateral tonsilloliths were discovered. Two weeks following the surgery, the patient returned to the clinic with improved symptoms. At that time, she stated she had not experienced any halitosis and that she was satisfied with the outcome of the procedure.

Although no instruments were used to measure halitosis in this case, one may still consider the subjective feelings of the subject towards her condition valid. The fact that she reported significant satisfaction and no longer experienced halitosis following surgery may eliminate the potential of pseudohalitosis, a belief that one is experiencing halitosis when it is not present.[14]

Education

No literature was found that addressed implementing the knowledge of tonsilloliths as a halitosis inducing factor in the dental educational setting. Some researchers, however, agreed that possessing this knowledge is highly expected of oral healthcare providers.[2,7]

DISCUSSION

The literature seems to show a significant correlation between tonsilloliths and halitosis. Because oral healthcare providers are the professionals who are primarily consulted for the treatment of halitosis, it is important that they possess the current knowledge to properly diagnose and refer their clients. As reviewed in this paper, tonsilloliths have been shown to be a possible cause of halitosis. However, oral healthcare providers are not fully

aware of this relationship. Researchers agree that oral healthcare providers are accustomed to examining the oral cavity, but rarely examine the tonsil and pharynx area, indicating that the presence of a tonsillolith may be easily overlooked.[7] Van den Broek et al.[2] made the following statement, "Non dental related halitosis should not be underexposed", suggesting the need to increase an awareness to oral healthcare providers that tonsilloliths may sometimes be the cause of halitosis. A suggestion to increase this awareness is to implement the concept of tonsilloliths as a possible cause of halitosis in the educational setting. This includes incorporating tonsilloliths in the curriculum of dental institutions and developing continuing education courses for oral healthcare providers that address this issue. A recommendation for clinical practice would be to include not only a question regarding halitosis, but also one that addresses tonsil stones in the health form filled out by clients in dental offices.

CONCLUSIONS

Halitosis is a condition that may restrict social interaction especially when it comes to intimate relationships, thus negatively affecting one's quality of life. In reference to the authors' PICO question, "Could the increased familiarity and knowledge of tonsillolith assist oral healthcare providers to properly identify its relationship to patients suffering from halitosis?" it is conclusive that the association between the presence of tonsilloliths and the manifestation of halitosis is present in the literature. There is no evidence, however, on any attempts that might have been made to address the need for an increased awareness and knowledge of tonsilloliths as a halitosis inducing factor to oral healthcare providers. Through the formation of this paper, however, its use will serve the purpose of increasing the familiarity of the halitosis–tonsillolith link to oral healthcare providers, who are the primarily consulted professionals by the public on the issue of halitosis. Implementation of increasing awareness of the relationship of tonsilloliths to halitosis in both the educational and clinical settings needs to be performed.

Further research needs to be conducted in order to analyze the prevalence of people with tonsilloliths, as this information was not found in the literature. This is an important statistic because it could bring more attention to this topic, thus, increasing awareness. The sooner the diagnosis of tonsillolith derived halitosis, the sooner the appropriate treatment is delivered, and quality of life is restored.

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The Cochrane Effective Practice and Organisation of Care (EPOC) Group is a Review Group of The Cochrane Collaboration—an international network of people helping healthcare providers, policy makers, patients, their advocates and carers, make well informed decisions about human health care by preparing and publishing systematic reviews.

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The effectiveness of strategies to change organisational culture to improve healthcare performance

Art. No.: CD008315.
DOI: 10.1002/14651858.
CD008315.pub2

Parmelli E, Flodgren G, Schaafsma ME, Baillie N, Beyer FR, Eccles MP

ABSTRACT

Background

Organisational culture is an anthropological metaphor used to inform research and consultancy and to explain organisational environments. Great emphasis has been placed during the last years on the need to change organisational culture in order to pursue effective improvement of healthcare performance. However, the precise nature of organisational culture in healthcare policy often remains underspecified and the desirability and feasibility of strategies to be adopted has been called into question.

Objectives

i. To determine the effectiveness of strategies to change organisational culture in order to improve healthcare performance.
ii. To examine the effectiveness of these strategies according to different patterns of organisational culture.

Search strategy

We searched the following electronic databases for primary studies: The Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, CINAHL, Sociological Abstracts, Web of Knowledge, PsycINFO, Business and Management, EThOS, Index to Theses, Intute, HMIC, SIGLE, and Scopus until October 2009. The Database of Abstracts of Reviews of Effectiveness (DARE) was searched for related reviews. We also searched the reference lists of all papers and relevant reviews identified, and we contacted experts in the field for advice on further potential studies.

Selection criteria

We considered randomised controlled trials (RCTs) or well designed quasi-experimental studies, controlled clinical trials (CCTs), controlled before and after studies (CBAs) and interrupted time series analyses (ITS) meeting the quality criteria used by the Cochrane Effective Practice and Organisation of Care Group (EPOC). Studies should be set in any type of healthcare organisation in which strategies to change organisational culture in order to improve healthcare performance were applied. Our main outcomes were objective measures of professional performance and patient outcome.

Data collection and analysis

At least two review authors independently applied the criteria for inclusion and exclusion criteria to scan titles and abstracts and then to screen the full reports of selected citations. At each stage results were compared and discrepancies solved through discussion.

Main results

The search strategy yielded 4239 records. After the full text assessment, no studies met the quality criteria used by the EPOC Group and evaluated the effectiveness of strategies to change organisational culture to improve healthcare performance.

Authors' conclusions

It is not possible to draw any conclusions about the effectiveness of strategies to change organisational culture because we found no studies that fulfilled the methodological criteria for this review. Research efforts should focus on strengthening the evidence about the effectiveness of methods to change organisational culture to improve health care performance.

The psychological effects of the physical healthcare environment on healthcare personnel

Art. No.: CD006210.
DOI: 10.1002/14651858.
CD006210.pub3

Tanja-Dijkstra K, Pieterse ME

ABSTRACT

Background

The physical healthcare environment is capable of affecting patients. This concept of 'healing environments' refers to the psychological impact of environmental stimuli through sensory perceptions. It excludes more physiological effects such as those produced by ergonomic (i.e. fall prevention) or facilitative (i.e. hygiene-related) variables. The importance of an atmosphere in the healthcare environment that promotes the health and well-being of patients is evident, but this environment should not negatively affect healthcare personnel. The physical healthcare environment is part of the personnel's 'workscape'. This can make the environment an important determinant of subjective work-related outcomes like job satisfaction and well-being, as well as of objective outcomes like absenteeism or quality of care. In order to effectively build or renovate healthcare facilities, it is necessary to pay attention to the needs of both patients and healthcare personnel.

Objectives

To assess the psychological effects of the physical healthcare environment on healthcare personnel.

Search strategy

We searched the Cochrane EPOC Group Specialised Register; Cochrane Central Register of Controlled Trials; Database of Abstracts and Reviews of Effects; MEDLINE; EMBASE; CINAHL; Civil Engineering Database and Compendex. We also searched the reference lists of included studies.

Selection criteria

We included randomised controlled trials (RCT), controlled clinical trials (CCT), controlled before and after studies (CBA), and interrupted time series (ITS) of psychological effects of the physical healthcare environment interventions for healthcare staff. The outcomes included measures of job satisfaction, satisfaction with the physical healthcare environment, quality of life, and quality of care.

Data collection and analysis

Two reviewers independently assessed studies for eligibility, extracted data, and assessed methodological quality.

Main results

We identified one study, which adopted a CBA study design to investigate the simultaneous effects of multiple environmental stimuli. Staff mood improved in this study, while no effects were found on ward atmosphere or unscheduled absences.

Authors' conclusions

One study was included in this review. This review therefore indicates that, at present, there is insufficient evidence to support or refute the impact of the physical healthcare environment on work-related outcomes of healthcare staff. Methodological shortcomings, particularly confounding with other variables and the lack of adequate control conditions, partially account for this lack of evidence. Given these methodological issues, the field is in need of well-conducted controlled trials.

The use of the exit interview to reduce turnover amongst healthcare professionals

Art. No.: CD006620.
DOI: 10.1002/14651858.
CD006620.pub2

Flint A, Webster J

ABSTRACT

Background

Exit interviews are widely used in healthcare organisations to identify reasons for staff attrition, yet their usefulness in limiting turnover is unclear.

Objectives

To determine the effectiveness of various exit interview strategies in decreasing turnover rates amongst healthcare professionals.

Search strategy

We used a comprehensive search strategy including an electronic search of the following databases: DARE, CENTRAL, MEDLINE, EMBASE, CINAHL, PsycINFO, ERIC (search date: 7 September 2010) and EPOC Specialised Register (search date: 30 September 2009). We also screened the reference lists of included studies and relevant reviews.

Selection criteria

Randomised controlled trials, controlled clinical trials, controlled before and after studies and interrupted time series studies comparing turnover rates between healthcare professionals who had undergone one form of exit interview with another form of exit interview or with no interview.

Data collection and analysis

Two review authors independently assessed trial quality and extracted data.

Main results

The search identified 1560 citations of which we considered 19 potentially relevant. The two authors independently reviewed the abstracts of these studies and retrieved the full texts of eight studies. We excluded all eight following independent assessment. They were either interviews, commentaries on how to do an exit interview or descriptive studies about reasons for leaving. We found no trials that matched our inclusion criteria.

Authors' conclusions

Evidence about the effectiveness of exit interviews to reduce turnover is currently not available. However, exit interviews may provide useful information about the work environment which, in turn, may be useful in the development of interventions to reduce turnover.

Interventions to manage dual practice among health workers

Art. No.: CD008405.
DOI: 10.1002/14651858.
CD008405.pub2

Kiwanuka SN, Rutebemberwa E, Nalwadda C, Okui O, Ssengooba F, Kinengyere AA, Pariyo GW

ABSTRACT

Background

Dual practice, whereby health workers hold two or more jobs, is a common phenomenon globally. In resource constrained low- and middle-income countries dual practice poses an ongoing threat to the efficiency, quality and equity of health services, especially in the public sector. Identifying effective interventions to manage dual practice is important.

Objectives

To assess the effects of regulations implemented to manage dual practice.

Search strategy

Databases searched included: The Cochrane Central Register of Controlled Trials (CENTRAL) 2011, Issue 4, part of The Cochrane Library. www.thecochranelibrary.com, including the Cochrane Effective Practice and Organisation of Care (EPOC) Group Specialised Register (searched 26 May 2011); MEDLINE In-Process & Other Non-Indexed Citations May 24, 2011 (searched 26 May 2011); MEDLINE, Ovid (1948 to May week 2 2011) (searched 26 May 2011); EMBASE, Ovid (1980 to 2011 week 20) (searched 26 May 2011); Science Citation Index and Social Sciences Citation Index, ISI Web of Science (1975 to present) (searched 04 December 2009); LILACS (searched January 2010); and AIM (December 2009) (searched 18 December 2009).

Selection criteria

Randomized controlled trials, non-randomized controlled trials, controlled before-and-after studies and interrupted-time-series studies. Dual practice was defined as holding more than one job. Studies for inclusion were those focusing on interventions to manage dual practice among health professionals employed in the public health sector.

Data collection and analysis

Two review authors independently applied the criteria for inclusion and exclusion of studies when scanning the identified titles and abstracts. The same two review authors independently screened full reports of selected citations. At each stage, results were compared and discrepancies settled through discussion.

Main results

No studies were found which were eligible for inclusion in this review.

Authors' conclusions

There is a need to rigorously evaluate the effects of interventions implemented to manage dual practice among health workers. However, there is still much that is unknown about dual practice itself. The designing of studies to evaluate the effects of interventions to manage dual practice could benefit from prior studies to assess the various manifestations of dual practice, their prevalence and their likely impacts on health services delivery. These findings would then inform the design of studies to evaluate interventions to manage dual practice.

Preventive staff-support interventions for health workers

van Wyk BE, Pillay-Van Wyk V

Art. No.: CD003541.
DOI: 10.1002/14651858.
CD003541.pub2

ABSTRACT

Background

Healthcare workers need to be supported to maintain sufficient levels of motivation and productivity, and to prevent the debilitating effects of stress on mental and physical well-being.

Objectives

To assess the effects of preventive staff-support interventions to healthcare workers.

Search strategy

We searched The Cochrane Effective Practice and Organisation of Care Group (EPOC) Specialised Register (and the database of studies awaiting assessment), Biblioweb (searched 28 August 2008); The Cochrane Central Register of Controlled Trials (The Cochrane Library 2008, Issue 3) (searched 28 August 2008); MEDLINE, Ovid 1950 to August Week 2 2008 (searched 26 August 2008); CINAHL, Ovid 1982 to August Week 4 2008 (searched 26 August 2008); EMBASE, Ovid 1980 to 2008 Week 34 (searched 26 August 2008); PsycINFO, Ovid 1806 to July Week 5 2008 (searched 27 August 2008); Soc iological Abstracts, CBA 1952 to present (searched 28 August 2008).

Selection criteria

Randomised controlled trials of interventions to support healthcare workers in coping with work-related stress, preventing burnout and improving job satisfaction, without changing contractual conditions of service or physical work environment. Three types of interventions were included in this review: (1) support groups for staff; (2) training in stress management techniques; and (3) management interventions for supporting staff.

