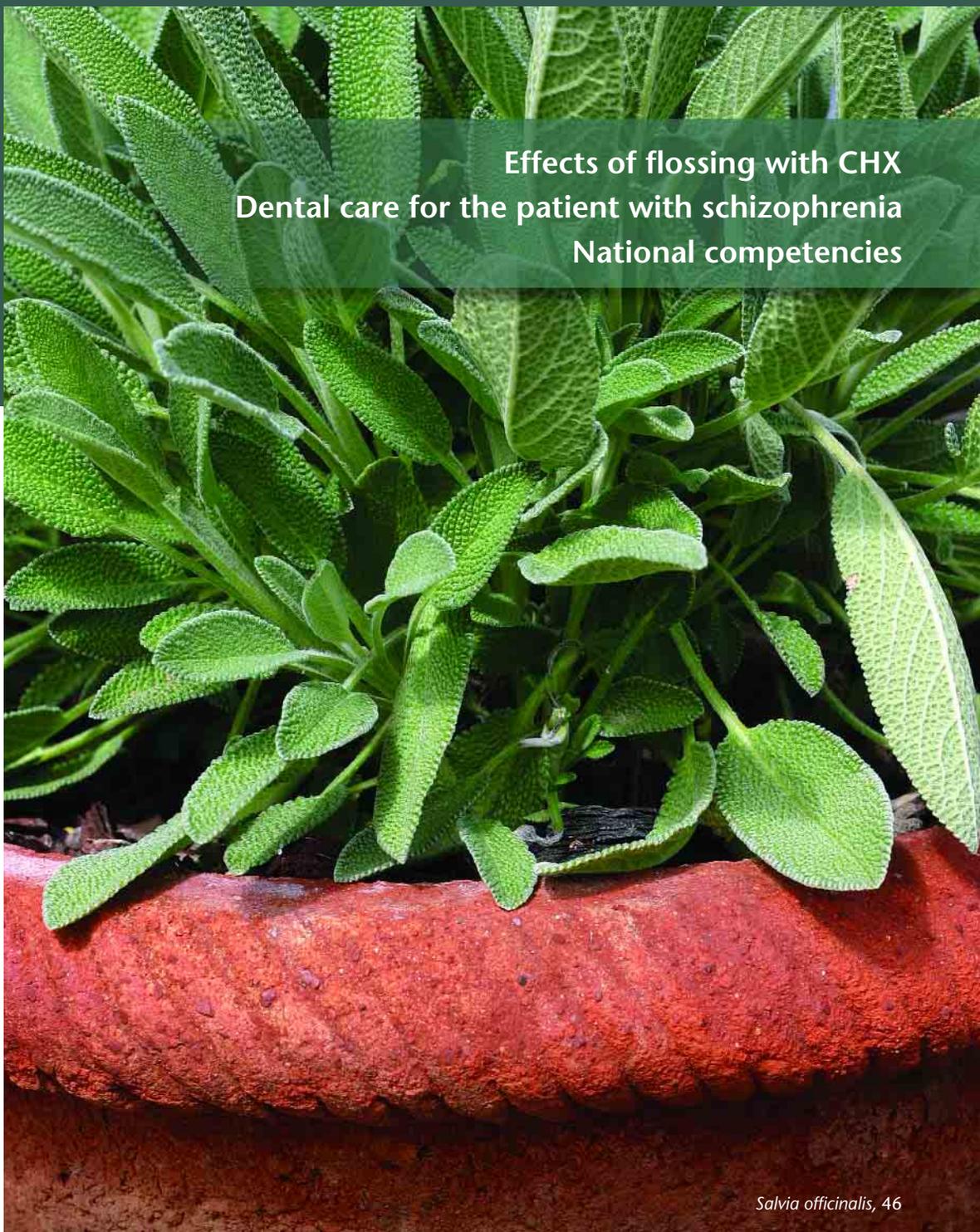


CJDH JCHD

JANUARY-FEBRUARY 2008, VOL. 42, NO. 1



Effects of flossing with CHX
Dental care for the patient with schizophrenia
National competencies

Salvia officinalis, 46

Continuing professional development this year

The arrival of a new year is often a time to reflect on the past — our successes and accomplishments, challenges and yes, even those unmet goals. For me, a new year also signifies a fresh start, and a chance to envision how I'd like the year to be. As a dental hygienist, it's also a perfect time to plan for new professional opportunities, set new learning goals, and think of new ways to make a difference to the oral health of Canadians. What's your vision for this year?

"A vision is not just a picture of what could be; it is an appeal to our better selves, a call to become something more," Rosebeth Moss Kanter.

The Canadian Dental Hygienists Association (CDHA), as the national voice and vision of dental hygiene in Canada, has worked diligently over the past few years to remove barriers to preventive oral care. Recent legislative changes in Alberta and Ontario have created new opportunities for dental hygienists to reach beyond the walls of private practice to offer their services in a variety of settings. In Manitoba, the Transitional Council of the College of Dental Hygienists, with its focus to increase access to dental hygiene care by Manitobans, is working on enabling regulations and registering dental hygienists for extended practice in 2008. These are just a few examples of foundational changes now underway that will essentially shift the paradigm of oral care delivery in Canada. If these changes offer you new professional opportunities to practise, it's important to develop the business and marketing skills you need to complement your role as an oral health care provider. "Independent Practice", a new on-line course, is just one of several resources the CDHA has recently developed to help fulfil its mission and its visionary goals that *members have the resources to support business success*. Consider adding "Learn more about independent practice" to your 2008 vision.

Are you wondering what else to add to your 2008 list? The evolution and maturation of dental hygiene as a profession did not occur overnight or by coincidence. Progress continues through diligent, grassroots work of dental hygienists equipped with a vision and a strong commitment to make a difference. As Margaret Mead so eloquently said, *"Never doubt that a small group of committed people can change the world. Indeed, it is the only thing that ever has"*. By actively participating in your professional association, you will have a voice, be able to shape the future through your contributions — you can make change happen. There are other great benefits to getting involved. With so many clinicians working as solo dental hygienists in private practice, regular meetings can offer

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Your feedback may be sent to: president@cdha.ca



Carol-Ann Yakiwchuk,
RDH, DipDH, (BSc-DENT HYG)

Une autre année de perfectionnement professionnel continu

La venue d'une nouvelle année prête souvent à une réflexion sur le passé : nos réussites et réalisations, les défis et, oui, même les buts non atteints. Pour moi, la nouvelle année marque aussi un nouveau départ et m'amène à imaginer comment j'aimerais voir se dérouler l'année. Pour l'hygiéniste dentaire que je suis, c'est aussi le moment idéal de prévoir les nouvelles possibilités sur le plan professionnel, définir de nouveaux objectifs de formation et penser à de nouvelles façons d'améliorer la santé buccodentaire de la population canadienne. Et vous, comment voyez-vous cette année ?

« Une vision, ce n'est pas seulement un aperçu de ce qui pourrait arriver; c'est un appel à nous améliorer, une incitation à nous développer davantage », Rosebeth Moss Kanter.

L'Association canadienne des hygiénistes dentaires (ACHD), voix et vision de l'hygiène dentaire au Canada, a travaillé sans relâche ces dernières années à éliminer les obstacles en matière de soins buccodentaires préventifs. Les récentes modifications législatives de l'Alberta et de l'Ontario ont ouvert de nouvelles perspectives aux hygiénistes dentaires pour aller au-delà de la pratique privée et offrir des services dans divers milieux. Au Manitoba, le conseil de transition du Collège des hygiénistes dentaires, qui cherche à accroître l'accès des soins buccodentaires offerts aux Manitobains, peaufine la réglementation pertinente et poursuit l'inscription des hygiénistes dentaires en vue d'élargir la pratique en 2008. Ce ne sont là que quelques exemples des changements fondamentaux en cours qui modifieront essentiellement le modèle de prestation des soins buccodentaires au Canada. Si ces changements vous ouvrent de nouvelles possibilités de pratique, il importe de développer vos talents en matière d'administration et de marketing, lesquels viendront compléter vos compétences en tant que prestataires de soins de santé buccodentaire. Le nouveau cours de formation en ligne sur la « Pratique indépendante » est une des nombreuses ressources que l'ACHD a récemment mises au point dans le cadre de sa mission et de ses objectifs visant à faire en sorte que *les membres aient les ressources et le soutien pertinent pour réussir sur le plan des affaires*. Songez à ajouter « En apprendre davantage sur la pratique indépendante » à vos résolutions pour 2008.

Pensez-vous à ajouter d'autres points à cette liste ? L'évolution et la maturation de la profession d'hygiéniste dentaire ne sont pas survenues du soir au lendemain ni par coïncidence. La progression se poursuit à la base grâce à la diligence et aux efforts des hygiénistes dentaires qui ont une vue sur l'avenir et s'engagent fermement à changer les

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Vous pouvez envoyer vos réactions à president@cdha.ca

MASTHEAD

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Toll free: 1 800 267-5235, Fax: 613 224-7283

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Your professional growth

Personal change, growth, development, identity formation—these tasks that once were thought to belong to childhood and adolescence alone now are recognized as part of adult life as well. Gone is the belief that adulthood is, or ought to be, a time of internal peace and comfort, that growing pains belong only to the young; gone the belief that these are marker events—a job, a mate, a child—through which we will pass into a life of relative ease.

Lillian Breslow Rubin, *Intimate Strangers*, ch.1;1983.

As we step into a new year we are experiencing continuing changes to the profession from both a practice and an education perspective. Legislative changes, recognition of dental hygienists as primary health care professionals, and educational opportunities abound. A cauldron of emotions can accompany such changes from elation to fear and everything in between. To assist you through these changes, CDHA remains tuned in to our members' needs and the professional environment.

2008 will prove to be an exceptional year for events that you will not want to miss. For the first time ever we meet in Banff, Alberta, for "Navigating the Imagination - A Leadership Invitational" between 26 and 28 May. This unique 3-day event is designed to fulfil CDHA's commitment to foster members' professional growth. Registration for the Invitational is open to dental hygienists who consistently demonstrate their dedication to leadership to other association members, and to promoting dental hygiene care to Canadians. Enterprising dental hygienists who wish to hone their leadership skills will also benefit from this event.

Innovation continues with our "Product Showcase Goes Live" in Toronto, Ontario on 21 June, an electrifying event focusing on cutting edge topics in technological influences in oral health care. Participants can attend special workshops, ask opinion leaders questions, network with colleagues, and have the opportunity to a free registration pass to any of our 2009 events.

Based on the success and overwhelming requests to repeat the Student Summit, we will be holding this event again at two different locations in Fall. Independent Practice Workshop on 1 November in Vancouver wraps up CDHA's calendar of events.