Data collection and analysis

Two authors independently performed study selection, quality assessments and data abstraction.

Main results

Ten studies involving 716 participants met the criteria for inclusion. None assessed the effects of support groups for health workers. Eight studies assessed the effects of training interventions in various stress management techniques on measures of stress and/or job satisfaction, and two studies assessed the effects of management interventions on stress, job satisfaction and absenteeism.

Three studies demonstrated a beneficial effect of stress management training intervention on job stress. Only one of these showed that this effect is sustainable over the medium-term. One study demonstrated the beneficial effect of a high intensity, stress management training intervention on burnout. Low and moderate intensity stress management training interventions failed to demonstrate benefit on burnout or staff satisfaction.

Management interventions demonstrated increases in job satisfaction, but failed to show effect on absenteeism.

Most studies had several methodological shortcomings leaving them vulnerable to potential biases.

Authors' conclusions

There is insufficient evidence for the effectiveness of stress management training interventions to reduce job stress and prevent burnout among healthcare workers beyond the intervention period. Low quality evidence suggests that longer-term interventions with refresher or booster sessions may have more sustained positive effect, but this needs to be rigorously evaluated in further trials.

Low quality evidence exists to show that management interventions may improve some measures of job satisfaction. However, further trials are needed to assess whether this finding is replicable in other settings. There was insufficient evidence of the benefit of management interventions on staff absenteeism.

Rigorous trials are needed to assess the effects of longer-term stress management training and management interventions in primary care and developing country settings.

Local opinion leaders: effects on professional practice and health care outcomes

Art. No.: CD000125.
DOI: 10.1002/14651858.
CD000125.pub4

Flodgren G, Parmelli E, Doumit G, Gattellari M, O'Brien MA, Grimshaw J, Eccles MP

ABSTRACT

Background

Clinical practice is not always evidence-based and, therefore, may not optimise patient outcomes. Opinion leaders disseminating and implementing 'best evidence' is one method that holds promise as a strategy to bridge evidence-practice gaps.

Objectives

To assess the effectiveness of the use of local opinion leaders in improving professional practice and patient outcomes.

Search strategy

We searched Cochrane EPOC Group Trials Register, the Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, HMIC, Science Citation Index, Social Science Citation Index, ISI Conference Proceedings and World Cat Dissertations up to 5 May 2009. In addition, we searched reference lists of included articles.

Selection criteria

Studies eligible for inclusion were randomised controlled trials investigating the effectiveness of using opinion leaders to disseminate evidence-based practice and reporting objective measures of professional performance and/or health outcomes.

Data collection and analysis

Two review authors independently extracted data from each study and assessed its risk of bias. For each trial, we calculated the median risk difference (RD) for compliance with desired practice, adjusting for baseline where data were available. We reported the median adjusted RD for each of the main comparisons.

Main results

We included 18 studies involving more than 296 hospitals and 318 PCPs. Fifteen studies (18 comparisons) contributed to the calculations of the median adjusted RD for the main comparisons. The effects of interventions varied across the 63 outcomes from 15% decrease in compliance to 72% increase in compliance with desired practice. The median adjusted RD for the main comparisons were: i) Opinion leaders compared to no intervention, +0.09; ii) Opinion leaders alone compared to a single intervention, +0.14; iii) Opinion leaders with one or more additional intervention(s) compared to the one or more additional intervention(s), +0.10; iv) Opinion leaders as part of multiple interventions compared to no intervention, +0.10. Overall, across all 18 studies the median adjusted RD was +0.12 representing a 12% absolute increase in compliance in the intervention group.

Authors' conclusions

Opinion leaders alone or in combination with other interventions may successfully promote evidence-based practice, but effectiveness varies both within and between studies. These results are based on heterogeneous studies differing in terms of type of intervention, setting, and outcomes measured. In most of the studies the role of the opinion leader was not clearly described, and it is therefore not possible to say what the best way is to optimise the effectiveness of opinion leaders.

Interventions to improve question formulation in professional practice and self-directed learning

Art. No.: CD007335.
DOI: 10.1002/14651858.
CD007335.pub2

Horsley T, O'Neill J, McGowan J, Perrier L, Kane G, Campbell C

ABSTRACT

Background

Formulating questions is fundamental to the daily life of a healthcare worker and is a defining characteristic of professional competence and meaningful learning. With high expectations for healthcare providers to remain up-to-date with current evidence and the movement towards formalizing reflective practice as part of physician revalidation, it is important that curricula developed for improving the ability to formulate well-constructed questions are based on the best evidence.

Objectives

To assess the effectiveness of interventions for increasing the frequency and quality of questions formulated by healthcare providers in practice and the context of self-directed learning.

Search strategy

We obtained studies from searches of electronic bibliographic databases, and supplemented these with handsearching, checking reference lists, and consultation with experts.

Selection criteria

We considered published and unpublished randomized controlled trials (RCTs), controlled clinical trials (CCTs), interrupted time-series (ITS), and controlled before-after (CBA) studies of any language examining interventions for increasing the quality and frequency of questions formulated by health professionals involved with direct patient care.

Data collection and analysis

Two review authors independently undertook all relevancy screening and 'Risk of bias' assessment in duplicate. Intervention characteristics, follow-up intervals, and measurement outcomes were diverse and precluded quantitative analysis. We have summarized data descriptively.

Main results

Searches identified four studies examining interventions to improve question formulation in healthcare professionals. Interventions were mostly multi-component, limited within the context of EBM and primarily in physician and resident populations. We did not identify studies examining changes in frequency of questions formulated or those within the context of reflection. Risk of bias was generally rated to be 'high risk'. Three of the four studies showed improvements in question formulation in physicians, residents, or mixed allied health populations in the short- to moderate term follow up. Only one study examined sustainability of effects at one year and reported that skills had eroded over time.

Authors' conclusions

Evidence from our review suggests that interventions to increase the quality of questions formulated in practice produce mixed results at both short- (immediately following intervention), and moderate-term follow up (up to nine months), comparatively. Although three studies reported effectiveness estimates of an educational intervention for increasing the quality of question formulation within the short term, only one study examined the effectiveness in the longer term (one year) and revealed that search skills had eroded over time. Data suggests that sustainability of effects from educational interventions for question formulation are unknown.

Interventions for improving the adoption of shared decision making by healthcare professionals

Art. No.: CD006732.
DOI: 10.1002/14651858.
CD006732.pub2

Légaré F, Ratté S, Stacey D, Kryworuchko J, Gravel K, Graham ID, Turcotte S

ABSTRACT

Background

Shared decision making (SDM) is a process by which a healthcare choice is made jointly by the practitioner and the patient and is said to be the crux of patient-centred care. Policy makers perceive SDM as desirable because of its potential to a) reduce overuse of options not clearly associated with benefits for all (e.g., prostate cancer screening); b) enhance the use of options clearly associated with benefits for the vast majority (e.g., cardiovascular risk factor management); c) reduce unwarranted healthcare practice variations; d) foster the sustainability of the healthcare system; and e) promote the right of patients to be involved in decisions concerning their health. Despite this potential, SDM has not yet been widely adopted in clinical practice.

Objectives

To determine the effectiveness of interventions to improve healthcare professionals' adoption of SDM.

Search strategy

We searched the following electronic databases up to 18 March 2009: Cochrane Library (1970-), MEDLINE (1966-), EMBASE (1976-), CINAHL (1982-) and PsycINFO (1965-). We found additional studies by reviewing a) the bibliographies of studies and reviews found in the electronic databases; b) the clinicaltrials.gov registry; and c) proceedings of the International Shared Decision Making Conference and the conferences of the Society for Medical Decision Making. We included all languages of publication.

Selection criteria

We included randomised controlled trials (RCTs) or well-designed quasi-experimental studies (controlled clinical trials, controlled before and after studies, and interrupted time series analyses) that evaluated any type of intervention that aimed to improve healthcare professionals' adoption of shared decision making. We defined adoption as the extent to which healthcare professionals intended to or actually engaged in SDM in clinical practice or/and used interventions known to facilitate SDM. We deemed studies eligible if the primary outcomes were evaluated with an objective measure of the adoption of SDM by healthcare professionals (e.g., a third-observer instrument).

Data collection and analysis

At least two reviewers independently screened each abstract for inclusion and abstracted data independently using a modified version of the EPOC data collection checklist. We resolved disagreements by discussion. Statistical analysis considered categorical and continuous primary outcomes. We computed the standard effect size for each outcome separately with a 95% confidence interval. We evaluated global effects by calculating the median effect size and the range of effect sizes across studies.

Main results

The reviewers identified 6764 potentially relevant documents, of which we excluded 6582 by reviewing titles and abstracts. Of the remainder, we retrieved 182 full publications for more detailed screening. From these, we excluded 176 publications based on our inclusion criteria. This left in five studies, all RCTs. All five were conducted in ambulatory care: three in primary clinical care and two in specialised care. Four of the studies targeted physicians only and one targeted nurses only. In only two of the five RCTs was a statistically significant effect size associated with the intervention to have healthcare professionals adopt SDM. The first of these two studies compared a single intervention (a patient-mediated intervention: the Statin Choice decision aid) to another single intervention (also patient-mediated: a standard Mayo patient education pamphlet). In this study, the Statin Choice decision aid group performed better than the standard Mayo patient education pamphlet group (standard effect size = 1.06; 95% CI = 0.62 to 1.50). The other study compared a multifaceted intervention (distribution of educational material, educational meeting and audit and feedback) to usual care (control group) (standard effect size = 2.11; 95% CI = 1.30 to 2.90). This study was the only one to report an assessment of barriers prior to the elaboration of its multifaceted intervention.

Authors' conclusions

The results of this Cochrane review do not allow us to draw firm conclusions about the most effective types of intervention for increasing healthcare professionals' adoption of SDM. Healthcare professional training may be important, as may the implementation of patient-mediated interventions such as decision aids. Given the paucity of evidence, however, those motivated by the ethical impetus to increase SDM in clinical practice will need to weigh the costs and potential benefits of interventions. Subsequent research should involve well-designed studies with adequate power and procedures to minimise bias so that they may improve estimates of the effects of interventions on healthcare professionals' adoption of SDM. From a measurement perspective, consensus on how to assess professionals' adoption of SDM is desirable to facilitate cross-study comparisons.

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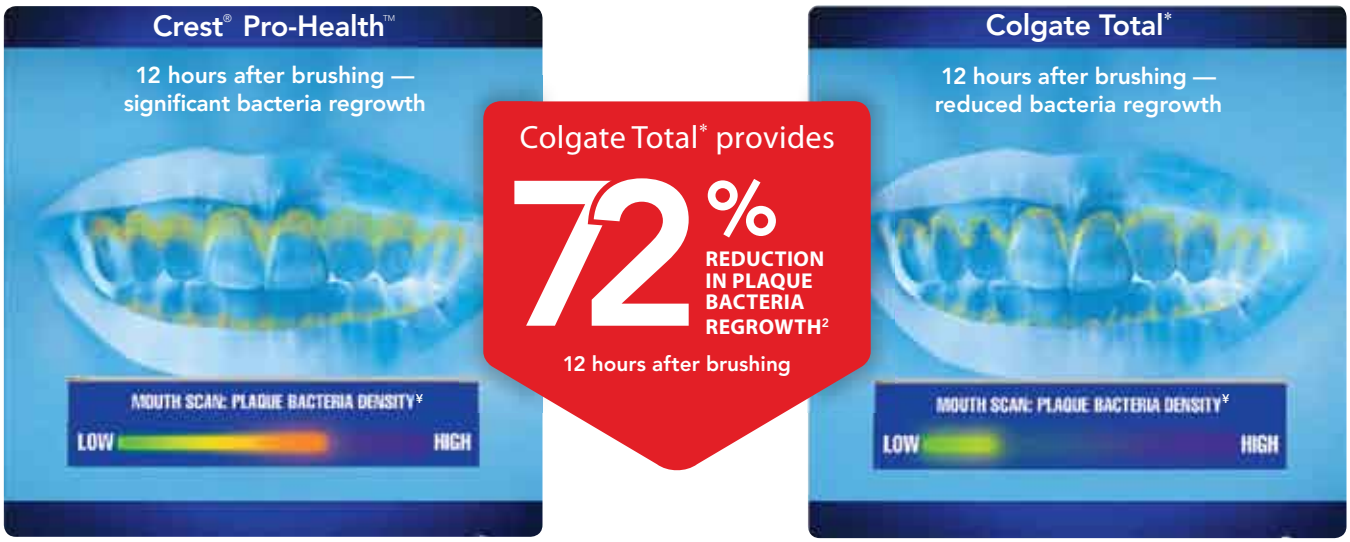

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Obstructive sleep apnea for the dental hygienist: Overview and parameters for interprofessional practice

Soo-Lyun An, DipDH; Catherine Ranson, DipDH, BHA

ABSTRACT

Objective: This literature review is intended to provide an overview of obstructive sleep apnea (OSA) to assist dental hygienists with developing an OSA screening protocol. This paper will also provide a review of legal and ethical considerations related to the diagnosis, treatment, referrals, and the circle of care for OSA clients. **Methods:** OSA is associated with concomitant conditions such as obesity, hypertension, and cardiovascular disease and thus requires a multidisciplinary client management strategy. A multidisciplinary search was conducted using databases that include: Academic Search Premier, Bioline International, Biological Sciences@ Scholars Portal, Biomed Central, Medline, PubMed Central, Scifinder, Scholars Portal and Scholars Portal E-Journals. In addition, physicians, dentists, and an oral myofunctional therapist provided clinical perspectives. **Discussion:** OSA is a potentially fatal disorder that affects 15–24% of the adult population; however 70–80% of cases are undiagnosed. Clinical signs and symptoms include loud snoring, witnessed apneas, and excessive daytime sleepiness. OSA has a myriad of cardiovascular, metabolic and neurocognitive consequences. Untreated OSA may lead to cognitive impairment, sexual dysfunction, and a poorer quality of life. Many of the comorbid conditions and risk factors associated with OSA can be identified through a comprehensive dental hygiene client assessment. **Conclusions:** OSA can have serious detrimental effects on client's overall health and quality of life. Dental hygienists are primary healthcare providers who can screen clients for OSA through comprehensive health histories and extra/intra oral assessments. Dental hygienists can facilitate a medical diagnosis by recognizing OSA signs, symptoms and risk factors, using OSA screening tools, and by providing the client with medical referrals. The dental hygienist may support clients with OSA by providing oral health education, and nutritional counselling.