Recent legislative changes in several Canadian jurisdictions now allow dental hygienists to self initiate and establish independent dental hygiene practice. To provide our members with the requisite tools and knowledge to establish their own practice whether storefront or mobile, we are launching the first of a series of five online, certifi-

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Your feedback may be sent to: saz@cdha.ca



Susan Ziebarth,
BSc, MHA, CHE

Votre croissance professionnelle

L'évolution, la croissance et le développement personnels ainsi que la formation de sa propre identité –, ces tâches, que l'on croyait jadis être uniquement le propre de l'enfance et de l'adolescence, sont aujourd'hui perçues comme faisant aussi partie de la vie adulte. L'on ne croit plus que l'âge adulte soit, ou devrait être, un temps de confort et de paix intérieure, que les difficultés de croissance relèvent seulement de la jeunesse; on ne croit plus que ce soient des événements marquants – emploi, copin-copine, enfant – à traverser dans notre cheminement vers une vie de bien-être relatif.
(notre traduction)

Lillian Breslow Rubin, *Intimate Strangers*, ch.1; 1983.

Au moment d'entreprendre une nouvelle année, nous avons le sentiment que la profession continue d'évoluer tant sur le plan de la pratique que de la formation. Les modifications de la loi, la reconnaissance de l'hygiéniste dentaire en tant que professionnelle des soins de santé primaires et les possibilités de formation abondent. Autant de changements peuvent susciter une multitude d'émotions allant de l'exultation à la peur. Pour vous aider face à ces changements, l'ACHD demeure branchée sur les besoins de nos membres et leur environnement professionnel.

L'année 2008 s'avèrera une année exceptionnelle d'activités que vous ne voudrez pas rater. Nous nous réunirons pour la première fois à Banff (Alberta) sous le thème « À la barre de l'imagination – Invitation au leadership » du 26 au 28 mai. Cette activité unique de 3 jours a pour objet de remplir l'engagement de l'ACHD à favoriser la croissance professionnelle de ses membres. L'inscription à cette Invitation est ouverte à toutes les hygiénistes dentaires qui ont constamment démontré leur souci du leadership auprès des autres membres de l'association et de la promotion des soins d'hygiène dentaire auprès de la population canadienne. Les hygiénistes dentaires qui ont l'esprit d'initiative et souhaitent affiner leurs talents de leaders bénéficieront aussi de cette activité.

L'innovation se poursuivra avec notre électrisante présentation de nouveaux produits de prestige, *Product Showcase Goes Live*, qui aura lieu le 21 juin à Toronto (Ontario) et se concentrera sur le dernier cri des sources technologiques d'influence sur les soins oculaires. Les participants pourront participer à des ateliers particuliers, interroger les chefs de file, prendre contact avec les collègues et elles auront l'occasion d'obtenir gratuitement un laissez-passer au choix pour l'une de nos activités de 2009.

À la suite de la réussite du Sommet étudiant et de l'importante demande qui s'ensuit, nous reprendrons cette

...suite à la page 25

Vous pouvez envoyer vos réactions à saz@cdha.ca

The effects of flossing with a chlorhexidine solution on interproximal gingivitis: a randomized controlled trial

Pauline H. Imai, D_{IP}DH, BDS_C, MSc; Edward E. Putnins, DMD, D_{IP}PERIO, MRCD (C), MSc, PhD; Donald M. Brunette, BSc, MSc, PhD

ABSTRACT

Background: Gingivitis is an inflammatory response of the gingival tissues to bacterial plaque that can be treated by brushing and flossing or rinsing with chlorhexidine. This study examined whether floss presoaked in chlorhexidine improved oral health relative to flossing alone. **Methods:** A 3-month, parallel, randomized control trial was conducted on 27 adults with a minimum of 10 bleeding sites, who were randomly assigned to a floss soaked in 0.12 per cent chlorhexidine or floss soaked in a placebo, quinine sulfate. Debridement and flossing instructions were performed at Week - 1. Probing depth, bleeding on probing, gingival plaque, and stain indices were assessed at Weeks 0, 6, and 12. Flossing compliance was monitored by self-reports and length of floss used. **Results:** Flossing compliance was high for both groups. All subjects had statistically significant reductions in gingival indices scores ($p < 0.0001$). The chlorhexidine group had statistically significant reductions for probing depth at Week 6 ($p = 0.03$); the effect was more pronounced in shallow sites (probing depth < 4 mm) Week 6 ($p = 0.01$) and Week 12 ($p = 0.01$). The chlorhexidine group also had statistically significant reductions for bleeding on probing in subjects with moderate gingivitis ($p = 0.01$) and in all areas of the mouth ($p = 0.01$ anterior; $p = 0.04$ posterior). The two groups did not differ significantly for stain and plaque indices. **Conclusion:** Flossing with chlorhexidine reduces probing depths and bleeding on probing in subjects with moderate gingivitis compared to flossing alone.

RÉSUMÉ

Contexte : La gingivite est une réaction inflammatoire des tissus gingivaux à la plaque bactérienne qu'on peut traiter avec la brosse à dents et la soie dentaire ou une solution de chlorexidine. Cette étude a donc pour objet d'établir si la soie dentaire préalablement trempée dans la chlorexidine améliore à elle seule la santé buccale. **Méthodes :** Des essais parallèles randomisés ont été menés pendant trois mois chez 27 adultes qui avaient au moins 10 sites de saignement et à qui on avait demandé au hasard d'utiliser de la soie dentaire trempée dans une solution de 0,12% de chlorexidine ou un placebo de sulfate de quinine. Les instructions touchant le débridement et la soie dentaire ont été exécutés la première semaine. On a ensuite évalué la profondeur de sondage, le saignement lors du sondage, la plaque gingivale et les indices de coloration aux semaines 0, 6 et 12. La fidélité d'utilisation de la soie dentaire a été surveillée par le biais des comptes-rendus personnels et la longueur de la soie dentaire utilisée. **Résultats :** Les deux groupes ont utilisé très fidèlement la soie dentaire. Tous les sujets ont présenté une diminution statistiquement significative de l'indice gingival ($p = 0,0001$). Le groupe soumis à la chlorexidine a eu une réduction statistiquement significative de la profondeur de sondage à la 6^e semaine ($p = 0,03$); le résultat a été plus prononcé dans les sites de faible profondeur (< 4 mm au sondage), ($p = 0,01$) à la 6^e semaine et ($p = 0,01$) à la 12^e semaine. Le groupe soumis à la chlorexidine a aussi montré une diminution statistiquement significative du saignement au sondage chez ceux qui avaient une gingivite modérée ($p = 0,01$) et dans toutes les autres parties de la bouche (antérieures, $p = 0,01$; postérieures, $p = 0,04$). Les deux groupes n'ont pas souffert de façon significative des indices de la coloration et de la plaque. **Conclusion :** L'utilisation de la soie dentaire trempée dans la chlorexidine réduit la profondeur et le saignement au sondage chez les sujets qui ont une gingivite modérée, comparativement à la soie dentaire seule.

Key words: chlorhexidine, dental floss, bleeding on probing

INTRODUCTION

Gingivitis is an inflammatory response of the gingiva to bacteria in dental plaque.¹⁻³ Although gingivitis can occur on all gingival surfaces, it is more prevalent in the interproximal areas.⁴ Gingivitis can be treated by mechanically removing the dental plaque by brushing teeth and dental flossing⁴⁻⁶ or by chemically inhibiting plaque formation via chlorhexidine (CHX).⁷⁻⁹

Kinane et al. (1992) investigated a novel flossing device that combined the beneficial aspects of dental floss and CHX to reduce gingival bleeding in gingivitis subjects.¹⁰ No significant differences were found between the CHX and placebo flossing devices.¹⁰ Although the dose of CHX may have been too low,¹⁰ another explanation is that the dental floss in the flossing device blocked the CHX from reaching the interproximal areas.

The purpose of this three-month, double-blinded, parallel randomized controlled trial (RCT) was to determine whether dental floss immersed in CHX would reduce the clinical signs of interproximal gingivitis better than a floss in placebo solution. Since rinsing with CHX is known to

cause extrinsic brown tooth stain,¹¹ a secondary aim was to determine whether flossing with CHX would result in tooth staining.

MATERIALS AND METHODS

The study received approval from the University of British Columbia's Clinical Research Ethics Board (#C05-0513 & H05-70513) and met the requirements of the Tri-Council Policy Statement for Ethical Conduct for Research Involving Humans 1998.

Twenty-seven adults with gingivitis or localized, mild periodontitis were recruited from Vancouver, British Columbia through newspaper advertisements, community advertisements, postings on Craig's List, and referrals. The American Academy of Periodontology (1999) definitions

From the University of British Columbia, Vancouver
Submitted 30 Apr. 2007; Revised 2 Sept. 2007; Accepted 5 Nov. 2007
Correspondence to: DM Brunette, Oral Biological and Medical Sciences, University of British Columbia, 2199 Westbrook Mall, Vancouver, BC V6T 1Z3; brunette@interchange.ubc.ca

of plaque-associated gingivitis and localized, mild chronic periodontitis were used in the study.¹² Plaque-associated gingivitis is defined as gingival inflammation, which is confined to the gingivae with no clinical attachment loss or on stable, but reduced periodontium and is only associated with dental plaque and no other local contributing factors.¹² Chronic periodontitis is defined as a slow progressive disease that results in clinical attachment loss.¹² Chronic periodontitis can be further classified by extent, which is the number of sites that are involved, and severity of clinical attachment loss.¹² For example, localized, mild periodontitis is defined as 1-2 mm of clinical attachment loss in less than 30 per cent of the total sites.¹²

Subjects were enrolled if they were non-smoking adults with gingivitis or localized, mild periodontitis. A minimum of 10 bleeding on probing (BOP) sites was required. Subjects who were accepted into the study were required to floss daily, attend all instructional sessions, and sign a consent form.

Subjects were excluded from the study if they were pregnant or planned to become pregnant within the next three months, were allergic to CHX or quinine sulfate (QS), or were required to take antibiotic premedication for dental treatment. Subjects were also excluded if they had full or partial dentures, extensive crown and bridge coverage, full orthodontic bands and brackets, or generalized, severe periodontitis (i.e., more than 30 per cent of the sites having clinical attachment loss of 5 mm or more).¹² Subjects were excluded or removed from the study if they took antibiotics, Dilantin, Cyclosporin A, Nifedipine or other calcium channel blockers, daily aspirin or anti-coagulants, CHX or whitening products.

The enrolled subjects were randomly assigned to treatment group (CHX), dental floss (Johnson & Johnson Reach® unflavoured waxed dental floss, Montreal, Canada) with 0.12 per cent CHX (Peridex®, Zila Pharmaceuticals, Inc., Phoenix, Arizona), or placebo group (QS), dental floss (Johnson & Johnson Reach® unflavoured waxed dental floss, Montreal, Canada) with 0.1 per cent quinine sulfate solution. The placebo solution was prepared by a pharmacist to taste, smell, and to appear similar to the CHX solution. Subjects were randomized using a block design determined by a person who was not involved with the study in any other capacity. Subjects were enrolled on an ongoing basis between March 2006 and mid-September 2006, at which time the study was closed to accrual to allow the subjects to complete the 3-month study.

The study consisted of four visits over a 3-month period. All potential subjects underwent a screening visit at which medical and dental histories were recorded, periodontal condition and numbers of bleeding points were assessed, and the subject was informed about the nature of the study. If the subject met the inclusion and exclusion criteria, informed consent was obtained and the subject was scheduled for the debridement appointment.

During the debridement appointment (Week - 1) calculus and plaque were removed with a combination of ultrasonic and hand instrumentation. Superficial tooth stains were removed with rubber cup prophylaxis and pumice. Flossing technique was reviewed until the subject

was adept at using dental floss. Additional flossing instructions were available on a video clip on the study website and in the flossing diary. Subjects were requested to brush as usual, but refrain from using electric toothbrushes. Mouthwashes and additional professional dental hygiene services such as scaling, root planing, and rubber cup polishing were also prohibited during the study period.

Approximately one week after the debridement visit, subjects returned for baseline data collection (Week 0), which was collected in the following order: modified Löe and Silness gingival index (GI),¹³ modified Lobene stain index (SI),¹⁴ modified Silness and Löe plaque index (PI),¹⁵ probing depths in millimeters (PD) and modified Ainamo and Bay bleeding on probing (BOP).¹⁶

At the end of the baseline visit, subjects received a randomly-assigned floss and flossing diary to record their flossing activity. Subjects were instructed to brush as usual then floss once a day with approximately 18" (46 cm) of dental floss. They were also requested not to rinse their mouth with water after flossing to prevent the "medicine" from being washed away.

The solution-filled floss container was placed in a heavy glass candleholder to prevent accidental spillage. Subjects were requested to ensure that the dental floss was wet at all times and were given a small bottle with extra solution to refill the floss container as needed. If the subjects thought the floss was getting dry while flossing, they were encouraged to use two pieces of dental floss, i.e., one piece for each row of teeth. All subjects received an Oral-B soft Indicator® toothbrush #40 (Gillette Co., Boston, Massachusetts) and Colgate® regular anti cavity mint toothpaste (Colgate-Palmolive Canada Inc., New York, New York) with instructions to only use these products with their assigned dental floss and not to share the study materials with family members.

At Weeks 6 and 12, measurements were retaken on the same teeth in the same order as Week 0. The dental floss, floss diary, toothbrush, and toothpaste were replenished with a new supply at Week 6. Subjects were questioned about any changes in their medical histories and whether they had experienced any side effects at each of the follow-up visits. To assess flossing compliance, the length of remaining dental floss in the container was measured and compared with the self-reported usage recorded in the flossing diary. If at the end of the study a subject presented with any one or all of these - calculus, stain, and BOP, an exit debridement was performed. All subjects were dismissed at Week 12 and requested to return to their usual oral health care professional for continuing care.

One examiner, who was blinded to the treatment assignments and calibrated before the study began, collected the clinical data on all subjects. All measurements were taken on six sites per tooth (mesial-buccal, buccal, distal-buccal, distal-lingual, lingual, and mesial-lingual) on all teeth except third molars and teeth with crown and bridge coverage. Index scores were averaged per tooth then added together and divided by number of teeth for the subject's full mouth score. Teeth were lightly dried with pressurized air prior to the measurements. Teeth were disclosed with Trace ® disclosing solution (Young dental manufacturing company, Earth City, MO, USA) and lightly rinsed for PI. A

pressure-sensitive, 3-6-9 mm periodontal probe with a point tip diameter of 0.5 mm (Kerr-Hawe Click-Probe®, Kerr U.S.A. 1717 West Collins Avenue, Orange, CA 92867) set at 25 N (Newtons) was used to record the PD and BOP.

Statistical Analyses

An intention-to-treat protocol and whole-mouth scores were used in the statistical analyses. Whole-mouth scores for each subject were computed by adding the subject's individual tooth scores and dividing by the number of teeth. The statistical unit was the subject. According to Barbano and Clemmer (1974), subject level scores approach a continuous scale when ordinal scores are averaged to produce full-mouth scores. The continuity is further enhanced by the fact that many of these studies take the difference between a baseline reading and a reading after some subsequent treatment.¹⁷ Cohen (2001) and Sullivan and D'Agostino (2003) also concluded, "(1) Parametric tests are sufficiently robust relative to typical violations of normality; (2) presumed statistical prohibitions against the application of parametric methods to ordinal data do not actually exist; and (3) 'ordinal' dental indices have sufficient quantitative meaning to be considered quasi-interval. For these reasons, parametric tests should not be avoided; they will be valid and usually more powerful and more easily applied to complex designs than non parametric alternatives."^{18,19} Parametric tests have been used in other studies investigating the effects of CHX.²⁰⁻²² Therefore student t-tests, which are statistical tests comparing the difference between the means of two groups,²³ were used for between treatment and within treatment analyses in this study. All data were tested for normality using qq-plots, "a graphical method for diagnosing differences between the probability distribution of a statistical population from which a random sample has been taken and a comparison distribution."²⁴ In situations where the normality assumption appeared questionable, Wilcoxon tests were performed to ensure that the interpretations of the two methods came to the same conclusions. Alpha was set a priori at 5 per cent.

As predetermined in the research protocol, the primary outcome was BOP. GI, PI, and PD were secondary out-

comes to provide additional information regarding the effects of flossing with chlorhexidine compared to flossing with placebo solution. SI was used to monitor for the common side effect known to be associated with chlorhexidine. Only predetermined stipulated hypotheses were analyzed.

Post hoc exploration of the data was done using stratification and analysis of covariance (ANCOVA) with baseline values as a covariate. Stratifications were done using baseline values. PDs were stratified into groups based on the baseline PD, but the outcome measure was in the follow-up value of millimetres. Ratios were used for the PI scores (Week 0:Week 6, Week 0:Week 12) to establish a common baseline point between the two groups.

RESULTS

Twenty-six (18 women and 8 men) of the 27 enrolled subjects completed the 12-week study. One subject withdrew at Week 6 because she was unable to "get into the flossing habit." The subject flossed for 8 days immediately after being randomized and then ceased flossing prior to the Week 6 visit. Another subject, who was on an extended holiday, missed the Week 6 visit, but continued to follow the research protocol and presented at Week 12. The subjects reported no side effects to the clinical examiner and the clinical examiner did not note any intra-oral side effects in the subjects.

At Week 0, the treatment and control groups were clinically similar for GI, PI, SI, PD, and BOP. Slight mean differences between groups were not statistically significant (Student t-test). Nevertheless, to control for the possibility of these differing baseline values on the outcomes, ANCOVA was conducted using the baseline values as a covariate. The adjusted p-values are reported in addition to the p-values from the Student t-tests.

Probing Depths (PD)

A statistically significant reduction in overall PDs was found for the subjects using the floss presoaked with CHX compared to those using the floss presoaked with the placebo solution at Week 6 (p = 0.03, adjusted p-value = 0.02) in Table 1. At Week 12, the mean overall PD for sub-

Initial probing depth sites (PD)	CHX group (n = 12)		QS group (n = 14)		p-value (2 sample t-test or Wilcoxon Rank Sum test)	Adjusted p-value (ANCOVA with baseline as covariate)
	Mean	SD	Mean	SD		
Week 0						
Overall PD	2.31	0.34	2.42	0.32	0.19	
PD < 4mm	2.11	0.05	2.24	0.03	0.06	
PD ≥ 4mm	4.07	0.03	4.14	0.04	0.14	
Week 6						
Overall PD	2.20	0.24	2.40	0.19	0.03	0.02
PD < 4mm	2.06	0.12	2.23	0.16	0.01	0.03
PD ≥ 4 mm	3.73	1.18	4.05	0.09	0.73	0.50

Table 1: Comparison of overall probing depths (PD) and stratified probing depths (PD < or ≥ 4 mm) for chlorhexidine (CHX) and placebo (QS) groups at Weeks 0 and 6.

Initial probing depth (PD)	CHX group (n = 12)		QS group (n = 14)		p-value (2 sample t-test or Wilcoxon Rank Sum test)	Adjusted p-value (ANCOVA with baseline as covariate)
	Mean	SD	Mean	SD		
Week 0						
Overall PD	2.31	0.34	2.42	0.32	0.19	
PD < 4mm	2.11	0.05	2.24	0.03	0.06	
PD ≥ 4mm	4.07	0.03	4.14	0.04	0.14	
Week 12						
Overall PD	2.29	0.35	2.44	0.20	0.18	0.26
PD < 4mm	2.09	0.16	2.26	0.11	0.01	0.01
PD ≥ 4 mm	3.76	1.13	4.04	0.06	0.85	0.32

Table 2: Comparison of overall probing depths (PD) and stratified probing depths (PD < or ≥ 4 mm) for chlorhexidine (CHX) and placebo (QS) groups at Weeks 0 and 12.

jects using the floss presoaked in CHX remained below baseline values compared to those using the floss presoaked in QS, which rose above its baseline value; however, this was not statistically significant ($p = 0.18$, adjusted p -value = 0.26) as shown in Table 2.

Since dental floss is more effective in PDs that are less than 4 mm,²⁵⁻²⁷ further analyses were conducted with the subjects' gingival sites stratified into PD < 4 mm and PD ≥ 4 mm. At Week 6, there was a statistically significant reduction in PD in sites that were originally less than 4 mm for subjects using the CHX-soaked floss compared to those using the QS-soaked floss ($p = 0.01$, adjusted p -value = 0.03), but not in sites that were initially 4 mm or greater ($p = 0.73$, adjusted p -value = 0.50).

At Week 12, the shallow sites continued to demonstrate a statistically significant reduction in PD for the CHX group but not for the QS group ($p = 0.01$, adjusted p -value = 0.01). There was no statistically significant difference for PD between the CHX and QS groups for the sites that were initially 4 mm or greater ($p = 0.85$, adjusted p -value 0.32).

Bleeding on Probing (BOP)

A statistically significant reduction for BOP (mean change of -0.04) occurred for all subjects ($p = 0.02$) from Week 0 to Week 6, with smaller reductions continuing to occur up to Week 12 (mean change of -0.02, $p = 0.18$). Of the initial positive bleeding sites, 83 per cent stopped bleeding in the CHX group and 78 per cent in the QS group.

As the response to CHX might be related to the level of oral health, further analyses were conducted with the subjects stratified according to "mild gingivitis" (defined for the purposes of this RCT as less than 11 initial positive BOP sites, which was the minimal number of BOP sites to be considered for inclusion into the RCT) and "moderate gingivitis" (11 or more initial positive BOP sites). Only the subjects with moderate gingivitis who used the floss presoaked in CHX had a statistically significant reduction in BOP from Week 0 to Week 6 ($p = 0.01$), shown in Table 3.

Since it is easier for subjects to floss the anterior teeth (canine to canine) as opposed to the posterior teeth (first premolar to second molar),²⁶ further analyses were conducted with the BOP sites separated into anterior and

Gingivitis severity (initial BOP sites)	Floss used	N	Mean change from Week 0 to Week 6	SD	p-value (Wilcoxon Signed Rank test)
Moderate (≥ 11)	CHX	8	-0.12	0.09	0.01
Moderate (≥ 11)	QS	6	-0.08	0.06	0.06
Mild (<11)	CHX	4	0.02	0.04	0.50
Mild (<11)	QS	8	0.02	0.06	0.73

Table 3: Comparison of mean change in bleeding on probing (BOP) from Week 0 to Week 6 for subjects stratified according to mild gingivitis (< 11 initial BOP sites) and moderate gingivitis (≥ 11 initial BOP sites) using floss soaked in either chlorhexidine (CHX) or placebo (QS).