RÉSUMÉ

Objet : Cette revue de la littérature présente à la profession de l'hygiène dentaire un aperçu général de l'apnée obstructive du sommeil (AOS) afin d'aider les hygiénistes dentaires à élaborer un protocole de dépistage de l'AOS. Cet article offre aussi une revue des aspects juridiques et éthiques du diagnostique, du traitement, de la soumission de cas et du cercle des soins pour les patients atteints de l'AOS. **Méthodes :** L'AOS est associée à des états concomitants, telles l'obésité, l'hypertension et la maladie cardiovasculaire; elle requiert ainsi une stratégie de gestion multidisciplinaire de la clientèle. Une recherche multidisciplinaire a été effectuée dans les bases de données suivantes : *Academic Search Premier*, *Bioline International*, Sciences biologiques dans *Scholars Portal*, *Biomed Central*, *Medline*, *PubMed Central*, *Scifinder*, *Scholars Portal* et les journaux électroniques de *Scholars Portal*. Et outre, des médecins, des dentistes et une thérapeute buccale myofonctionnelle ont apporté des perspectives cliniques. **Discussion :** L'AOS peut être un désordre funeste chez 15 à 24 % de la population adulte; toutefois 70 à 80 % des cas ne sont pas diagnostiqués. Les signes et les symptômes cliniques comprennent les ronflements bruyants, les apnées témoins et la somnolence diurne excessive. L'apnée obstructive du sommeil a une myriade de conséquences cardiovasculaires, métaboliques et neurocognitives. L'AOS non traitée peut mener à une déficience cognitive, à un dysfonctionnement sexuel et à un appauvrissement de la qualité de vie. Plusieurs des problèmes de comorbidités et des facteurs de risque associés à l'AOS peuvent être identifiés grâce à une évaluation complète de l'hygiène dentaire du patient. **Conclusions :** L'AOS peut affecter gravement la santé globale et la qualité de vie du client. Les hygiénistes dentaires sont les principaux fournisseurs de soins de santé qui examinent les patients en scrutant tous leurs antécédents de santé et en faisant des évaluations intra et extra buccales. Les hygiénistes dentaires peuvent faciliter le diagnostic médical en reconnaissant les signes, les symptômes et les facteurs de risque de l'AOS avec des outils d'examen de l'AOS et en orientant le patient vers le médecin. L'hygiéniste dentaire peut soutenir sa clientèle atteinte de l'AOS, par l'information sur la santé buccale et le conseil diététique.

Key words: obstructive sleep apnea, apnea–hypopnea index (AHI), hypertension, continuous positive airway pressure (CPAP), sleep apnea questionnaires, obesity, gastroesophageal reflux disease (GERD), bruxism, oral appliances, systemic inflammation, cariovascular disease, atherosclerosis

OBJECTIVE AND BACKGROUND

This article is intended to provide an overview and summarize available knowledge about obstructive sleep apnea (OSA) to assist dental hygienists with developing an OSA screening protocol.

OSA is a potentially fatal disorder that is characterized by repetitive, complete or partial obstruction of the upper airway during sleep causing cessation in airflow.[1–4] Obstruction of the airway during sleep leads systemic oxygen deprivation, leading to potentially deleterious effects

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on organs such as the heart and brain. OSA occurs in both adults and children. OSA was reported to be prevalent in 9% of women and 24% of men in 1993.[5] Studies indicate a rise in OSA prevalence and report OSA in 15–25% of middle aged and older adults,[6–9] that may be associated with the rise in North American obesity rates.[10–13] In addition to the increase in OSA prevalence, 70–90% of OSA cases are undiagnosed.[5,8,14,15] Undiagnosed OSA may be attributed to the paucity in awareness of OSA in the medical and oral health professions and failure to recognize common OSA symptoms.[15–17]

It was estimated in 1990 that in the US, healthcare costs associated with diagnosed OSA amount to $275 million per year.[18] OSA sequelae include cardiovascular disease and other comorbidities; consequently undiagnosed and untreated OSA cases may engender an even more significant economic strain on the healthcare system. Superfluous healthcare costs associated with undiagnosed/untreated OSA are related to treating OSA sequelae and comorbidities without addressing OSA as the primary etiologic condition.

The two salient types of sleep apnea are central sleep apnea (CSA) and OSA. OSA is defined as "a cessation of airflow for at least 10 seconds…the event is obstructive if during apnea there is an effort to breathe".[4] Thus, OSA results when the airway is obstructed or collapses during sleep resulting in respiratory effort to restore breathing. CSA is defined as a "cessation in airflow for at least 10 seconds…the event is central during apnea if there is no effort to breathe".[4] CSA results from the brain's imbalance of respiratory control during sleep that leads to a decrease or absence in the effort to breathe. This paper will focus on OSA, as the discussion of CSA is beyond the scope of this paper. It is also important to distinguish between OSA and obstructive sleep apnea syndrome (OSAS). OSA is limited to the medical condition as defined above and may not include symptoms.[5] OSAS is the syndrome associated with OSA and is accompanied by symptoms such as excessive daytime sleepiness and snoring.[5] Clients with OSA may not necessarily exhibit symptoms of OSA.[5]

Research has identified OSA as a chronic and multifaceted disease, and when undiagnosed and untreated can result in an array of concurrent health disorders. As a result, this literature review will also provide an overview of the comorbidites associated with OSA. This article will also provide an overview of legal and ethical considerations related to the diagnosis, treatment, referral, and the circle of care for OSA clients.

METHODS

OSA is associated with numerous concomitant conditions; therefore, the literature search was conducted in multidisciplinary databases including Academic Search Premier, Bioline International, Biological Sciences@ Scholars Portal, Biomed Central, Medline, PubMed Central, Scifinder, Scholars Portal, and Scholars Portal E-Journals. Physicians, dentists and an oral myofunctional therapist provided clinical perspectives. Medical and dental disciplines searched included respirology, sleep medicine, anesthesiology, otorhinolaryngology, cardiology, gastroenterology, immunology, endocrinology, pediatric medicine, pediatric dentistry, general dentistry, prosthodontics, orthodontics, oral surgery, and orofacial myology. Key words used in the search include: obstructive sleep apnea, hypopnea, apnea-hypopnea Index (AHI), polysomnogram, hypertension, continuous positive airway pressure (CPAP), sleep apnea questionnaires, obesity, metabolic syndrome, mouth breathing, orofacial myology, asthma, gastroesophageal reflux disease (GERD), oral appliances, bruxism, adenotonsillar hypertrophy, systemic inflammation, cariovascular disease, and atherosclerosis. Inclusion criteria involved full text articles, randomized clinical trials, literature reviews, and systematic reviews. Non peer reviewed and unpublished papers were excluded in the search for this paper. The literature search involved an international search for articles in English. Based on the inclusion and exclusion criteria, 251 articles were included in this review.

Interviews with primary healthcare providers—a sleep medicine respirologist, an otolaryngologist and dentist, two general practice dentists who were trained to deliver oral appliance therapy for the treatment of OSA, a certified oral myofunctional therapist, and an orthodontist—were conducted to gain insight into the clinical management and treatment of clients with OSA (Fitzpatrick M. Telephone interview. 10 February 2011; Wade P. Personal interview. 10 January 2011; Priemer L. Personal interview. 30 September 2010; Shnall J. Personal interview. 21 January 2011; Moeller J. Telephone interview. 10 February 2011; Tovilo K. Personal interview. 14 February 2011). These health professionals were selected on their clinical and academic experience within their respective professions and knowledge of OSA.

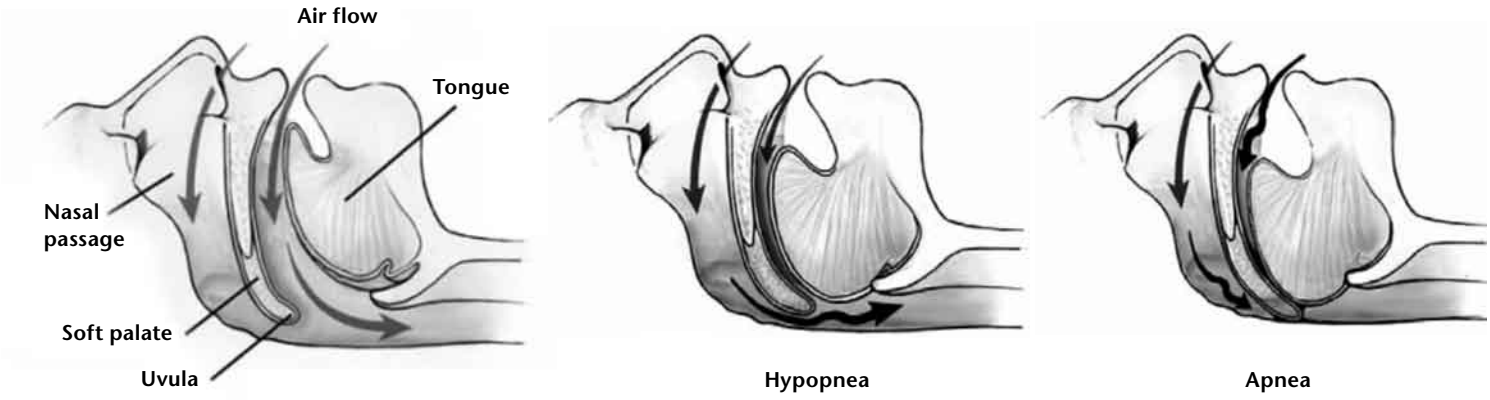
DISCUSSION

The following sections of this article will discuss the pathophysiology of OSA, craniofacial clinical presentation of OSA, risk factors for OSA in adults, incidence, and risk factors for OSA in children, comorbid conditions that are associated with OSA, diagnosis of OSA, treatment modalities, and the dental hygienist's role in screening, referring and supporting OSA clients.

OSA pathophyiology

The upper airway, which is also referred to as the pharyngeal airway, is the soft tissue region bordered by the nasopharynx, the epiglottis, the maxillomandibular complex (anteriorly) and the spinal column (posteriorly)[19–21] as depicted in figure 1. OSA arises from narrowing of the airway that results in pharyngeal airway collapse and occlusion. Obstruction of the upper airway can involve one or more components of the pharyngeal airway anatomy including the base of the tongue, the soft palate, uvula, hypertrophic adenoids and tonsils, and the nose.[22,23] The primary site of airway obstruction associated with OSA is considered to be in the oropharyngeal–hypopharyngeal area.[1,23] Thus, if nasal obstruction is involved in OSA, resolution of nasal obstruction may not necessarily resolve OSA if the primary site of obstruction is the oropharyngeal–hypopharyngeal area.[23,24]

The pharyngeal airway soft tissue is dilated during



▲ **Figure 1.** Partial and complete airway obstruction resulting in hypopnea and apnea, respectively. Reprinted from Hahn PY, Somers VK. Sleep apnea and hypertension. In: Lip GYH, Hall JE, eds. *Comprehensive Hypertension.* St. Louis, MO: Mosby; 2007:201–07. ©Elsevier, 2007. Reproduced with permission.

wakefulness but loses its tone during sleep.[19,21] OSA occurs as a sequel to the negative pressure of inspiration which draws soft tissue anatomy against the pharyngeal walls, narrowing or obstructing the airway,[21,23] resulting intermittent interruption of ventilation. The occurrence and severity of hypoventilation during sleep is measured by the apnea–hypopnea index (AHI). An apnea is defined as a cessation of airflow resulting from a complete blockage of the upper airway lasting for at least 10 seconds[4,8] as shown in Table 1. However, AHIs have been reported to last up to two minutes (Fitzpatrick M. Telephone interview. 10 February 2011). Hypopneas are defined as a partial obstruction of the upper airway resulting in a 20–50% decrease in airflow, and 3–4% oxygen desaturation.[25,26] Both apneas and hypopneas result in arterial hypoxemia and hypercapnia.[27–36] Arterial hypoxemia is considered a reduction in arterial blood oxygen and hypercapnia is considered an increase in blood carbon dioxide.[25,26] Recurrent reduction of systemic oxygen and elevated carbon dioxide may lead to metabolic disturbances[37–42] such as in obesity,[10–12] cardiac disease,[2] stroke and death.[7,8]

The AHI measures the number of apneas and hypopneas per hour during sleep. OSA is characterized by a minimum of five apneas and/or hypopneas during sleep.[8] The severity of OSAS is determined by the frequency of hypoventilation. The AHI quantifies the severity of OSA by calculating the number of apneas and hypopneas divided by the hours slept.[25] For adults, mild OSAS is scored at AHI> 5–15 hour, moderate OSAS is an AHI>15–30, and severe OSAS is an AHI >30.[26,29] For children, mild OSA is an AHI= 1–5, moderate is an AHI>=6–10, and severe is considered at an AHI of >10.[30] See Table 1.

Table 1. Apnea–hypopnea index (AHI): OSA severity for adults and children.

OSA severity	Mild	Moderate	Severe
Adults AHI score	>=5–15	15–30	>30
Children AHI score	1–5	6–10	>10

OSA symptoms

It is important to distinguish between OSA and OSAS. OSA clients may present as asymptomatic. When a client with OSA exhibits symptoms, they are considered to have OSAS.[5] There is a greater percentage of the population which has OSA but does not exhibit symptoms of the syndrome.[5] Primary symptoms associated with OSAS are loud chronic snoring,[43–48] witnessed apneas and excessive daytime sleepiness.[5,43] Primary symptoms are those that are highly associated with OSA.[48] The presence of primary symptoms would warrant a medical referral for an OSA assessment.[48] A combination of common OSA symptoms in addition to other OSA risk factors would also warrant a referral for an OSA medical assessment.

Loud chronic snoring arises from the vibration of soft tissue obstruction during inspiration.[23,25] Snoring may be followed with periods of silence that may indicate the presence of an apneic event. Clients with OSA may awaken from apenic and hypopneic events in an inadvertent strenuous effort to restore respiration.[25] Awakening may be synchronous with sounds of snorting, gasping, and choking.[43,46] Apneic and hypopneic episodes can occur isochronously during sleep. Sleep fragmentation from intermittent arousals often results in excessive daytime sleepiness[43,47–54] that can lead to increased work and traffic accidents[55–62] and a poorer quality of life.[49,63] Quality of life is defined as "the functional effect of an illness and its consequent therapy upon the patient, as perceived by the patient".[63] Effects of OSA on quality of life may involve limitations in "physical and occupational function, psychological functions, social interaction, and somatic sensation".[63]

Other common symptoms of OSAS related to decreased systemic oxygen and sleep disturbances include nocturia,[64–67] morning headaches,[64–68] xerostomia,[37,66] impairment of cognitive function,[69–76] depression,[77–80] sexual dysfunction,[81,82] irritability,[66] and decreased concentration.[13,66] These OSA symptoms are related to the sequelae arising from systemic oxygen desaturation and sleep arousals.

Table 2. Symptoms of obstructive sleep apnea syndrome (OSAS).

Primary symptoms	Common symptoms
• Excessive daytime sleepiness • Loud chronic snoring • Waking events accompanied by snorting, gasping choking sounds witnessed by another person (witnessed apneas)	• Morning headaches • Xerostomia • Depression • Memory impairment • Decreased concentration • Irritability • Nocturia • Sexual dysfunction/ impotence • Diminished quality of life

OSA craniofacial presentations

Craniofacial features of OSA include intraoral and extraoral findings. Extraoral features identified as risk factors associated with adult OSA include a neck circumference >40 cm (15.75 inches).[83–86] Men who have a 43.18 cm (17 inches) neck circumference (or greater) are at higher risk for OSA.[43] A neck circumference of 40.64 cm (16 inches) or greater for women increases OSA risk.[43] Excess adipose tissue in the neck region increases the risk of upper airway soft tissue obstruction.

Other craniofacial characteristics of clients with OSA (as seen in Table 3) include a small retrognathic mandible,[87–89] and inferior displacement of the hyoid,[90,91] increased anterior face height,[92–96] a steep mandibular plane angle,[92,93,97] decrease in nasal patency,[92–98] and Class II malocclusion.[93,99–101] These craniofacial presentations may involve mandibular retrognathia that can lead to the posterior displacement of the oropharyngeal soft tissues during sleep. Posterior displacement of soft tissues can heighten the risk of OSA pharyngeal occlusion.

Table 3. Craniofacial–oral risk factors associated with OSA.

Extraoral–craniofacial presentations of clients with OSA	Common intraoral features of clients with OSA

• Small, retrognathic mandible
• Large neck circumference
  ○ Men >43.18 cm (17 inches) diameter
  ○ Women >40.64 cm (16 inches) diameter
• Increased anterior face height (long looking face)
• Steep mandibular plane angle
• Inferior displacement of hyoid
• Decreased nasal passage size
	• Large, low, flat, posteriorly positioned tongue
	• High vaulted narrow palate
	• Elongated soft palate and uvula
	• Hypertrophic tonsils/ adenoids
	• Class II malocclusion, crossbite
	• Reduced intermaxillary space
	• Edentulous (especially sleeping without dentures)
	• Dental erosion (associated with GERD)
	• Attrition associated with bruxism

OSA intraoral and extraoral clinical presentations and risk factors

Prominent intraoral features include a posteriorly inclined, low lying broad tongue,[101–106] a reduction in intermaxillary space,[103,104] and a narrow high vaulted palate.[93–99] The hard palate is the floor of the nasal cavity thus; a narrow hard palate can lead to a decreased nasal space,[107,108] and increased nasal resistance.[98,99,108] A normal vaulted palate allows sufficient intermaxillary space to accommodate the tongue. Thus, a narrow high palate/ maxillary constriction may not accommodate the tongue, resulting in a low and flat tongue posture and crowding of the pharyngeal airway.[99] Other intraoral risk factors for OSA include an elongated soft palate,[105,109] hypertrophic uvula,[66,105] and enlarged tonsils/adenoids.[101,102,105] These intraoral features may increase the probability of upper airway obstruction.

Other common intraoral features of clients with OSA may include dental attrition and erosion which relate to common concomitant OSA conditions such as GERD,[110–114,] and bruxism.[115–118] Bruxism leads to muscle activation in the upper airway—tongue, suprahyoid and masseter—and is often observed at the end of an apneic event, restoring tone to the airway, alleviating the obstruction, and terminating the apneic event.[115] Edentulism is also an OSA risk factor.[119–122] The absence of posterior teeth may lead to loss in vertical dimension and collapse of pharyngeal soft tissues,[119,121,122] resulting in an increase OSA risk. Accordingly, the severity of AHI has been shown to be higher in clients with OSA who sleep without dentures.[121,122]

Adult OSA risk factors

Independent risk factors for OSA include sex,[48,123] age,[48] and hypertension.[124,125] Men between the ages of 30 and 50 have twice or thrice higher incidence of OSA than women of the same age.[46,47,126] The link between OSA and hypertension is thought to be a causal relationship and OSA is considered an independent risk factor of hypertension.[125,126] Studies have also shown that both hypertension and OSA exacerbate each other,[127] and that about 50 per cent of clients with OSA develop systemic hypertension.[124] The relationship between OSA and hypertension may be attributed to an increase in sympathetic nerve activity and increased peripheral vascular resistance that results from a decrease in oxygen saturation during sleep.[128] The increase in peripheral resistance leads to vasoconstriction that may result in a 25 per cent raise in systemic blood pressure accompanied by further blood pressure surges at each apneic episode.[129]

Obesity is defined by a body mass index (BMI) greater than 30,[12] and is a recognized risk factor for OSA.[130–157] Obesity can lead to an increase in craniofacial adipose tissue that can cause upper airway obstruction.[43,84–89] However, it is important to distinguish that *not all adults with OSA are obese*.[47] Other associated risk factors include pregnancy,[139–144] tobacco,[47,84] alcohol use,[45,47] sedative use,[47,142] and genetics.[145,146] Weight gain and edema may increase OSA risk and pre-eclampsia during pregnancy.[139–144] Tobacco use is believed to cause inflammation of the pharyngeal soft tissues that may increase the risk for upper

airway occlusion during sleep and exacerbate OSA related cardiovascular risk. Alcohol and sedatives may decrease pharyngeal airway soft tissue tonicity, exacerbating the risk of pharyngeal occlusion.[37,139] The genetic risk for OSA is related to genetic biochemical markers and shared familial craniofacial architecture.[47,87,105] Clients who have a familial history of OSA have 2 to 4 times greater risk for OSA.[37,105] These risk factors for OSA should be considered as part of an overall OSA risk assessment during client care.

Concomitant conditions associated with OSA

OSA can be the progenitor and aggregator for a myriad of concomitant conditions. Concurring conditions associated with OSA include numerous cardiovascular diseases including arrhythmias,[147,148] atrial fibrillation,[149,150] stroke,[147,151] myocardial infarction,[152,153] heart failure,[153,155] systemic hypertension,[120,156–160] atherosclerosis,[161–167] pulmonary hypertension,[135,159] and systemic inflammation.[161–167] Other concurrent conditions associated with OSA include diabetes mellitus,[168,169] asthma,[170–172] allergic rhinitis,[23,173] fibromyalgia,[174] metabolic syndrome.[37–40] The mechanisms of interaction between concomitant conditions and OSA are complex, and discussion of all of these mechanisms is beyond the scope of this article. This article will provide a brief discussion on the mechanisms of OSA, systemic inflammation, atherosclerosis, and cardiovascular disease.

OSA, systemic inflammation, and cardiovascular disease

OSA is considered a risk factor for cardiovascular disease by the American Heart Association and the American College of Cardiology.[26] Systemic inflammation is suggested to be a sequela to OSA and an important factor in the pathogenesis of cardiovascular disease.[175,176] Accordingly, OSA clients are five times more likely to die from cardiovascular related causes.[176] Systemic inflammation that results from OSA is thought to exacerbate cardiovascular disorders such as hypertension, atherosclerosis and heart disease.[175–179] OSA related oxygen deprivation may lead to immuno-inflammatory alterations resulting in vascular changes and atherosclerotic remodelling. Studies suggest a positive correlation between atherosclerotic plaque volume and OSA.[176] OSA related atherosclerosis may also be exacerbated by hypertension related vascular hypertrophy and OSA related hormonometabolic changes such as insulin resistance and dyslipidemia.[176]

OSA also results in an increase of atherosclerotic pro-inflammatory mediators such as C-reactive protein (CRP). CRP is a salient pro-inflammatory mediator associated with OSA.[178,181–183] Elevation of CRP has been detected in clients with OSA independent of comorbidities such as obesity.[164] Chronic periodontal disease is also associated with an increase in systemic inflammatory mediators, atherosclerosis, and coronary heart disease.[184–190] CRP is also the inflammatory mediator associated with chronic periodontal disease.[187,190] A recent study has suggested that there may be an association between OSA and chronic periodontal disease.[191] The link between OSA and periodontal disease is suggested to be related to the chronic inflammatory nature of both conditions.[191] However, more research is needed to explore the nature of this association.

Pediatric OSA, epidemiology, and risk factors

OSA occurs in approximately 2 per cent of children.[192] Pediatric OSA is most often associated with hypertrophy of adenoid and tonisllar tissue[174,192–210] that may lead to pharyngeal occlusion. However, other common conditions and risk factors associated with pediatric OSA include loud chronic snoring,[211] obesity,[193,194,206] allergic rhinitis,[172,212,213] nasoseptal obstruction,[205,212,214] micrognathia,[32,205,212] retrognathia,[32,68] and genetics.[205] Relative mechanisms of pediatric OSA risk factors are similar to those discussed for adults.

Craniofacial–oral features of children with OSA are also similar to those of adults. Clinical presentation includes a low lying tongue position,[197] a high, narrow, vaulted palate and maxillary constriction,[215,216] increased soft palate volume,[216] retrognathia,[32,68,103] decreased nasal patency,[68,108] malocclusion, posterior crossbite,[217–219] anterior open bite,[211] and increased anterior facial height.[68,103] These risk factors are associated with an increased risk of pharyngeal obstruction during sleep.

Nasal obstruction and hypertrophic adenoids and tonsils may also lead to mouth breathing.[89,172] The typical facial architecture associated with mouth breathing is termed "adenoid face" or "long face" syndrome.[96,107,231] The adenoid face is characterized by an incompetent lip seal, a narrow upper dental arch, increased anterior face height, a steep mandibular plane angle, and a retrognathic mandible.[93] There are commonalities between the typical orofacial architecture of chronic mouth breathing and craniofacial risk factors for clients with OSA. Common orofacial findings of chronic mouth breathing include open lip posture,[94] Class II malocclusion,[107,218] crossbite,[107,218] an increased anterior facial height,[95,218] a hypertrophic soft palate,[108] a narrow, high, vaulted palate,[107,108,218] a low and flat tongue,[197,220] and a steep mandibular occlusal plane.[96,107,108] Craniofacial features of mouth breathing clients suggest the posterior inclination of the mandible and pharyngeal tissues which may be related to OSA risk. Although, chronic mouth breathing is not causally related to OSA,[104,108] the presentation of craniofacial architecture associated with mouth breathing may indicate latent craniofacial risk for OSA.[195,108]

Children with OSA often will experience detrimental neurobehavioural consequences,[201,205,212] a poorer quality of life,[205] and can negatively affect academic performance.[205,212] Some studies have shown that OSA in children may have a higher prevalence of attention deficit disorder (ADD).[32,69,76] Negative cognitive consequences of pediatric OSA may be attributed to oxygen deprivation during sleep and sleep arousals.[32,69] However, more research is needed to define the relative mechanisms between OSA and ADD.