Area in subjects' mouth	Floss used	N	Mean change	SD	P-value (Paired t-tests)
Anterior (canine to canine)	CHX	12	-0.02	0.001	0.01
	QS	13	0.00	0.0004	0.40
Posterior (bicusps to molars)	CHX	12	-0.02	0.002	0.04
	QS	13	-0.01	0.0003	0.06

Table 4: Comparison of the mean changes in bleeding on probing (BOP) for sites stratified according to anterior or posterior areas of the mouth in subjects using either the floss soaked in chlorhexidine (CHX) or placebo from Week 0 to Week 6.

posterior areas. Statistically significant reductions in BOP occurred from Week 0 to Week 6 for the CHX group in both anterior ($p = 0.01$) and posterior areas ($p = 0.04$), seen in Table 4. In comparison, the QS group showed no statistically significant reductions in BOP from Week 0 to Week 6 (anterior, $p = 0.40$; posterior, $p = 0.06$).

From Week 0 to Week 12, subjects using the CHX-soaked floss continued to have statistically significant reductions in BOP in the anterior areas ($p = 0.01$). All other comparisons for BOP between the CHX and QS groups were not statistically significant, depicted in Table 5.

Area in subjects' mouth	Floss	N	Mean change	SD	P-value (Paired t-tests)
Anterior (canine to canine)	CHX	13	- 0.02	0.001	0.01
	QS	14	- 0.01	0.0004	0.09
Posterior (bicuspid to molars)	CHX	13	- 0.01	0.001	0.23
	QS	14	0.00	0.0003	0.32

Table 5: Comparison of the mean changes in bleeding on probing (BOP) for sites stratified according to anterior or posterior areas of the mouth in subjects using either the floss soaked in chlorhexidine (CHX) or placebo from Week 0 to Week 12.

Plaque Index (PI)

Over the 12-week study, a constant mean PI was found for subjects using the CHX-soaked floss and this appeared to differ from the increasing PI in patients enrolled in the QS group shown in Figure 1. However, there was no statistical significant difference between these groups.

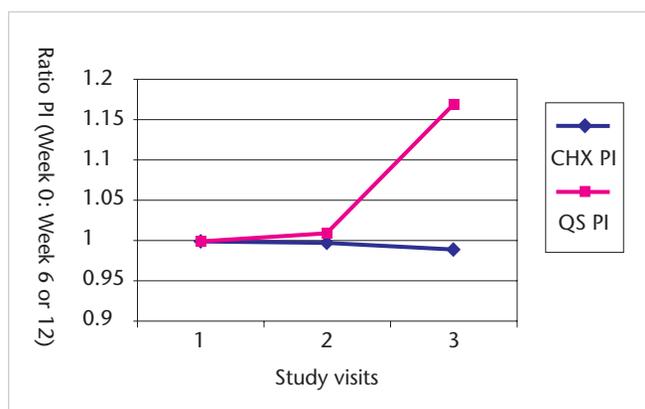


Figure 1: Chlorhexidine (CHX) and placebo (QS) groups ratio plaque index scores Weeks 0 (1), 6 (2), and 12 (3).

Gingival Index (GI)

All subjects had statistically significant reductions in mean GI scores from Week 0 to Week 6 (mean change of -0.56, $p < 0.001$) as well as from Week 0 to Week 12 (mean change of -0.58, $p < 0.0001$) demonstrated in Figure 2.

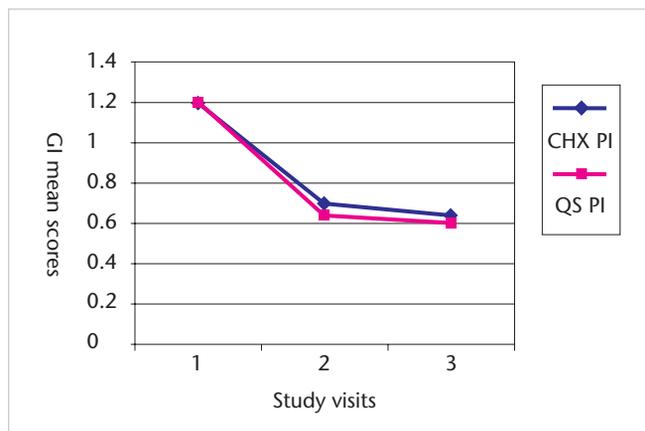


Figure 2: Chlorhexidine (CHX) and placebo (QS) groups mean gingival scores Weeks 0 (1), 6 (2), and 12 (3).

Stain Index (SI)

There was no statistically significant difference between the CHX and QS groups for stain at Week 6 ($p = 0.91$, adjusted $p = 0.52$) or Week 12 ($p = 0.18$, adjusted p -value = 0.32). Both groups had a slight, but not statistically significant, increase in stain over the 12 weeks (mean change 0.05, $p = 0.14$).

Flossing Compliance

Both groups demonstrated high levels of flossing compliance with no statistically significant differences between the groups. At Week 6, the self-reported median flossing compliance was 98 per cent for the CHX group and 97 per cent for the QS group and at Week 12 it was 100 and 93 per cent respectively. Median yards of floss used ranged from 35 to 43 yards (about 32-39 m) per 6-week period.

DISCUSSION

The introduction of a daily flossing regimen resulted in an overall benefit for all study subjects. Flossing, as shown by the results of the positive control group, resulted in statistically significant reductions in BOP scores from Week 0 to Week 6, and to a lesser degree up to Week 12. All subjects also had statistically significant reductions in GI scores over the 12-week study. The reductions in bleeding and gingival index scores found in this RCT are similar to the results found in other studies, which have demonstrated the beneficial effects of flossing for the treatment of gingivitis.²⁵⁻²⁸

However, presoaking the dental floss in CHX solution had additional benefits compared to the floss soaked in the placebo solution. The CHX-soaked dental floss had statistically significant reductions for probing depths in sites that were initially less than 4 mm compared to the floss in placebo solution, which did not demonstrate any statistically significant PD reductions. Both groups did not have statistically significant reductions in PDs for sites that were initially 4 mm or more most likely because dental floss can only effectively deplaque sulcular depths to a maximum of 3 mm.^{25,29,30} The data suggests that the CHX-soaked floss may have been able to carry the CHX into the interproximal area to produce a reduction in PDs less than 4 mm similar to the effects seen by oral irrigation with CHX solution. For example, Flemmig et al. (1990) demonstrated a reduction in probing depths (mean reduction of 4.6 per cent at 6 months, $p < 0.05$) in shallow sulci by irrigating with 0.06 per cent CHX rinse.³¹ Although the method of applying CHX differs, oral irrigation may flush CHX subgingivally into the sulcus³¹ just as dental floss may carry CHX into the sulcus to reduce probing depths.

The CHX-soaked floss also demonstrated additional BOP reductions for subjects with 11 or more initial BOP sites compared to the QS-soaked floss. The subgroup of moderate gingivitis subjects using the CHX-soaked floss had a statistically significant reduction in BOP from Week 0 to Week 6, which continued to a lesser degree up to Week 12. CHX mouth rinse has been shown in other studies to reduce bleeding, with reductions ranging from 46-67%.^{8,9,27,31-35} However, according to Cumming and Løe (1973) and Caton et al. (1993) CHX mouth rinses may have limited effects interproximally.^{4,36} In this study, the

CHX was applied interproximally via a presoaked dental floss and was able to exert an additional effect over what was achieved with flossing alone.

Since individuals can floss the anterior teeth (canine to canine) more effectively than the posterior teeth (first premolar to second molar),²⁶ analyses were conducted with the BOP sites grouped into anterior and posterior sites. The subjects using the CHX-soaked floss had statistically significant reductions in BOP over the 12 weeks for the anterior areas, but only had statistically significant reductions in the posterior areas up to Week 6. The results of this study are similar to those of Wong and Wade (1985) in that the subjects were able to floss the anterior teeth more effectively than the posterior teeth.²⁶

The Silness and Loe (1964) plaque index requires an examiner to see the amount and location of plaque in order to assign a score for the tooth¹⁵; it is the easiest, most portable and cost-effective method to use in the field.³⁷ However, it is not possible to visualize the interproximal surfaces, which were targeted by the CHX-soaked floss. A more sensitive measure that quantifies plaque in the interproximal area needs to be developed.

Numerous studies have shown CHX to be an effective anti-plaque agent.¹¹ In this RCT, the researchers were unable to assess the anti-plaque effects of the CHX-soaked floss because of the limitations of the plaque index; however, the statistically significant reductions in PDs and BOP indicate that the CHX-soaked floss was having a beneficial effect in the interproximal area compared to the placebo-soaked floss in similar sites.

The other benefit of using a CHX-soaked dental floss rather than a CHX mouth rinse is that the floss method may minimize tooth staining. CHX mouth rinse is known to cause tooth staining within a few days of use in 3 out of 4 individuals who use it¹¹ and this is the primary reason for low compliance with the CHX mouth rinse regimen.^{11,21,38-42} However, in this RCT there was no noticeable tooth staining in subjects using the CHX-soaked floss. Both the CHX and QS groups had slight increases in tooth stain over the 12 weeks but this was not statistically significant and may be attributed to dietary sources such as tea and coffee drinking.

Subjects' compliance with the flossing regime was excellent, with most subjects flossing daily. Although the subjects used more than twice the amount of floss than was expected, the high usage corresponded to the high numbers of self-reported flossing days, indicating that compliance was high.

CONCLUSION

In this efficacy study, dental flossing alone reduced GI and BOP scores and therefore, is an effective method for treating gingivitis. However, dental floss presoaked in a 0.12 per cent CHX solution offers additional benefits for the treatment of gingivitis such as, reducing PDs in shallow sulcular sites (PD < 4 mm) and bleeding in subjects with moderate amounts of gingival bleeding. The CHX-soaked floss is also more effective for reducing bleeding in all areas of the mouth, but more so in the anterior sites, than the floss soaked in the placebo solution. Although it was not possible to discern a difference between the groups for

interproximal plaque levels because of the limitations of the PI, the other positive results associated with using the CHX-soaked floss indicates that flossing with the CHX-soaked floss provides additional beneficial effects in the interproximal area compared to flossing alone.