Screening and medical diagnosis

In 2009, the American Academy of Sleep Medicine recommended, "Questions regarding OSA should be incorporated into routine health evaluations. Suspicion

Table 4. STOP-BANG questionnaire and the Epworth Sleepiness Scale.

STOP-BANG questionnaire	Epworth Sleepiness Scale
Answer "Yes" or "No" to the following questions. A total of "yes" to 3 or more items on this questionnaire is considered high risk for OSA (231). **S:** Do you snore loudly? **T:** Do you often feel tired, fatigued, or sleepy during daytime? **O:** Has anyone observed you stop breathing during your sleep? **P:** Do you have high blood pressure? **B:** BMI >30? **A:** Age >50? **N:** Neck circumference >40 cm? **G:** Gender male? **STOP-BANG score** _____	A score of 10 or more is considered sleepy. If you score 10 or more on this test, you may not be obtaining adequate sleep. These issues should be discussed with your physician. Use the following scale to choose the most appropriate number for each situation: 0 = would never doze or sleep 1 = slight chance of dozing or sleeping 2 = moderate chance of dozing or sleeping 3 = high chance of dozing or sleeping **Situation** **Chance of dozing or sleeping** Sitting and reading _____ Watching TV _____ Sitting inactive in a public place _____ Being a passenger in a motor vehicle for an hour or more _____ Lying down in the afternoon _____ Sitting and talking to someone _____ Sitting quietly after lunch (no alcohol) _____ Stopped for a few minutes in traffic while driving _____ **Total score** _____

of OSA should trigger a comprehensive sleep evaluation. The diagnostic strategy includes a sleep oriented history and physical exam, objective testing, and education of the client."[29] A medical diagnosis of OSA can be facilitated by routine screening initiatives by any primary healthcare provider. Screening for OSA may involve identifying comorbidities associated with OSA in the health history, adding related questions as part of the health history, identification of craniofacial–oral risk factors and clinical presentations associated with OSA, and use of screening questionnaires. A comprehensive health history assessment will reveal salient concomitant conditions associated with OSA such as obesity, hypertension, diabetes, depression, and GERD. Questions in the health history related to OSA can include the investigation of diagnosed OSA, and primary symptoms of OSA including snoring, witnessed apneas, and excessive daytime sleepiness.

There are various soft tissue obstruction grading systems such as the Friedman, Fujita and Mallampati scoring methods used to screen for OSA risk during the intraoral assessment.[101,102,220–222] When using such grading systems, it is important to recognize that these grading systems are not used to diagnose OSA, nor do these grading systems indicate absence or severity of OSA.[223]

Common screening questionnaires used to assess OSA risk include the STOP-BANG questionnaire,[224] and the Epworth sleepiness scale.[225] The STOP-BANG questionnaire is an acronym which is used to identify salient risk factors of OSA, those being S-snoring, T–tired during daytime, O–observed apneas, P–high blood pressure, B–BMI >30, A–age (middle age), N–neck circumference >40 cm (15.75 inches), G–gender (male). A simplified version is the STOP questionnaire that utilizes the first four questions for screening for OSA.[48] The Epworth sleepiness scale is commonly used to determine the extent of daytime sleepiness related to OSA as shown in Table 4. Questionnaires, health history findings, and clinical assessments should be used collectively to determine the need for a referral to the family physician for an assessment of OSA.

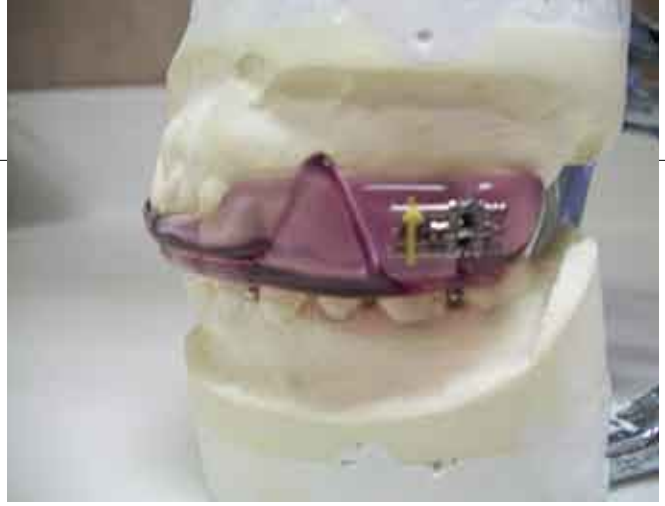
Medical diagnosis

The in-laboratory polysomnogram (PSG) is considered the gold standard for diagnosing OSA.[1,25,29] The PSG records the number of apneic and hypopneic events during the sleep cycle. The PSG also records other sleep mechanisms such as sleep latency, oxygen saturation and sleep position.[1,25,69] There are a number of other diagnostic methods such as portable home monitoring units and anecdotal questionnaires.[192,226–230] However, portable home monitoring units are recommended by the American Academy of Sleep Medicine[29] to be used as a pretesting evaluation to determine the need for a PSG. Thus, portable home monitoring units are not considered the primary diagnostic method for OSA.[29]

Medical treatment and management of clients with OSA

Continuous positive airway pressure (CPAP) is considered the first line treatment in the treatment of OSA that opens up the airway during sleep.[1,231] CPAP armamentarium usually consists of a face mask that covers both the nose and mouth. The mask is secured to a ventilating device as shown in Figure 2. The effectiveness of CPAP therapy in the treatment of OSA has been documented by numerous

▲ **Figure 2.** Continuous Positive Airway Pressure (CPAP) is the first line treatment for OSA. Image of model wearing a full mask CPAP, courtesy of Resmed Company and the CPAP Clinic Company, Toronto. Reproduced with permission.



▲ **Figure 3.** Somnodent oral appliance for the treatment of OSA.

studies.[155,156,232,233] Although the CPAP therapy is the first line treatment for OSA, it has inadequate levels of client compliance,[234–236] and its non compliance is related to the cumbersome nature of the apparatus and poor fit of the nasal mask.[234–236] Compliance with the CPAP therapy ranges from 25.5–58%, with women being less compliant than men.[215,216] Secondary medical treatment of OSA includes oral appliances, surgical management and behavioural modification.[29] Surgical modalities to treat OSA include adenotonsillectomy, uvulopalatopharyngealplasty, maxillomandibular advancement.[237,238] Studies have shown that surgical removal of adenoids and tonsils results in 75–100% resolution of OSA in children.[192]

Oral appliance therapy for the treatment of OSA

Oral appliance therapy is considered by the American Academy of Sleep Medicine to be a secondary line of treatment of OSA.[29,231] This oral appliance therapy is administered by a specially trained dentist using a medical device.[239,240] Oral appliances used to treat OSA involve the placement of a custom dual arch appliance. An OSA oral appliance is designed to advance the mandible anteriorly as shown in Figure 3. Mandibular advancement also protracts the base of the tongue forward, opening up the throat and airway. Oral appliances are generally indicated for mild to moderate OSA.[231,241] Client compliance with oral appliances is considered greater than client compliance with CPAP therapy.[241] If oral appliance therapy is implemented, a second follow up PSG is required to determine the efficacy of the oral appliance on the OSA condition.[29,231]

Behavioural modification and other conjunctional therapies for OSA

Behavioural modification to treat OSA focuses on managing risk factors and comorbidities related to OSA. Behavioural modification involves tobacco cessation for clients who use tobacco products, weight loss through diet and exercise,[230,242–244] positional therapy,[29,230] and abstinence from alcohol and sedative use prior to sleep.[29,243] Weight loss is usually difficult for clients with OSA[29] which may be related to excessive daytime sleepiness. Hence, clients with OSA may find it difficult to muster the energy to engage in physical activity. In addition, studies have suggested that clients with OSA and obesity have increased leptin resistance.[244] Leptin regulates appetite satiety,[135] and leptin resistance is associated with an unregulated appetite. Accordingly, OSA clients who have leptin resistance and excessive daytime sleepiness usually struggle with weight loss.[244]

OSA is often exacerbated when sleeping in the supine position. Positional therapy involves the use of a positioning device such as a pillow, backpack, or tennis ball that adheres to the client's back during sleep. These devices are used to prevent the client from assuming a supine position during sleep.[29,230] However, not all OSA relates to sleep position.[29] A diagnosis of a PSG will determine if positional therapy is indicated.[29]

A novel association has been made between orofacial myofunctional therapy and improvement in AHI scores.[245,246] Although orofacial myofunctional therapists in North America do not treat OSA, a recent Brazilian study has shown that orofacial myofunctional therapy techniques that use orofacial exercises can reduce the severity of AHI in OSA clients by increasing the tone of the soft tissues of the pharyngeal airway.[245,246] However, more research is needed to establish its efficacy.

Screening and supporting clients with OSA

In Canada, dental hygiene is a self regulated profession in most provinces. Dental hygiene standards and scope of practice will vary in each province, thus the parameters of supporting and referring clients with OSA may also vary in each province. Dental hygienists should be familiar with their regulatory body standards of practice within their respective provinces. The authors of this article reside in Ontario, thus the following discussion will be from an Ontario perspective. The College of Dental Hygienist of Ontario (CDHO) offers a professional practice advisory called the "Knowledge Network".[247] The CDHO Knowledge Network provides access to all Ontario registered dental hygienists as well as guest access. The CDHO knowledge network advisory on OSA suggests, "as part of their role in preventive healthcare, dental hygienists may identify in a patient/client what appear to be possible early warning signals of obstructive sleep apnea; in that event they should promptly arrange or advise referral of the patient/client to the family physician".[247] Thus, dental hygienists have a recognized seminal role in screening and facilitating the assessment of OSA. Dental hygienists can screen

for OSA by identifying comorbid conditions associated with OSA, recognizing craniofacial and oral risk factors for OSA, using OSA related questionnaires, and referring to the family physician for a medical consultation for OSA. The dental hygienist can also help support and educate clients with OSA by discussing such behaviour modification strategies as tobacco cessation for clients who use tobacco products, by providing nutritional counselling, and by educating the client about the oral–systemic link.

Parameters for interprofessional practice

If a client is suspected of having OSA, the client should be referred to his or her family physician for a sleep apnea risk assessment. The family physician will determine the need for a consultation with a specialist in sleep medicine to determine if PSG is indicated.[248] PSG is typically conducted in an overnight sleep laboratory, and results are diagnosed by the specialist physician. Sleep medicine physicians are typically respirologists/pulmonologists. Once a diagnosis of OSA has been made, the specialist will determine if CPAP therapy is required.[29] If CPAP therapy is declined, or the client is non adherent, the physician will determine whether alternative treatment for OSA is suitable.[29] If an oral appliance is indicated for the treatment of OSA, the physician and dentist will consult with one another to initiate oral appliance therapy.[249]

Clients with OSA and excessive daytime sleepiness are at higher risk for traffic accidents.[59,62] In Ontario, physicians are required to report clients whose medical conditions are considered "dangerous…to operate a motor vehicle"[250] to the Ministry of Transportation of Ontario (MTO). Criteria for physician reporting to the MTO include the presence of uncontrolled sleep apnea,[250] and/or if the client's medical condition impairs their ability to drive safely. The driver's licence can also be reinstated if the client is no longer considered a risk to road safety.[250] Disclosure of this contingency is the sole responsibility of the physician.[250] Dental hygienists should explore their provincial regulations in regards to physician reporting in their respective provinces.

If a client has had a previous sleep study and has been diagnosed with OSA but untreated, the client should also be referred back to his or her family physician to determine the OSA status[29,248] prior to oral appliance therapy or any other treatment modality.[249] In 2009, the American Academy of Sleep Medicine posited, "the presence or absence and severity of the OSA must be determined before initiating treatment in order to identify those clients at risk of developing the complications of sleep apnea, guide selection of appropriate treatment, and to provide a baseline to establish the effectiveness of subsequent treatment".[29] Once a treatment for OSA has been implemented, a second PSG is required to determine the efficacy of the treatment.[29,248]

Clients who request treatment for snoring must undergo a physician consultation prior to treatment consideration.[29,231,249] The Royal College of Dental Surgeons of Ontario postulates, "snoring may be symptomatic of a serious and sometimes life-threatening medical condition called obstructive sleep apnea (OSA). Before oral appliance therapy is considered, it is essential that the presence or absence of OSA be determined by means of a medically supervised sleep test."[249] Snoring may be attributed to various etiologies. A differential diagnosis by a physician must be made prior to any treatment of snoring.[29,231,249]

CONCLUSION

OSA is a life threatening condition that often remains undiagnosed. In 1992, the national commission on sleep disorders announced "an urgent need for physicians, nurses, all healthcare professionals to be able to identify and refer or treat clients with sleep disorders."[251] Dental hygienists have a significant role in the screening of clients with OSA and in facilitating a medical diagnosis through an interprofessional referral.

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Initiating discourse on recognizing and reporting child abuse

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ABSTRACT

Objective: The purpose of the article is to promote discourse among Canadian registered dental hygienists and educators about reporting suspicions of child abuse and neglect by presenting a study that was conducted in a US dental hygiene program in 1994 and 2009. **Methodology:** Survey data were collected on two classes of dental hygiene students from the same university based dental hygiene program. **Results:** Both groups of dental hygiene students were deficient in legal knowledge for reporting child abuse and neglect. Current students felt more prepared to recognize child abuse and neglect. Willingness to report scenarios of abuse and neglect were similar for both groups. **Conclusions:** Canadian registered dental hygienists and educators must be familiar with reporting laws in their territory or province. Survey of students' knowledge and willingness to report may be a way to determine educational needs and outcomes.

RÉSUMÉ

Objet : Promotion des échanges chez les hygiénistes dentaires diplômées et les éducatrices du Canada sur le signalement des soupçons d'abus et de négligence des enfants par la présentation d'une étude effectuée dans un programme d'hygiène dentaire des É.-U. en 1994 et 2009. **Méthodologie :** Les données de l'étude ont été colligées dans deux classes d'étudiantes d'un même programme universitaire d'hygiène dentaire. **Résultats :** Les deux groupes d'étudiantes en hygiène dentaire manquaient de connaissances juridiques pour le signalement des abus et négligences des enfants. Les étudiantes du moment semblaient mieux préparées à reconnaître les abus et négligences des enfants. Les deux groupes avaient la même propension à signaler des scénarios d'abus et de négligence. **Conclusion :** Les hygiénistes dentaires diplômées et les éducatrices du Canada doivent se familiariser avec le signalement des lois dans leur territoire ou province. L'étude de la connaissance et la détermination des étudiantes à signaler les cas peut offrir un moyen d'établir les besoins et les résultats en matière de formation.

Key words: child abuse; neglect; dental hygiene students; reporting laws; child maltreatment; dental injuries; registered dental hygienists

INTRODUCTION

Are you prepared to recognize and report the signs of child abuse and neglect? How would you respond to a child who reports abuse to you? To whom would you make the report, and would you be required to give your name? Do you know what will happen after you make a report? Can you be sued for making a false report? Can you be punished if you fail to report?

Published articles describing the role Canadian registered dental hygienists (RDHs) and dentists play in the recognition and reporting of suspicions of child abuse and neglect are sparse to non existent. An article published in *Chronic Diseases in Canada* points out the need for a comprehensive, collaborative, and multisectoral approach for identification, prevention, and intervention in child maltreatment.[1] This call for a multisector approach provides an impetus for Canadian RDHs and educators to evaluate the profession's preparedness in the recognition and reporting of suspected child abuse and neglect. *Entry-To-Practice Competencies and Standards for Canadian Dental Hygienists*[2] are used to describe the essential knowledge, skills, and attitudes important for the practice of the profession. They support the dental hygiene process of care by more clearly articulating the abilities inherent in the assessment, diagnosis, planning, implementation, and evaluation of dental hygiene services.[2]

Much of the research, on the role RDHs have in the identification and reporting of child maltreatment, has been conducted in the US. Canadian educators can evaluate the lessons learned from those studies to determine how prepared Canadian educated RDHs are in recognizing and reporting suspicions of child maltreatment. The majority of RDHs in Canada are self regulated. Therefore, they must know their legal obligations and responsibilities, which include mandatory reporting of abuse. Oral health professionals are not required to prove abuse or neglect, just to report suspected cases. It is up to the protective services agencies to determine whether a case is founded.[3]

As mandated reporters of child abuse and neglect, US and Canadian RDHs must be able to recognize the signs and symptoms, and are responsible for knowing the state or provincial statutes and the protocol necessary for filing a report. RDHs are mandated reporters in all fifty states of the US. The federal *Child Abuse Prevention and Treatment Act* (CAPTA) as amended by the *Keeping Children and Families Safe Act of 2003* defines abuse and neglect as:

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1) any recent act or failure to act on the part of the parent or caregiver which results in death, serious physical or emotional harm, sexual abuse, or exploitation;

2) an act or failure to act that presents an imminent risk of serious harm.[4]

Each state or province must establish its own definitions within the minimum standards set by the federal government. CAPTA defines neglect as the deprivation of adequate food, clothes, shelter, medical, and dental care. However, only 6 percent of dentists commonly suspect physical abuse among their patients compared with 23 percent of physicians and 53 percent of social workers.[5] It is not known what percentage of RDHs have suspected or reported physical abuse. In states that track cases by the profession, dentists have made less than 1 percent of all reports.[6]

Dental hygiene curriculum is an important avenue to include the information students need to recognize and report child abuse and neglect. Appropriate steps should be taken to assure that this is happening. A study conducted in 2000 with directors of accredited US dental hygiene programs found only 71 percent of the programs included material on child abuse and neglect in their curricula.[7,8] Approximately 40 percent of these dental hygiene programs devoted more than one hour to child abuse and neglect in their curricula.[7]

Review of the literature

Dentists and RDHs are required to report suspicions of child maltreatment in Canada; these professions are absent from the list of "professional referral sources" from which data were collected for the 2008 Canadian Incidence Study of Reported Child Abuse and Neglect.[9] An explanation may be that the scope of practice and abilities that RDHs possess are not recognized by other professional groups.

Similarly, in the 1999 report "Child Abuse Reporting and Classification in Health Care Settings", the term *registered dental hygienist* is not found. Dentists are identified as a "professional person" whose responsibility is to report suspicions of child maltreatment; but there is no explicit mention of RDHs.[10] Bulk of the narrative is written about the role of physicians in identifying and reporting suspicions. Perhaps the reason the narrative focuses on physicians is that society views MDs as an essential provider. Similarly, dentists are viewed as "the gatekeeper" of the mouth. Regardless, all healthcare providers share the responsibility to recognize and report when it appears that a child has been abused or neglected. The likelihood that a healthcare provider will encounter a child who has been abused or neglected is great given the prevalence of the act.

Each year, the US Department of Health and Human Services compiles data on child maltreatment in the United States.[7] In 2002, 896,000 children were listed as victims of maltreatment and of those children, 18.6 percent were considered physically abused. Additional estimates showed that 1,400 children died as a result of abuse or neglect that year. Nearly 65 percent of the injuries inflicted in reported child abuse cases occurred in the oral facial region.[7] Most acts of domestic violence involving a child are evident in chipped or fractured teeth or attempted strangulation marks on the neck.[11–14] Another important point is that RDHs spend more time with the client and can assess areas such as the side of the face, ears, neck, top of the shoulders and forearms where abuse is most common.[15] Overall, 65 to 75 percent of all physical manifestations of abuse are found on the head, face, mouth and neck.[16] Bite marks are sometimes found in child abuse cases. Bite marks should be suspected when ecchymoses, abrasions, or lacerations are found in an elliptical or ovoid pattern. Bites produced by carnivorous animals tend to tear skin. Human bites compress the flesh and can cause abrasions, contusions, and lacerations.[15] RDHs should always document what they see in the client's chart as well as have photographic documentation with use of a millimeter reference scale and digital camera. A tag with the date and reference number is helpful for complete documentation, especially if the case goes to a court of law. This should also be reported to Child Protective Services in the US, and to Canadian child services such as Alberta Children Services, Child Protection, or Services for Family and Youth, to name a few, for proper and acute follow up.

Child neglect can be noted in the dental practice as well. This could be the abandonment or the omission of protection, support, or care, thereby exposing the minor to harm. The actions against the victim do not involve physical infliction of pain. They can include nutritional deficits, and negligence, and this includes neglecting to provide medical or dental treatment to the child. Dental neglect, as defined by the American Academy of Pediatric Dentistry is the "willful failure of parent or guardian to seek and follow through with treatment necessary to ensure a level of oral health essential for adequate function and freedom from pain and infection".[17] Failure to obtain certain dental treatment could include untreated, rampant decay, trauma, pain, infection, or bleeding.[6]

There have been ideas or perceptions in the past that most occurrences of child abuse and neglect happen in minority groups or low socioeconomic backgrounds. It is now known that child maltreatment occurs in families at all economic levels and from every ethnic background,[6,18] although some have suggested that the poor are more likely to be reported, accused and convicted of child abuse and neglect.[6,19]

In the US, failure to report by a mandated reporter can result in fines ($100 to $500) and prison time (10 days to 5 years). Most states view the first offense as a misdemeanor, but the second failure to report may be a felony, dependent upon the state's individual laws and statutes. Almost every state's statute contains a penalty for failure to report suspected cases. All of the fifty states in the US provide immunity from liability, civil or criminal, for mandated reporters. However, such immunity does not apply to liability arising from willful misconduct or gross negligence.[6,20] It is also critical to mention that oral health professionals' malpractice insurance does not cover criminal acts.

The purpose of the US study was to compare knowledge and attitudes of child abuse and neglect and willingness to report suspicions by current dental hygiene students to that of dental hygiene students who attended the same university program in 1994.

Table 1. Knowledge and opinion based questions: Comparison between students enrolled in 1994 and 2009.

Survey questions	Strongly agree or agree		Strongly disagree or disagree		Neither agree or disagree	
	1994	2009	1994	2009	1994	2009
1. Individuals in my field are mandated to report child abuse and neglect.	98.2%	98.5%	1.7%	1.5%		
2. My educational experienced has adequately prepared me to recognize the signs and symptoms of child abuse and neglect.	65.5%	89.6%	18.9%	6.0%		
3. Professionals failing to make a report when child abuse or neglect is suspected may allow that child to be continuously injured.	98.2%	97%	0%	1.5%	1.8%	1.5%
4. If you saw signs of abuse on a child and did not report them, then suspected that the child died as a result of the abuse, you would immediately report your suspicions.	74.1%	77.6%	6.0%	7.5%		
5. When a person knowingly transmits a false report, they shall be guilty of a crime.	74.1%	82.1%	15.5%	10.5%		
6. Professionals failing to make a report of suspicions of child abuse and neglect may be charged with a crime.	53.4%	55.2%	15.5%	20.0%		
7. Health care professionals who file reports of suspicions of child abuse and neglect must give his/her name.	17.2%	4.5%	67.2%	80.6%		
8. Health care professionals should be required to attend an in-service training on child maltreatment.	81%	86.6%	6.8%	7.5%		
9. I should become more familiar with my state laws and the legal definitions of child maltreatment in order to understand my legal obligations.	89.6%	95.5%	1.7%	1.5%		
10. Health care professionals should be required to report suspicions of child abuse and neglect.	96.5%	92.5%	1.7%	0%		

METHODOLOGY

A seventeen item survey was developed and administered to 125 dental hygiene students enrolled in a midwestern US dental hygiene program. Of the seventeen items, ten statements were presented to assess knowledge and opinions about reporting child abuse and neglect. Response options were reported on a Likert type scale. The last seven questions presented possible scenarios and the forced choice responses indicated the willingness to report child abuse and neglect.

The survey was developed in 1994 and approved by the school's human subjects committee. Data were collected on 58 dental hygiene students enrolled in the dental hygiene program at that time. Fifteen years later the same survey was administered to 67 dental hygiene students after receiving approval from the human subjects committee. All data were entered by participants on computer scan sheets. Investigators wanted to compare recent students' knowledge and opinions associated with reporting child abuse and neglect and willingness to report to those of students enrolled in 1994. Survey data were analyzed using descriptive statistics and Chi square test.

RESULTS

For the ten knowledge and opinion based questions, comparisons were made between students enrolled in 1994 and 2009 (Table 1). Results show that both groups of students had deficits in the legal knowledge of reporting suspicions of child abuse or neglect. Only 55% of the 2009 students and 53% of the 1994 students either strongly agreed or agreed that failure to report suspicions of abuse or neglect could result in a crime. Moreover, only 4% of the 2009 students and 17% of the 1994 students strongly agreed or agreed that he or she must give his or her name when reporting suspicions of child abuse or neglect. Even though the frequency was low for both groups, there was a significant difference between the two groups (χ^2=6.65, p< .01).

Approximately 92% of all students strongly agreed or agreed that health professionals should be required to report suspicions of child abuse and neglect, but only 83% strongly agreed or agreed that in service training on child maltreatment was required. When responses of students enrolled in 2009 were compared to those enrolled in 1994 regarding educational preparation, a statistically significant difference was identified. Ninety percent of the 2009 students either strongly agreed or agreed they were adequately prepared to recognize signs and symptoms of child abuse and neglect as compared to 65% of students enrolled in 1994 (χ^2=6.80, p< .01). When analyzing the strongly agree responses, only 11% of 1994 students strongly agreed that their educational experiences adequately prepared them

Table 2. Scenario questions and probability of reporting child abuse and neglect.