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Dental care for the patient with schizophrenia

David B. Clark, BSc, DDS, MSc(ORAL PATHOLOGY), FRCDC

ABSTRACT

Background: Dental hygienists will often be required to treat people who have psychiatric disorders such as depression, bipolar disorder and schizophrenia. Often the signs and symptoms of these illnesses are not obvious so it is incumbent upon the dental health practitioner to have a basic understanding of the more common psychiatric disorders including their presentation and medical management. **Discussion:** This knowledge will be important in the further understanding of the many oral health problems that may arise as manifestations of a particular mental illness including the side effects of the numerous psychotropic medications used in the pharmacotherapeutic management of these disorders. Because psychiatric problems often are invisible, one may not acknowledge the associated and very real impairments that are indeed an integral part of each disorder. The focus is on a description of one of the most serious of all psychiatric diagnoses, schizophrenia, and a review of the impact this illness may have from a dental health practitioner's perspective. **Conclusion:** The implications for this illness on a patient's oral health, the contribution to specific oral clinical findings, and the considerations for dental management are highlighted.

RÉSUMÉ

Contexte : Les hygiénistes dentaires doivent souvent soigner des personnes qui ont des troubles psychiatriques, telles la dépression, la psychose maniaco-dépressive ou la schizophrénie. Les signes et symptômes de ces maladies ne sont pas toujours évidents. Il incombe donc aux praticiens des soins dentaires d'avoir des connaissances de base au sujet des troubles psychiatriques les plus communs et de leurs manifestations ainsi que de la prise en charge médicale. **Discussion :** Ces connaissances seront importantes pour mieux comprendre les problèmes de santé buccodentaire dont les manifestations pourraient résulter d'une maladie mentale particulière, y compris les effets secondaires de nombreux médicaments psychotropes utilisés dans le traitement pharmaceutique de ces troubles. Comme les problèmes psychiatriques sont souvent invisibles, on peut ne pas reconnaître les déficiences réelles qui y sont associées et font effectivement partie de chacun d'entre eux. L'on se concentre sur la description d'un des plus sérieux diagnostics psychiatriques, la schizophrénie, et passe en revue les impacts que cette maladie peut avoir sur la prestation des soins buccodentaires. **Conclusion :** L'article met l'accent sur les implications de cette maladie sur la santé buccodentaire du patient, la contribution des caractéristiques cliniques buccales particulières et la gestion de la pratique dentaire.

Key words: schizophrenia, antipsychotic medications, adverse effects, oral health complications

In any given year approximately 1 in 5 adult Canadians will experience and suffer from some form of mental illness.^{1,2} In Canada, approximately 85 per cent of hospitalizations for mental illness occur in general hospitals with approximately 1 in 12 hospital beds used for patients with schizophrenia. This represents more beds than those needed for any other single illness outside of cardiovascular diseases.³ Epidemiological studies in Canada reveal that schizophrenia affects approximately 1 per cent of the Canadian population (1 in 100 adults) and the onset of the illness is often in late teens to early adulthood, at a time when people are pursuing further educational opportunities or embarking on a new career path.¹ While men and women are affected equally by the illness, symptoms often tend to develop earlier in males. Schizophrenia occurring in children is rare, with a reported incidence of approximately 1 in 40,000 children. Symptomatology is essentially the same as for that displayed in adults although difficulty may be encountered in differentiating this from other disorders such as autism. After the age of 45, in what is referred to as late-onset schizophrenia, women tend to have higher rates of the illness including rates of hospitalization compared to men. The implication of these statistics means that virtually every oral health care practice will include patients who are suffering from a particular psychiatric illness but whose symptomatology is often not obvious or easily recognized. The client's thoughts, behaviour, emotions, general health and social relationships are invariably involved and affected by psychiatric illness and further exacerbated by the specific treatments used in the

management of these conditions.

WHAT IS SCHIZOPHRENIA?

Mental illnesses can take many forms including such common psychiatric diagnoses as mood disorders (major depression, bipolar disorder), anxiety disorders, eating disorders, panic disorders, and schizophrenia. Schizophrenia however is quite distinct from bipolar illness and panic disorders, and while first identified as a discrete mental illness in 1887, did not become so named until 1911.⁴ The word has Greek origins, split (schizo) and mind (phrenia), a mind split from reality. This early definition contributed to the misperception of the illness being confused with someone having a split personality which is a distinct and less common psychiatric disorder. Schizophrenia represents the most common and serious form of psychosis affecting mood, thought and behaviour, and for which there is currently no cure. A psychosis is an extremely disordered pattern of thought, perception, emotion and behaviour. Consequently the psychotic person will have a very bizarre sense of reality accompanied by emotional and cognitive impairments leading to the loss of normal function in his/her environment. Because schizophrenia affects an individual's ability to function effectively in selfcare, family relationships, school, employment and social life in general, this illness is sadly overrepresented in

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Correspondence to: Dr. DB Clark, Director Dental Services, Whitby Mental Health Centre, 700 Gordon Street, Whitby, ON L1N 5S9; molarman3@hotmail.com

both the prison and homeless populations. A common misconception about schizophrenia and psychiatric illness in general, is that most patients are violent and dangerous. This has been fuelled for decades largely by the media as well as the print and film industries. In reality, only about 5 per cent or less are considered dangerous and this encompasses those individuals who exhibit primarily acute psychotic symptoms (e.g. from non compliance with medications) often exacerbated with the use of street drugs or alcohol or their combination. Individuals suffering from psychiatric illness in general are often the victims of crime rather than the perpetrators of these events.² Substance abuse involves up to 80 per cent of those affected with schizophrenia and can result in reduced effectiveness of ongoing treatments, exacerbation of symptoms and a higher tendency towards non compliance for treatment regimens. 40-60% of patients with schizophrenia will attempt suicide with 10-15%^{5,6} ultimately achieving this end.

GENETIC AND ENVIRONMENTAL FACTORS

While the etiology of schizophrenia continues to remain unclear, genetic factors have begun to be implicated in the etiology and pathogenesis of not only this disease but many other psychiatric disorders as well. Children with one parent suffering from schizophrenia have a 10-13% risk of developing the illness. This figure will jump to almost 46 per cent if both parents suffer from schizophrenia. For first-degree relatives, the risk for developing schizophrenia is 5-10% while for second-degree relatives, the risk is 2-4%.^{6,7} A combination of genetic and biochemical factors are now considered to be increasingly responsible for the development of functional abnormality and hyperactivity at dopaminergic receptor sites in the brain causing the positive, disorganized and negative symptoms of the illness. Abnormal regional cerebral blood flow and cerebral metabolism has also been reported in some patients.⁸ More recently, diagnostic imaging studies (MRI, CT, PET) are showing evidence of cerebral atrophy, ventricular enlargement and other anatomic abnormalities in the brain structure of patients with schizophrenia.⁹ This evidence offers further support for an organic component to the etiology of this disease. It also appears that schizophrenia may be triggered by certain environmental events in an individual genetically predisposed to this illness. Substance abuse, stressful psychosocial events, medical illness and the chronic stress of poverty all have been reported to be so-called trigger factors unmasking this underlying disease.⁶

SYMPTOMS

There are two illnesses which, while sounding similar to schizophrenia, are distinct disease entities. Schizoaffective disorder shows features of both schizophrenia and a mood disorder (e.g. depression) simultaneously. On the other hand, schizophreniform disorder must include two or more symptoms of schizophrenia but unlike schizophrenia, the disorder lasts a much shorter time of 1-6 months.

As with other psychiatric illnesses, a diagnosis of schizophrenia is generally made on the basis of a cluster of particular symptoms, each with a clinical significance or

impairment criterion. It is this methodology that comprises the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM IV) which is the standard reference for defining and classifying psychiatric disease in North America.¹⁰ There is currently no blood test, x-ray or CT scan that will provide a diagnosis of schizophrenia. The longterm outcome of schizophrenia varies greatly between individuals. While approximately 25 per cent may experience a significant remission of the symptoms of the disease, (with ongoing medication and psychotherapy), another 25 per cent may exhibit mild yet persistent symptoms. However, the larger number of those affected (approximately 50 per cent) will describe having chronic moderate to severe signs and symptoms throughout their lifetime.⁶

The symptomatology profile of schizophrenia comprises what are referred to as positive, negative and disorganized symptoms.^{6,7,11} During an acute phase of the illness, psychotic symptoms predominate and represent the so-called "positive" indications of the illness. These are not good symptoms but rather those aspects of the disease which should not be present in a healthy person. Such positive symptoms will include delusions, hallucinations, thought disturbances and sometimes a catatonic behaviour in the individual. A predominance of positive symptoms is considered to correlate with an ultimately better response to current pharmacological management of the illness. Auditory hallucinations are among the most prevalent of the positive symptoms and may present with the patient hearing the voices of others often making either complimentary, reassuring comments or more often negative, punitive or defamatory comments about them. The latter comments may prove critical in contributing towards any attempts at suicidal behaviour. The reduction in the frequency of hearing these voices is often an important standard by which the effectiveness of a particular anti-psychotic medication is gauged. The cause of these voices is poorly understood but several theories have been put forward to explain this phenomenon. One theory proposes a malfunction in the communication system within the brain whereby, because of an increase in dopamine receptors or the heightened sensitivity of such receptors, perceptions coming in overwhelm the ability of the brain to discern, direct and assimilate each message. As a result, there will be a misdirection of such signals resulting in a disturbance of normal thought, emotional and response processes for that individual.³ Very recent studies using MRI have discovered specific structural and functional abnormalities in the brain regions associated with the capacity of human voice processing in patients with schizophrenia experiencing chronic auditory hallucinations. Identifying and marking such regions may in time elicit more effective treatment strategies.¹²

Delusions are firm convictions perceived by the patient that have no basis in reality. These may reflect one's belief that they have no control over their thoughts or that their thoughts and actions are controlled by someone else. Thought broadcasting, thought insertion, and thought withdrawal comprise this category of symptoms. For example, an individual may believe that as a result of a dental procedure such as the placement of a filling or a

tooth extraction, a transmitter device has been inserted into the tooth or extraction socket. This may require one of many collaborative relationships between the dental health practitioner and a mental health professional to attempt to reassure the patient that such a delusion is completely false. Acts of orofacial and self mutilation have also been described in the literature as occurring during an acute psychotic episode and have taken the form of autoextractions¹³, glossectomy¹⁴, self enucleation of the eye¹⁵ and excoriation of gingival tissues with sharp fingernails¹⁶. In the early studies of schizophrenia, the so-called "negative" symptoms comprised part of the initial subtyping of the illness based on the symptomatology of the disease.¹⁷ It was considered at that time that these negative symptoms correlated more with the chronicity of the disease. Lack of motivation or apathy is unfortunately often confused with simple laziness. This will lead to neglect, not only of one's general self care, but also of oral health care in particular. Blunted affect refers to a flattening of emotional expression but generally does not reflect the individual's inner ability to continue to feel strong emotions and a desire to be receptive to the kindness and consideration of others. Depression and ultimately social withdrawal complete the negative symptom complex and play a role in the high rate of attempted suicides in this patient population.

Disorganized symptoms complete the triad of symptomatology that may be expressed in a patient suffering from schizophrenia. These include a rapid shift of ideas and poor thought relation reflecting an inability to concentrate on one subject for any length of time. Bizarre stereotypical behaviours may be highlighted by facial grimacing, repetitive awkward movements, pacing or even mutism. A summary of the symptomatology associated with schizophrenia is presented in Table 1.

In general, the signs and symptoms of the illness must be present for a least a six-month period including an active phase of the illness where some of the more characteristic psychotic symptoms (e.g. delusions, hallucinations, and bizarre behaviours) are present. Schizophrenia is described as having four phases of existence and as such the signs and symptoms tend to recur in a cyclical pattern with varying severity and frequency.^{3,6} The earliest phase of the illness is referred to as the prodromal phase wherein the commonly described signs of social withdrawal, deterioration in work or school performance, reduced

concentration, irritability and suspiciousness all become manifest. The relapse or active phase of the disease is characterized by the appearance of the so-called positive symptoms including delusions, hallucinations, agitation and bizarre behaviours. An individual may often require hospitalization at this stage of the illness usually for one's own safety as well as for being able to initiate medical treatment and provide rest and nutrition for the patient. During the residual phase of schizophrenia, the negative symptoms become more obvious and include a lack of motivation and emotion (flat affect), poor general and oral hygiene, withdrawal, and poor thought and speech patterns. The final phase that is described for this illness is that of the recovery or maintenance phase where some stability may have been achieved via medical intervention and psychotherapy allowing an individual to slowly integrate back into their social, educational and vocational spheres of life. There is often however a continuous flux between each of the latter three phases of this illness and this unfortunately contributes to the high rate of chronic hospitalization seen in those suffering from schizophrenia.

MEDICAL MANAGEMENT

1. Associated risk factors

Compared to the general population, individuals with schizophrenia suffer from a higher risk of developing significant health problems such as coronary artery disease (CAD), diabetes, obesity, respiratory and genitourinary illnesses.¹⁸⁻²² A multiplicity of factors can be seen as playing a role in this increased incidence of physical illness. These include not only the effects of the illness itself but also the side effects of the antipsychotic medications as well as significant lifestyle differences in this patient population. Mortality data indicate that patients with schizophrenia have a life expectancy which is 20 per cent shorter than that of the general population and this statistic is not fully attributable to the increased rates of suicide and accidents among these individuals.¹⁸ CAD is considered to be the chief cause of the premature mortality rates in this specific patient population.²¹⁻²³ The major risk factors for CAD include smoking, hypercholesterolemia, obesity, hypertension and diabetes and it is these factors that are far more prevalent in the patient with schizophrenia. Almost 70 per cent of patients with schizophrenia smoke versus approximately 25 per cent of the general population.²³ It

Positive symptoms-behaviours that <i>should not be present</i>	Disorganized symptoms	Negative symptoms-absence of behaviour that <i>should be present</i>
Exaggeration of ideas and thoughts (grandiose) Delusions-persecutory type, thought broadcasting, thought insertion, thought withdrawal, being controlled by others. Hallucinations (auditory-e.g. "voices", visual, tactile-electrical, burning, tingling)	Thought disturbances -rapid shifting of ideas, poor thought relation, incoherent speech Bizarre behaviour-ritualistic/stereotypical, gesturing, imitating the speech of others, mutism, pacing.	Disturbances of affect-flat emotions, lack of expression, monotony of speech Impaired interpersonal relationships Lack of motivation, apathy, and social withdrawal. Absence of normal drives, interests <i>including self-care=poor general/oral hygiene (dental caries, periodontal disease, loss of teeth)</i>

Table 1: Symptomatology of schizophrenia

Class	Generic name	Trade name
Phenothiazines	Chlorpromazine	Thorazine
	Fluphenazine decanoate	Modecate
	Trifluoperazine	Stelazine
	Methotrimeprazine	Nozinan
	Perphenazine	Trilafon
Diphenylbutylpiperidine	Thioridazine	Mellaril
	Pimozide	Orap
	Quetiapine* Ziprasidone*	Seroquel Geodon
Butyrophenone	Haloperidol	Haldol
Dibenzoxazepine	Loxapine	Loxitane
Benzisoxazole	Risperidone*	Risperdal
	Olanzapine*	Zyprexa
	Clozapine*	Clozaril
atypical (second generation) antipsychotics		

Table 2: Commonly used antipsychotic medications

is therefore not surprising that the incidence of death from lung cancer is approximately twice that of the general population.¹⁹ The impact of smoking on the oral health of an individual is also significant not only from a periodontal standpoint but also for the increased risk of oral cancer. This necessitates an increased vigilance on the part of the dental hygienist for the early detection of suspicious oral lesions as part of a comprehensive head and neck examination. In particular, such high risk sites as the floor of mouth, ventral surface of the tongue and lower lip must be thoroughly evaluated for each patient.²⁴ In addition, cigarette smoking can interfere with the metabolism and effectiveness of antipsychotic medication requiring the administration and watchful titration of higher doses of these drugs.¹⁹ While lifestyle modifications are critical to reducing these risk factors, patients with schizophrenia face additional barriers in this regard.

2. Medications and side effects

Lack of compliance in taking prescribed antipsychotic medications occurs in over 50 per cent of patients with schizophrenia due largely to both their personal ineffectiveness and intolerable side effects of medications. As well, through a lack of education into the illness itself, many patients feeling better while on specific antipsychotics will decide they are no longer needed and discontinue these drugs. Financial concerns, lack of access to proper medical care including routine screening, as well as receiving less than optimal care during acute cardiovascular episodes are additional hurdles that these individuals may face.²¹

Along with various psychotherapy modalities, social, living and vocational skills training, the use of various psychotropic or neuroleptic medications remains the cornerstone of treatment for schizophrenia, shown in Table 2. No less important will be the degree of social and family supports that individuals receive once discharged from the hospital environment to promote self esteem and a sense of well being.

The first generation or so-called conventional antipsychotics were introduced in the early 1950s and revolutionized the treatment of schizophrenia and the practice of psychiatry in general.^{7,25} These antipsychotics functioned as antagonists of D2 dopamine receptors proving most efficacious against the positive symptoms of the disease. However, these drugs were not without a high rate of side effects including such early extrapyramidal signs as Parkinsonian-like movements (e.g. oral dyskinesias) and akathisia (extreme restlessness).^{6,7}

Oral dyskinesias are abnormal, involuntary and uncontrollable movements affecting mainly the tongue, lips and jaws that will vary in severity and distribution. Such involuntary movement disorders are often drug related and have generated more interest since the advent of the conventional antipsychotic drugs within the past fifty years.²⁶ One subtype of the oral dyskinesias, tardive dyskinesia, is a late stage extrapyramidal effect. Tardive dyskinesia, from the literature studies, has a prevalence rate of 20-25% of those individuals undergoing longterm treatment with antipsychotic (primarily the conventional antipsychotics) medication, all of which are potent D2 (dopamine) receptor blockers.^{6,7,20} Tardive dyskinesia is characterized by rhythmic and the involuntary movements of the tongue (fly-catcher's tongue), face (bonbon sign) and jaws as well as, in some cases, the extremities resulting in fine tremor-like motions of the fingers, hands and feet.⁶ Flycatcher's tongue refers to a darting motion of the tongue socio-economic in and out of the mouth. Bonbon sign refers to a pushing of the tongue against the inside of the cheek as if a piece of candy were being pressed against the cheek wall. These movements may lead to abnormal chewing habits and facial tics. Premature tooth wear, impaired retention of removable prostheses, speech impairment and social embarrassment are some other consequences of this late stage side effect. The incidence of tardive dyskinesia in young adults is between 4 and 5% per year with a risk reportedly 3 to 6 times greater in more elderly individuals with schizophrenia. Risk factors other than age also may include a female predilection as well as a prior history of extrapyramidal reactions to neuroleptic agents.^{6,26}

In most cases, the prevalence of movement disorders as a side effect of conventional antipsychotic medication has been removed by the second generation or "atypical" antipsychotics such as Clozapine, Risperidone, Olanzapine and Seroquel.²⁷ These newer medications have a lower affinity for binding to the D2 receptors with a concomitant lower risk for extrapyramidal adverse effects. At the same time, they demonstrated significant effectiveness against both the positive, disorganized and negative symptoms of schizophrenia.

3. Monitoring for other health risks

Clozapine was one of the first of this category of drugs introduced in the 1980s and is effective in many treatment resistant cases. However, between 1 and 2% of patients receiving Clozapine will suffer from its most serious side effect – agranulocytosis (white cell count less than 3000/mm³).^{9,25,27} The development of this condition does not appear to be dose related nor does it correlate with any

Drug	Adverse effects	
	General	Oral
Conventional (first generation) Antipsychotics • Chlorpromazine • Haloperidol • Perphenazine • Methotrimeprazine	EKG changes, orthostatic hypotension, blurred vision, constipation, nasal congestion, dizziness, skin pigmentation, extrapyramidal symptoms -e.g. Parkinsonian-like movements Malignant neuroleptic syndrome	xerostomia, tardive dyskinesia
Atypical (second generation) Antipsychotics • Clozapine • Olanzapine • Quetiapine • Risperidone	minor sedation, hypotension, sexual dysfunction, Metabolic syndrome: increased incidence Type 2 diabetes, obesity, hyperlipidemia, heart disease. Malignant neuroleptic syndrome agranulocytosis (Clozapine only)	xerostomia, dysphagia, stomatitis, dysgeusia drooling (Clozapine)

Table 3: Adverse effects of antipsychotic medications

known predisposing factors. Patients taking this antipsychotic require weekly blood monitoring to assess for the onset of agranulocytosis which, if diagnosed would result in the immediate cessation of Clozapine. Another side effect reported by over one-third of patients taking Clozapine is hypersalivation. Causation is speculated to occur as a result of the drugs combined antagonistic and agonistic effects on the muscarinic receptors (M3, M4) present in salivary gland tissue with the net result being hypersalivation. Other theories however question the possible effect of Clozapine on deglutition resulting in a pooling of saliva in the mouth and the subsequent development of clozapine induced hypersalivation.²⁵ Overall, this side effect may be highly stigmatizing and functionally disabling for some patients resulting in an increased non compliance to one's overall psychiatric treatment. While the newer second generation agents have been more efficacious than their firstline counterparts in reducing such adverse effects as the extrapyramidal symptoms and managing the entire symptomatology of schizophrenia, these advantages have been increasingly overshadowed by their propensity to contribute to hypertension, excessive visceral fat distribution, and alterations in both lipid and glucose metabolism. This has resulted in an increased risk for coronary artery disease and Type 2 diabetes.^{25,27,28} It is these same risk factors that define the cluster of findings known as the Metabolic Syndrome; a symptom complex seen in greater frequency in patients suffering from schizophrenia.^{19,29} Other risk factors inherent in this illness also undoubtedly play a role in the development of this syndrome and include lifestyle changes, poor diet and lack of exercise. An outline of the more commonly used antipsychotic medications and their adverse effects are shown in Table 3. A rare yet serious side effect of antipsychotic drug therapy is malignant neuroleptic syndrome. Seen in predominantly young male patients, the syndrome is characterized by tachycardia, dyspnea, tremors, muscle rigidity, dystonia, labile blood pressure and a spike in body temperature (up to 41 °C). Symptoms will persist for up to ten days after withdrawal of the particular neuroleptic medication and mortality rates of 10-20% have been reported.⁶

DENTAL MANAGEMENT

Just as any patient presenting with a systemic illness must be thoroughly evaluated, so too should we be able to comfortably assess our patients who present with a history of chronic mental illness. It is important to ascertain among other things an accurate list of current medications, the degree of stability of the illness, issues around the granting of consent and side effects of both the illness and its current medical management. Sample questions that may be used by the dental hygienist in their history taking to elicit this specific information are presented in Table 4. The difficulties inherent in a diagnosis of schizophrenia relate to some of the more typical clinical oral findings. These difficulties include financial hardships from loss of work, high rates of readmission to hospital, lack of family and/or community support networks and the stigma of the disease itself, ultimately contributing to the high rate of dental caries and periodontal disease seen in this group of individuals.^{6,11,30-33} Xerostomia remains a profound oral side effect of many antipsychotic medications further contributing to the decay process particularly the increased incidence of root caries.^{6,7,30,32,34,35} In addition, xerostomia may often result in painful oral ulcerations (e.g. denture related trauma), burning mouth, dysphagia, difficulty in speaking, and candidiasis. Due to the lack of a normal amount of saliva, great difficulty may be experienced in wearing dentures comfortably, impacting not

Sample questions

1. When was your mental illness diagnosed?
2. Which psychiatric medications are you taking?
3. How long have you been taking these medications?
4. Who is the primary care physician currently managing your condition?
5. Do you experience any medication side effects such as dry mouth, burning tongue or drooling?