Synopsis of scenarios	Definitely or probably report		Will not report		Not necessary to report
	1994	2009	1994	2009	
1. Mother reports slapping two-year-old. Bruising observed.	87.9%	89.6%	12%	10.5%	
2. Five-year-old child with oral syphilis lesion.	82.7%	92.5%	17%	7.5%	
3. Intoxicated patient admits molestation of thirteen-year-old daughter.	96.5%	100%	3%	0%	
4. Mother of seven-year-old asthmatic child admits she is unable to afford medication.	63.7%	52.2%	36%	47.8%	
5. You have knowledge that a four-your-old child is left home alone, repeatedly.	82.7%	83.6%	17%	16.4%	
6. You observe father repeatedly spanking son in office storage closet.	91.3%	94%	8%	6%	
7. Female patient reveals being molested by her father who is now married to a woman with two young children.	65.5%	79.1%	3.4%	19.4%	

to recognize signs and symptoms as compared to 52% of 2009 students. Although students reported receiving less than adequate preparation, only 34% of 1994 students and 49% of 2009 students strongly agreed that RDHs should be required to attend in service training on child maltreatment.

Seven scenarios were presented to assess students' willingness to report suspicions of child abuse or neglect. All scenarios presented situations that should be reported to authorities who would determine whether further investigation is warranted. There was no significant difference between the groups in the willingness to report the described scenarios. The two scenarios least likely to be reported were the situation involving the mother who could not afford to buy her son's asthma medication (58% of all students would report), and the situation where a father reportedly molested his daughter in the past and is remarried to a woman with two young children (72.3% would report). The scenarios that students would most likely report involved situations where the act of abuse was either admitted or was witnessed in the dental office. One hundred percent of 2009 students and 96.5% of the 1994 students were willing to report a situation where an intoxicated male patient admitted molesting his 13 year old daughter. Another scenario likely to be reported involved a father who was observed repeatedly spanking his son in the dental office storage room (92.7% would report). Frequencies of responses for all questions are presented in Table 2.

DISCUSSION

As mandated reporters of suspicion of child abuse and neglect, RDHs face two distinctly separate challenges. Perhaps the least complicated challenge is the lifelong acquisition of knowledge related to signs, symptoms, and reporting laws. The dilemma of whether or not to report is often the more complex challenge. Research indicates that identifying and responding to child maltreatment is a complex phenomenon that involves processing through at least three stages: observing the situation, assessing and labeling parental behavior, and responding to the situation.[21] Each stage is filtered through individual characteristics of the mandated reporters. As a result, individuals differ in opinion as to what constitutes maltreatment.[21] Each individual's characteristics and perceptions of parenting and discipline are shaped by cultural and ethnical experiences and traits. Although legislation can attempt to delineate acts that constitute abuse and neglect, ambiguity often exists when a mandated reporter is faced with the real life situation. Because authorities caution healthcare providers to exercise discretion and refrain from questioning the child for details about the suspected abuse, decisions whether to report may be based on visual signs and limited evidence. This along with individual perceptions contributes to the complexity of the decision making process.

A call to action is needed to bring attention to core competencies for health professionals. Licensing bodies and professional associations are positioned to provide ethical and legal advice along with training and mentoring for this serious medico–legal issue. Lifelong education is imperative for growth within each profession. Training programs are available online and at conferences, as are a plethora of websites for the purpose of educating mandated reporters on recognition and reporting of child abuse and neglect (Table 3).

The Department of Child and Family Services (DCFS) in the US offers a free web based training module "Recognizing and Reporting Child Abuse and Neglect: Training for Mandated Reporters" (Table 3). Included in this training are examples that do and do not constitute abuse and neglect. Another resource is "Prevent Abuse and Neglect through Dental Awareness" (PANDA), a program designed to train dental and other health professionals how to recognize and respond to suspicions of abuse.

Table 3. Online resources for training and education.

1.	www.dcfstraining.org/manrep/dca/dca-p4.jsp
2.	www.acf.dhhs.gov/programs/cb
3.	www.apsac.org
4.	www.calib.com/nccanch/pubs
5.	www.familyviolence.org
6.	www.gocwl.org/nrccm
7.	www.kempecenter.org
8.	www.preventchildabuse.org
9.	www.saem.org/inform/childab.htm
10.	www.state.il.us/dcfs

While dissemination of knowledge in this digital age is an achievable goal, the impact knowledge has on behavior change is debatable. Research shows that while education has a positive effect on knowledge, its impact on behavior change is either not effective or effective only in the short term.[22] Therefore, alternative ways to effect behavior change is necessary to improve the likelihood of reporting suspicions when faced with situations. A multidisciplinary training approach is necessary to foster greater breadth and depth in the understanding of reporting suspicions of child abuse and neglect.

Knowledge of child abuse and neglect reporting was similar for students who participated in the study in 1994 and in 2009. Statistical significance was proven for only two survey items. Significantly more 1994 students believed their name must be given when reporting suspicions. In Illinois, mandated reporters may make anonymous reports, although it is not the ideal way to report. When the reporter withholds his or her name, authorities cannot conduct follow up questions that may weaken the case against the perpetrator. If something happens to the child there is no legal proof that the mandated reporter fulfilled his or her role by making the report. Also, authorities would not be able to notify the reporter of the results of the investigation. Proper education may alleviate the confusion associated with this reporting requirement.

The second statistically significant finding showed that more 2009 students believed they were prepared to recognize signs of abuse and neglect. There are many potential reasons for this finding such as the increased public awareness of the problem, increased education in dental hygiene curriculum, and the increased prevalence of the problem. Moreover, advances in communication technologies, specifically the Internet, allow easy and instant access to facts, figures, and visual images.

Legal requirements for reporting remain a point of confusion for participating dental hygiene students. Slightly over half of all students knew the legal ramifications for failure to report a suspected case. Data from this study support those presented where dental hygiene students reported deficits in knowledge of the legal responsibility with reporting. If students were knowledgeable and confident in their legal obligation, the willingness to report may increase. A disconnect was apparent in students' willingness to report suspicions when confronted with scenarios that warrant reporting to authorities. Even though students may possess didactic knowledge regarding recognition of physical signs such as bruising, explicit instruction and confidential support through professional associations may be needed to facilitate in the development of decision making skills associated with making a report.

Findings of the study can be generalized to the dental hygiene program from which the data were collected. Even though much of the data corroborate findings of other studies, caution should be used in generalizing to a larger population.

CONCLUSIONS

The practical significance of the study indicates the need for dental hygiene program evaluation to determine whether students receive sufficient experiences in the recognition of child abuse and neglect, and in decision making skills necessary to report suspicions of such abuse. RDHs in Canada and the US have a responsibility to possess relevant knowledge and skills. It is important they have accurate and current knowledge, not only of the signs of abuse and neglect, but also of the laws. Revisions in educational approaches and the delivery of information through continuing education may be necessary to increase students and practicing RDHs' understanding of reporting child abuse and neglect. Canadian and US dental hygiene educators may present reporting responsibilities in the context of dental hygiene as a professional paradigm. Professional associations and licensing bodies need to act as a resource for current information and mentorship especially in Canada where RDHs are self regulated in most provinces.

Philosophical and theoretical approaches that force individuals to evaluate their cultural and ethnical characteristics of parenting and discipline may prove effective in impacting individuals' opinions of their responsibility and role as healthcare providers. Presenting case scenarios to illustrate specific examples of abuse and neglect that require reporting may give students an opportunity to role play and process the steps involved in deciding whether to report. The development of critical thinking skills through the evaluation of theoretical and philosophical constructs may assist in connecting knowledge with behavioral changes. Along with assessing students and RDHs' knowledge of signs, symptoms, and legal responsibilities, educators and trainers need to evaluate the effectiveness of instructional approaches used to teach critical thinking skills. Collaboration with provincial and local authorities may result in mentoring, and real life case scenarios may confirm the need to report. Furthermore, educators and trainers must be familiar with reporting laws for their state, territory, or province.

Although RDHs may encounter situations that raise suspicions of child abuse or neglect, it is not their obligation to collect evidence by questioning the child. Within the scope of practice, RDHs are obligated to document oral

and overall physical, psychological, and emotional observations. The RDHs' legal responsibility involves reporting the suspicion to proper authorities. Improper questioning by the dental team may interfere with evidence if the case goes to court. Once the suspicions are reported, professionally trained legal authorities will determine whether the situation needs to be investigated.

To be prepared to respond to suspicions of child abuse and neglect, dental hygiene students and RDHs must have appropriate education and training along with adequate support from profession associations and licensing agencies in order to make critical reporting decisions. Given the documented evidence of low reporting rate by dental providers, a call to action is needed to initiate discourse and change for improved child protection.

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Laser therapy

This section features some titles of the latest published research in laser therapy in relation to oral treatments, and the journals in which these papers appear. The search term "laser therapy" was used to find these titles through the US National Library of Medicine's database, PubMed. Please visit http://www.ncbi.nlm.nih.gov/pubmed/ for the full content of these articles, or access these articles through your university libraries.

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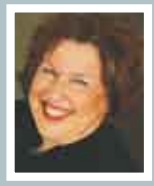

Shirley Gutkowski

Other featured speakers of interest to Dental Hygienists include:

Duncan Brown	Derek Hein	Kate O'Hanlan
Marci Eaton	Jo-Anne Jones	Stewart Rosenberg
Vicki Fenn	Warren Karp	Meg Soper
Theresa Gonzales	Kayla Ragosin-Miller	Geza Terezhalmy
Debra Grant	Reagan McVeigh	Beth Thompson

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2011–2012
CDHA Dental Hygiene Recognition Program
Programme de reconnaissance en hygiène dentaire de l'ACHD

CDHA is pleased to announce the 2011–2012 Dental Hygiene Recognition Program. This program, made possible through the contributions of CDHA's 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' web site, in the *Awards & Recognition* section.

L'ACHD est heureuse de présenter le programme de reconnaissance en hygiène dentaire pour 2011–2012. 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 étudiantes 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'ACHD, à la section *Awards & Recognition*.

Prize Categories / Catégories de prix

CDHA Achievement prize in participation with Sunstar G·U·M

One $2,000 prize to be awarded to a student enrolled in the final year of a dental hygiene program who has overcome a major personal challenge during his/her dental hygiene education.

Prix de l'ACHD pour une réalisation, décerné avec la participation de Sunstar G·U·M

Un prix de 2 000 $ offert à un étudiant ou une étudiante, inscrit(e) en dernière année d'un programme en hygiène dentaire, qui a surmonté un défi personnel important durant sa formation en hygiène dentaire.

CDHA Global Health Initiative prize in participation with Sunstar G·U·M

One $3,000 prize in recognition of a registered dental hygienist who has committed to volunteering as part of an initiative to provide oral health related services to persons in a disadvantaged community or country.

Prix de l'ACHD pour un programme de santé mondial, décerné avec la participation de Sunstar G·U·M

Un prix de 3 000 $ offert à un ou une hygiéniste dentaire autorisé(e) qui s'est engagé(e) comme bénévole dans un programme visant à offrir des services liés à la santé buccodentaire à des personnes faisant partie d'une communauté ou d'un pays défavorisé.

CDHA Visionary prize in participation with TD Insurance Meloche Monnex

One $2,000 prize awarded to a student in a master or doctoral program related to dental hygiene in recognition of a vision for advancing the dental hygiene profession.

Prix de l'ACHD pour l'esprit visionnaire destiné à un étudiant ou une étudiante de 2e ou 3e cycle dans un programme relatif à l'hygiène dentaire, décerné avec la participation de TD Assurance Meloche Monnex

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.

Get involved and you could win! / Participez et vous pourriez gagner !

Application deadline is **1 March 2012**. Watch www.cdha.ca for announcements on more awards.
La date butoir pour soumettre les demandes d'inscription aux différents prix est le **1er mars 2012**.

CDHA Fall Meeting, Educational Workshop, and AGM Highlights

Winnipeg, 29 September – 1 October 2011



▲ Joanne Noye, Sophia Baltzis, and Donna Scott.

▲ Palmer Nelson, the outgoing President, with Arlynn Brodie.


▶ *Run for the Cure* participants.

▲ Presidents of provicial associations and directors of CDHA Board.

The CDHA Fall Board Meeting and Annual General Meeting (AGM) were held in Winnipeg, marking the first time these CDHA events were held in Manitoba. Outgoing CDHA President Palmer Nelson introduced the incoming President Arlynn Brodie and President-Elect Sandra Lawlor, and extended a welcome to our newest board members, Joanne Noye (Nova Scotia) and Sophia Baltzis (Quebec). And for the very first time, the CDHA Board can proudly claim full sea to sea to sea representation with the election of Donna Scott representing Canada's three northern territories.

The Board reviewed and approved the executive limitations monitoring reports. Arlynn Brodie, the Chair, specially acknowledged Ondina Love, Executive Director, for her attention to detail and her quantitative approach to the reports. The Executive Director presented an overview of Canada's national political, economic, social, and technological (PEST) environment.

Currently, CDHA is developing a public water fluoridation position statement and a Q&A to address the national debate.

The Board conducted its annual review of "ends" or goals that set the direction for the operational strategic plans and assist the Executive Director and staff to make operational decisions. CDHA also conducted a 2011 operational survey that provided insight into the needs of CDHA membership. The Board reviewed, revised, and reprioritized CDHA's "ends" for the future of the dental hygiene profession in Canada.

The Ownership Linkage Planning Committee provided an update on their efforts towards strengthening the understanding by members that they are the owners of CDHA and the dental hygiene profession. The update commented on the first year progress of this three year initiative. The *CDHA Owner's Guide: How You Can Shape CDHA* was developed and launched this summer at the CDHA National Conference in Halifax.

The CDHA AGM and educational workshop, *Shining New Light on Dental Hygiene Practice*, was held on 1 October. The sold out event was attended by close to 190 participants. On behalf of the event's major sponsor, P&G, was Wendy Bebey who spoke on P&G's *Rise and Shine* campaign in support of breast cancer research. Wendy shared her own personal story to a captivated audience. The morning workshop featured three exciting sessions:

- *Oral cancer: Emerging pandemic.*
- *Lasers in dental hygiene practice: The evidence. The opportunity.*
- *Panel discussion of dental hygienists in non traditional careers.*

The AGM in Winnipeg, *Working For Our Profession, Working For You*, was the second CDHA AGM to be held in non traditional venues across Canada. This approach was a resounding success, as confirmed by the wonderful turnout. The meeting included the annual reports from the President and Executive Director, audited financial statements, and board recognition.

CDHA supported the CIBC *Run for The Cure* by registering as a national team. Seventeen CDHA affiliation teams from across the country also participated, and collectively raised over $30,000. The CDHA Board team ran in Winnipeg on the weekend of the AGM alongside the MDHA team, *Brush for The Cure*. Thank you to Sally Lloyd of Calgary, the national coordinator, and to the affiliation team captains for your dedication and time. We thank all members across the country who "Ran" for the Cure, and helped raise awareness and money for this important cause. We specially acknowledge Joanna Asadoorian of Winnipeg, the top fundraiser among all CDHA affiliated participants, who single handedly raised $5,300!

CDHA Distinguished Service Awards – 2010 and 2011

The CDHA Distinguished Service Award recognizes a dental hygienist who has made a significant contribution to the advancement of the dental hygiene profession in Canada. Candidates are selected on the basis of their outstanding contributions to one of the following: a task committee, an innovative project, a CDHA Board or committee, in academic advancement or in corporate support. The CDHA is pleased to announce the following award recipients:

2010 - SUSAN MATHESON

Susan has devoted most of her professional life to ensuring quality education programs. She currently holds the position of Director, Commission on Dental Accreditation of Canada. Throughout her twelve year service with the Commission she has been instrumental in guiding the development of sound accredited programs, not only in dental hygiene, but also in dental assisting and dentistry.

2011 - BARBARA LONG

Barbara has held an executive position with Saskatchewan Dental Hygienists' Association since graduation in 1980, and was the Registrar/ED from 2003 until her retirement this past spring. In addition to her other duties, she has held the position of lecturer and clinical instructor with the department of periodontology at the University of Saskatchewan for over thirty years. She worked with Hu Friedy to design the "vision curettes"— the first short blade curettes— and holds the Canadian and US patents for these instrument designs. Barbara was also instrumental in the lobbying efforts to bring self regulation to Saskatchewan in 1997.

Barbara Long ▶

Master's Research Award Funding Opportunity

Are you dental hygienist who is completing a master's degree? Apply for a $17,500 Award!

The Canadian Foundation for Dental Hygiene Research and Education (CFDHRE) and the Canadian Institutes of Health Research (CIHR) jointly announce a Master's Award in Dental Hygiene relevant to the following areas: biomedical research, clinical research, health services research, social, cultural, environmental and population health research.

Dental hygienists, as opposed to members of the larger general health community, will specifically benefit from this award which will bring dental hygiene research to the forefront.

Eligibility: Applicants must be registered dental hygienists, and the award must be held in Canada. This Priority Announcement will require the completion of a Relevance Form.

Application deadline: 1 February 2012

Earliest funding start date: 1 September 2012

Details: ENGLISH: http://www.researchnet-recherchenet.ca/rnr16/vwOpprtntyDtls.do?prog=1315&&view=currentOpps&org=CIHR&type=AND&resultCount=25&sort=program&all=1&masterList=true#dh

FRENCH: http://www.researchnet-recherchenet.ca/rnr16/vwOpprtntyDtls.do?prog=1315&tag=1.&language=F#hd

CONTACT

CIHR Priority Announcement Program Delivery Team (questions about guidelines and how to apply)
Tel: 613-954-1968 Toll-free: 1-888-603-4178
Fax: 613-954-1800 E-mail: PA-AP@cihr-irsc.gc.ca

CIHR ResearchNet Support (questions about technical difficulties in e-submission process)
Tel: 613-941-9080
E-mail: support@researchnet-recherchenet.ca

CFDHRE Program Director, Judy Lux
(questions about CFDHRE)
Tel: 1-800-267-5235 x 123 Fax: 613-224-7283

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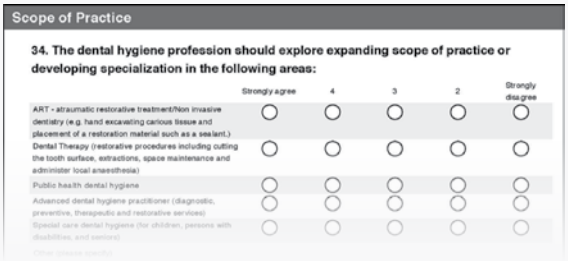

Educators' Survey Report

CDHA's premier nationwide *Educators' Survey Report* covers education policy issues, career supports and demographic profiles. All three sections will interest educators, but the policy section denoting significant positive changes in the evolution of the profession (e.g. scope of practice expansion, areas of specialization, entry-to-practice, and education) will interest all dental hygienists.

To read the survey visit http://www.cdha.ca/pdfs/profession/EducatorsSurvey.pdf

To read the summary of the survey visit http://www.cdha.ca/pdfs/profession/EducatorsSurveySummary.pdf

CDHA ACHD THE CANADIAN DENTAL HYGIENISTS ASSOCIATION / L'ASSOCIATION CANADIENNE DES HYGIÉNISTES DENTAIRES

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Canada's Oral Health: A Call to Action

CDHA presented its annual *Call to Action* to the House of Commons Standing Committee on Finance for pre-budget consultations on 12 August 2011. CDHA calls on the federal government to implement the following two recommendations that:

1. FNIHB increase the investment in oral health promotion and disease prevention through the following three program modifications:
   - Expand provider status to dental hygienists across Canada.
   - Implement equitable reimbursement rates for dental hygiene services.
   - Expand oral health promotion and disease prevention through the Children's Oral Health Initiative and the NIHB program.
2. Federal government continue its leadership to enhance federal, provincial and territorial cooperation for a strong, equitable pan Canadian public health system that meets the oral health needs of Canadians, and to support this end, designate a transfer of $10 million to the provinces each year for public health dental hygiene human resources.

La santé buccodentaire : Une invitation à passer à l'action

Nous lançons un appel au gouvernement fédéral pour qu'il donne suite aux deux recommandations suivantes.

1. Que la DGSPNI augmente les investissements dans la promotion de la santé buccodentaire et la prévention des maladies en modifiant les trois programmes suivants :
   - accorder le statut de pourvoyeur de soins aux hygiénistes dentaires de tout le Canada;
   - adopter des taux de remboursement équitables pour les services d'hygiène buccodentaire;
   - élargir la promotion de la santé buccodentaire et la prévention des maladies grâce à l'Initiative de santé buccodentaire des enfants (ISBE) et au programme des SSNA.
2. Que le gouvernement fédéral continue à jouer un rôle de premier plan pour resserrer la collaboration entre le fédéral, les provinces et les territoires pour un puissant régime équitable et pancanadien de santé publique qui répond aux besoins de santé buccodentaire de tous les Canadiens et, à cette fin, qu'il opère un transfert de 10 millions de dollars aux provinces chaque année pour des ressources humaines en hygiène dentaire dans le domaine de la santé publique.

The bilingual report will be made available on www.cdha.ca

Break cover in 2012

Graduate students in their research environment

Each of the quarterly issues of *Canadian Journal of Dental Hygiene* in 2012, volume 46, will feature graduate students in their research environment.

We invite you, a CDHA member and registered dental hygienist (RDH), to submit one picture and a brief write up for consideration as a front cover image in the *CJDH*. Read the details on www.cdha.ca

INDEX OF 2011

SUBJECT INDEX

Page references indicate the volume, issue, and the title page of the article.

Articles

AUTHOR INDEX

Page references indicate the volume, issue, and the title page of the article.

KEYWORD INDEX

Page references indicate the volume, issue, and the title page of the article.

CDHA Community Calendar

Plan ahead. Participate in the events posted on this page. And mark your calendar.

UPCOMING EVENTS/ÉVÉNEMENTS À VENIR (Events listed may be subject to change.)

Online event	November 2011 launch	On demand Webinar	*Sugar and its impact on oral and systemic health*	PHILIPS
Online event	November 2011 launch	On demand Webinar	*Elder Abuse Series (3rd in the series of three)*	CDHA ACHD
Online event	To be announced	Live Webinar	*Shedding light on oral cancer*	VELscope Vx Enhanced Oral Assessment

Keep checking **www.cdha.ca** under ***Webinars & Workshops*** for information on all our upcoming live and on demand webinars.

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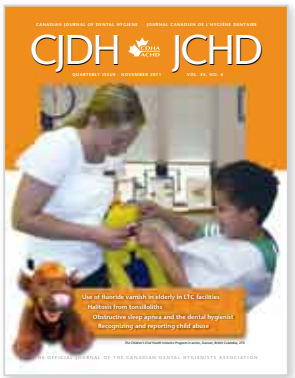
ALBERTA, Edson. Dental clinic: Edson Family Dentistry. Proficient, committed, and enthusiastic dental hygienist required for a busy family practice. 4 days/week, no evenings or weekends. Starting wage dependent on education and experience. Must have licence to practise in Alberta. Contact: Dr. Shari Jean Robinson; Tel: 780-723-5221; Fax: 780-723-2402.

ONTARIO, Mississauga. Private accredited Dental Hygiene college in Mississauga seeks instructors and administrators. Instructor requirements are the Adult Learning Certificate, an undergraduate science degree, RDH certification, and relevant Canadian experience. Apply to infocadh@bellnet.ca

Advertisers' index

About the cover
The front covers of the journal in 2011 feature the visual theme *Advocacy efforts of individual dental hygienists in our communities. CJDH* lauds their efforts and those of other dental hygienists who contribute so much to community. ©CDHA.



Shelly Sorensen volunteers at the evening clinic and at dental and toddler fairs to educate children and expectant mothers on the importance of oral hygiene and health. Shelly uses some of her grant monies to pay for the puppets, DVDs and books in her advocacy efforts to promote oral and overall health that began with her regular full time job as a dental hygienist working with Cowichan Tribes in British Columbia.

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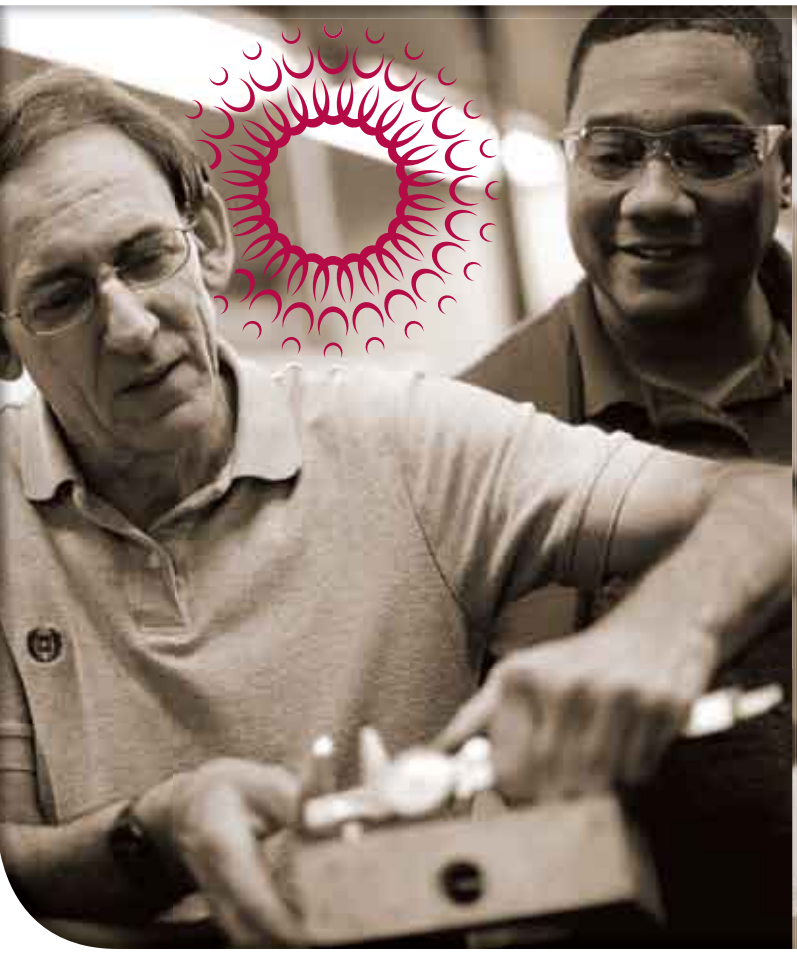

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