Derived from Oral Diagnosis Manual, 2007 used by the Department of Oral Diagnosis, Faculty of Dentistry, University of Toronto

Table 4: Sample questions used to enquire about a patient's mental health history

	Interacting drug	Effect
Neuroleptic (antipsychotic) Drugs	warfarin sodium	decrease blood levels of warfarin sodium-lower INR level
	tricyclic antidepressants	increase serum level of both drugs; marked anticholinergic effect
	opioid analgesics	increase sedative effect of opioids; increase risk of respiratory depression
	antihypertensives	increase risk of hypotension
	alcohol	increase risk of hypotension; increase risk of respiratory depression
	anxiolytics	increase risk of sedation; increase risk of respiratory depression
	nicotine	decrease blood levels of all antipsychotics
	anticonvulsants	decrease effects of antipsychotic medications

Table 5: Drug interactions involving antipsychotic medications

only on the patient's overall nutritional status but their psychological status as well. Polypharmacy is often a factor in the pharmacotherapeutic management of psychiatric illnesses including schizophrenia and together these combinations of drugs enhance the signs and symptoms of dry mouth. Often no drug substitution is available upon consultation with the patients' physician or psychiatrist and adjunctive measures are required to help relieve the severity of the dry mouth.

1. Education and clinical care

To that end, preventive dental education remains a critical aspect of dental management in a patient suffering from chronic schizophrenia as with any other chronic mental illness.^{6,7,36} This however is not without some modification on the part of a dental hygienist in light of the possible episodic and recurrent nature of the different phases of schizophrenia. Co-operation may vary considerably as exemplified by a patient's understanding at one time and apparent lack of understanding at another of the importance of oral hygiene and the techniques involved. Non compliance to appropriate dental care may mirror a non compliant attitude to medical intervention in general and it will be these perceptions of need that can prove to be the most challenging for the dental hygienist. This may necessitate more frequent appointment scheduling particularly in those patients suffering from severe xerostomia due to their psychotropic medication. Enlisting the support of family members in the instruction of oral hygiene techniques may be required for those patients who routinely fail to carry out daily oral hygiene practices through lack of motivation or interest. As part of a dry mouth management protocol, commercially available saliva substitutes, e.g. Biotene products (Laclede Inc, California) are recommended as well as salivary stimulants including sugarless gum and candies. Avoiding alcoholic, caffeinated and carbonated beverages helps serve to reduce the intensity of the xerostomia as well as lessen the secondary erosive effects of such beverages in an already compromised dentition. Dietary counselling is

also a paramount objective on the part of the dental hygienist in an attempt to reduce the high caries index. There is often a tendency to avoid the coarser and more textured foods in favour of easily ingested carbohydrate snack foods in someone experiencing a moderate to severe dry mouth. Antibacterial mouthrinses containing chlorhexidine have proven effective in reducing the severity of gingivitis keeping in mind the secondary side effects of transient tooth discolouration and taste alterations with this treatment modality. Application of fluoride varnishes such as Durafluor (Pharmascience, Montreal, PQ) and Cavity Shield (OMNII Oral Pharmaceuticals, Florida) are useful adjuncts in caries prevention. Other fluoride containing products such as Prevident toothpaste (Colgate Oral Pharmaceuticals) and 0.4 per cent stannous-fluoride mouthrinses also comprise a critical part of the preventive armamentarium. Regular scaling, root planning, prophylaxis, and oral hygiene instruction remain the mainstay of any dental hygiene program followed by any necessary restorative, surgical and prosthetic care. Three-month recall intervals may often be required for re-examination, prophylaxis, and topical fluoride rinse/varnish treatments.

Appointment scheduling may also require consultation and coordination with either a patient's social worker or family or both in order to be able to successfully implement an effective recall program.

Local anesthetics with judicious use of a vasoconstrictor can be utilized for most procedures but in order to circumvent a severe hypertensive episode, generally no more than two cartridges of a 1:100,000 solution are recommended.⁶ This would also presume that the dentist or dental hygienist aspirates during injection as well as injecting slowly. Epinephrine in retraction cords or applied topically to control hemorrhage is contraindicated.

Patients taking Clozapine are at increased risk of developing signs and symptoms related to agranulocytosis and as such the dental health practitioner must be alert as to the symptoms of pain (e.g. from oral ulcerations), fever, and sore throat in those patients taking this medication. A prior history of alcohol or street drug abuse or both may also be factors that complicate the dental management of a patient with a history of schizophrenia. Liver function may be irreversibly altered predisposing one to increased risk of hemorrhage, delayed wound healing, increased risk of infection and an alteration in drug metabolism to many of the commonly used drugs in dentistry including acetaminophen, amide-containing local anesthetics and codeine. In addition, dental health care practitioners need to be cognizant of the significant drug interactions that may occur in those patients being managed with antipsychotic medications. These interactions are listed in Table 5.

2. Schizophrenia – developmental or psychotic disorder?

Preliminary research has also proposed the theory that schizophrenia is more of a developmental disorder in which psychosis is present rather than it being a true psychotic disorder. This has arisen through the demonstration of concurrent developmental abnormalities throughout

the body and in particular the oral cavity.^{37,38} Patients with schizophrenia were shown to have a significantly wider palate as well as a greater incidence of other dental developmental abnormalities such as diastemas, rotated teeth, crowding, peg laterals, and interarch toothsize discrepancies. This group of researchers looking at both their evidence as well as that of others involving both physical and neuropsychiatric comorbidity in schizophrenia suggest more of a whole body model to schizophrenia rather than one defined largely on the basis of psychotic symptomatology. Other research has demonstrated a higher prevalence of both bruxism and temporomandibular disorders (TMD) in psychiatric patients, reflecting yet another significant comorbidity to the primary illness.³⁹ Patients with schizophrenia in particular have shown higher pain thresholds and pain tolerance levels than age-matched healthy control subjects. Whether the TMD and signs of bruxism reflect abnormal central nervous system activities or are neuroleptic induced problems remains to be determined. The alteration in pain threshold may lead to delays in diagnosis and treatment resulting in more longterm serious clinical consequences. A summary of oral findings is presented in Table 6.

3. Treatment planning

Treatment planning considerations for the patient suffering from schizophrenia must be both flexible and realistic and in many cases remain aggressive in terms of preventive care. The goal of any treatment plan will be to maintain oral health, comfort and function and in this specific patient population, will often require interprofessional consultation with a physician or psychiatrist in establishing the current pharmacotherapeutic regimens, psychological status and if needed, issues surrounding consent and competency towards treatment.⁴⁰ In addition, considerations for the provision of some sedative modalities prior to undertaking dental treatment would require prior physician consultation in order to prevent any potentiation of side effects of current psychotropic medications. Advanced procedures such as implant therapy may require a more detailed case study and analysis with respect to the degree of xerostomia, level of oral hygiene and in many cases, the availability of financial resources or support.

CONCLUSION

Admitting to having a mental illness is not the same thing as admitting to any other serious health issue since it often results in more suspicion than support. People with schizophrenia as well as those with any other psychiatric illness experience a "double-burden" with their illness including not only the signs and symptoms of their illness but also the social stigma and discrimination that results from having the disorder. This unfortunate stigma and discrimination remains the most tragic reality that faces these individuals. Stigmatization of people with mental disorders has persisted throughout history and is exemplified by distrust, bias, fear, stereotyping, embarrassment, and often avoidance. In turn, this complicates and even reduces the patient's ability to access resources and opportunities for treatment. The end result often leads to

Oral findings

Poor oral hygiene
Dental caries – rampant caries, root caries
Periodontal disease
Xerostomia
Tardive dyskinesia
Dysphagia
Impaired gag reflex
Trauma secondary to acts of self-mutilation (e.g. in acute psychotic states)
Candidiasis (e.g. immunocompromised patients)
Mucosal lesions (e.g. ulcerations secondary to agranulocytosis due to Clozapine)
Ill-fitting dentures; poor denture hygiene; inflammatory papillary hyperplasia
Delusional behaviours (e.g. "transmitters" placed within fillings)
Psychomotor disturbances (e.g. facial grimacing)
Hallucinations-somatic type (e.g. worms crawling in the mouth – in acute psychotic states)

Table 6: Oral findings in schizophrenia

low self esteem, substance abuse, isolation and a sense of hopelessness. Schizophrenia impacts on an individual's quality of life in numerous ways highlighted by a lack of one's personal perception of both general and oral health concerns. Lifestyle habits including an inability to sustain self care as well as socio-economic factors and medication side effects all serve to affect their quality of life in a detrimental fashion.

Current neuroleptic medication regimens and psychotherapeutic treatments have revolutionized the treatment of schizophrenia within the past fifty years. These changes have enabled many individuals with this illness to resume a relatively normal lifestyle from both an occupational as well as an interpersonal perspective. As healthcare professionals, dental hygienists can play a vital role to help continue to deprogram the stereotypical approach that many other patients continue to experience with a diagnosis of schizophrenia and alternatively, exhibit more sensitivity to patient vulnerability factors and psychological problems in particular, as it may relate directly to oral sign and symptom presentation, and ultimately dental treatment planning.

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Your professional growth

cate courses beginning January 2008.

Self-Initiation for Dental Hygienists, another online course, commences on 29 February. This course is for dental hygienists in Ontario seeking professional development to be eligible to apply for self-initiation with the College of Dental Hygienists of Ontario. However it is available to dental hygienists nationally and bilingually, and will provide comprehensive knowledge about the dental hygiene model of care using audio and video technology in its presentations.

Carpe diem. 

Votre croissance professionnelle

activité à deux endroits à l'automne. L'Atelier sur la pratique indépendante, qui aura lieu le 1^{er} novembre à Vancouver, terminera le calendrier d'activités de l'ACHD.

Les récentes modifications législatives de plusieurs juridictions canadiennes permettent maintenant aux hygiénistes dentaires d'entreprendre et d'établir leur propre pratique d'hygiène dentaire. Afin de procurer à nos membres les outils et les connaissances nécessaires pour lancer leur propre pratique, en cabinet ou mobile, nous lancerons en janvier 2008 sur Internet une série de cinq cours menant à un certificat.

L'Initiation personnelle à l'hygiène dentaire, autre cours en ligne, commencera le 29 février. Le cours s'adressera aux hygiénistes dentaires de l'Ontario qui souhaitent parfaire leurs connaissances afin d'être admissibles au cours d'initiation personnelle du Collège des hygiénistes dentaires de l'Ontario. Il sera cependant accessible également à l'échelle du pays, dans les deux langues officielles, et présentera à l'aide des techniques audiovisuelles un ensemble complet de connaissances sur les modèles de soins.

Carpe diem. 

National competencies for dental hygiene entry-to-practice

Susanne Sunell^{*}, EdD, RDH; Fran Richardson[‡], BScD, MEd, MTS, RDH; Brenda Udahl[§], BV/TEd, MHRD, SDT, RDH; Linda Jamieson[†], MHS, BA, RDH; Dianne Landry[∇], BEd, RDH

ABSTRACT

Objective: While the dental hygiene profession has several national documents pertaining to entry-to-practice issues, it lacks a common national standard. The need for such a standard is becoming increasingly important with the divergence of entry-to-practice educational models across Canada, programs being implemented in new jurisdictions, and the entrance of multiple post-secondary organizations into the educational sector. The objective of the study was to articulate the first draft of entry-to-practice competencies that would be used to support dental hygiene education, accreditation, examination and regulation. What are the essential national competencies for entry-to-practice into the Canadian dental hygiene profession? **Methods:** A 3-day workshop was held in February of 2007 with twenty-two key dental hygiene informants from across Canada. The initial product from the workshop was then refined and shaped through two feedback loops with the participants. **Results:** The group developed a new framework for dental hygiene competencies based on the literature in interprofessional education. The core abilities focus on dental hygienists as professionals, communicators and collaborators, advocates and managers. The competencies related to the specialized client services focus on dental hygienists as clinical therapists, oral health educators and health promoters. **Conclusion:** This draft competency profile better aligns the dental hygiene profession within the context of other health professions. However, it is still in an embryonic stage and needs to be validated with a larger group of dental hygienists. It has the potential to be a positive force to support greater consistency of educational, and possibly regulatory, standards across Canada.

RÉSUMÉ

Objectifs : Bien qu'elle ait à l'échelle nationale plusieurs documents traitant des titres de compétence pour l'accès à la profession, la profession des hygiénistes dentaires n'a pas encore de normes communes pour l'ensemble du pays. Le besoin d'un tel document prend de plus en plus d'importance, vu la divergence des modèles de développement des compétences à travers le Canada, la mise en place de programmes sous de nouvelles juridictions et la multiplication des organisations post-secondaires dans le secteur de l'éducation. Cette étude a donc pour objet d'élaborer une première ébauche articulée des compétences requises pour accéder à la profession et susceptibles de sous-tendre la formation, l'examen, l'agrément et la réglementation en matière d'hygiène dentaire. Bref, quelles devraient être les compétences essentielles requises à l'échelle nationale pour accéder à la profession d'hygiéniste dentaire au Canada ? **Méthodes :** Un atelier de trois jours a été tenu en février 2007, réunissant vingt-deux informatrices de toutes les régions du pays. Il en est ressorti un premier jet qui a été peaufiné par deux boucles de contrôle effectuées auprès des participantes. **Résultats :** Le groupe a élaboré un nouveau cadre de compétences en hygiène dentaire, basé sur la littérature en matière de formation interprofessionnelle. On a souligné que les aptitudes principales de l'hygiéniste dentaire devraient porter sur la profession, la communication, la collaboration, la représentation et l'administration. Les compétences de l'hygiéniste dentaire en matière de services spécialisés auprès de la clientèle portent sur la thérapie clinique, l'éducation en santé dentaire et la promotion de la santé. **Conclusion :** L'ébauche du profil des compétences situe mieux la profession d'hygiéniste dentaire dans le contexte des autres professions de la santé. Toutefois, elle en est encore à l'étape embryonnaire et a besoin d'être validée par un groupe plus important d'hygiénistes dentaires. Elle a le potentiel de devenir une force positive pour appuyer une plus grande cohésion de la formation, sur le plan des normes, et peut-être de la réglementation, à travers le pays.

Key words: dental hygiene, competencies, national standard

Over the years different national dental hygiene organizations have established educational standards to support their work. These are found in various forms such as the requirements for accreditation,¹ the competency statements for the national examination,² a framework for education and practice standards articulated by our professional association,^{3,4,5} and the learning outcomes developed by the educators' organization.⁶ These documents express the concept of entry-to-practice in different ways. The dental hygiene profession does not have a common national standard associated with entry-to-practice for the profession. While the various dental hygiene regulatory authorities are responsible for developing their own standards of practice, a common core national standard is considered preferable for mobility purposes.

The need for such a standard is becoming increasingly important with the divergence of entry-to-practice educational models across Canada, programs being implemented in new jurisdictions (e.g. New Brunswick), and the entrance of multiple post-secondary organizations into

the educational sector. Post-secondary organizations now include private and public organizations as well as colleges and technical institutes, university-colleges and universities. Entry-to-practice programs also vary in length ranging from 2-3-year diploma programs as well as one 4-year baccalaureate program.

National competency documents exist in many health professions; however, their integration across national organizations varies. Many tend to be organization specific documents as has been the case in dental hygiene.^{2,6} Dentistry has developed a national standard regarding entry-to-practice for general practitioners and this is used

* University of British Columbia, Vancouver and Omni Educational Group, Ltd.; ‡ Canadian Dental Hygienists of Ontario, Toronto;

§ SIAST, Wascana Campus, Regina, Saskatchewan; † Dental Hygiene Program, Georgian College, Orillia, Ontario and the Council for CDHO; ∇ consultant CDHA, DHEC, CDHO, NBDHA and NSDHA.

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Correspondence to: S.Sunell, University of British Columbia, 2329 West Mall, Vancouver, BC V6T 1Z4; ssunell@interchange.ubc.ca

by dentistry's national organizations.^{7,8,9} It provides a foundation for national accreditation, education and examination as well as provincial regulation. Given the diversity of dental hygiene education and regulation in Canada, a similar standard for the profession is seen as integral to the work of national and provincial organizations in these times of rapid flux and transformation.

National dental hygiene organizations identified the need to articulate the knowledge, skills, attitudes and judgments required for entry-to-practice to the profession. The competency approach provides a vehicle through which to articulate this entry-to-practice standard^{10,11,12,13} which can then be used to develop curriculum, assess programs, examine graduates and develop provincial regulatory standards as well as continuing competency programs.¹⁴ The articulation of core competencies is also expected to lead to an understanding of the competencies shared by all health professionals.^{15,16} It is expected to support inter-professional education initiatives given that a major barrier to such education is the lack of understanding of shared competencies.^{17,18,19} Ultimately the core competency profile is designed to help build the capacity of dental hygienists to support the oral health needs of the Canadian public.^{20,21}

COMPETENCIES

Why competencies?

The ability movement arose from a meshing of several related but unique discussions in the field of education. It was shaped from discussions surrounding outcomes based education (OBE), competency based education (CBE), learning outcomes and authentic assessments.²²⁻²⁴

OBE was developed in response to the mandate of secondary education to create "good citizens" and "good employees."^{25,26} The OBE movement arose from concerns that American high school graduates did not possess the skills and knowledge to integrate into economic and community life. In this literature, learning outcomes are described as "high-quality, culminating demonstrations of significant learning in context."²⁵ This definition places an emphasis on the proof of outcomes, and on demonstrations of learning. It also identifies that these demonstrations focus on "significant" graduate outcomes and must reflect a notion of "quality" in an authentic practice environment. The learning outcomes are defined in broad, general terms so as to reflect cumulative learning upon graduation from an educational program, learning which is reflective of life in "real world".

This fuelled discussions about authentic assessments found in evaluation literature. Educators identified the need to focus on coherence of the educational experience and suggested that this could be achieved by focusing on the connections between learning and assessments.²⁷ Abilities-based education was viewed to challenge educators to reassess existing assessment strategies.^{28,29} Current approaches to the evaluation of learning were not seen as meaningful when the aims of education were intellectual, moral and personal development.³⁰ From this perspective an abilities approach promoted a realignment of the curriculum, implementation and assessment strategies to harmonize these elements.

During the 1970s CBE was introduced into many vocational and occupational programs in postsecondary education. The CBE movement was intended to make education more relevant to the practice world of business and the trades.²⁸ It was strongly influenced by the behaviourist approach to learning with its emphasis on process guidelines. Proponents of CBE suggested that all learning could be broken down to discrete tasks which could be described in measurable, behavioural steps.^{31,32} Initially CBE was criticized for its reductionist and behaviourist approach.³³ However, as educators worked with the competency framework, it evolved from descriptions of discrete technical tasks to explanations of complex exit skills for graduates of professional programs. Reynolds and Salters³⁴ suggest that several competency models have emerged, with the first ones focusing on behaviour at the cost of knowledge and understanding. Further models adopted a more holistic approach to include additional elements affecting performance such as understanding, knowledge and values.^{14,35,36}

In Canada the first dental hygiene competencies were developed at the national level in the 1980s and they focused largely on the technical aspects related to clinical services. Dentistry also followed that route in the 1990s although their competency model reflected a shift on the continuum from competencies to learning outcomes; their model articulated more general outcomes.^{13,14} The movement of the competency approach from discrete skills to program exit skills made the differentiation between learning outcomes and competencies fuzzy.

In the 1990s the concept of learning outcomes which emerged from the OBE movement was introduced into Canadian post secondary education in many provinces in association with discussions about quality and accountability.³⁷⁻⁴⁵ Learning outcomes were viewed as a strategy for educational reform.^{24,33,38,40} They were described as the core of a reform approach which included prior learning assessment strategies and a seamless educational system.^{37,42,44} They were perceived as a vehicle to provide relevant and meaningful programs centred on learners' needs.^{29,39,46,47} The language of a learning outcomes approach was believed to align more readily with academic programs although many in the academic areas resisted this approach for fear that it represented an economic, work-based approach rather than a liberal, arts approach.⁴⁸⁻⁵² Learning outcomes were perceived as an approach to "dumb down" and control curriculum by government policy makers.

During this time the dental hygiene educators in Ontario and British Columbia shifted to a learning outcomes approach as the model decreased the emphasis on the small technical skills, and more clearly articulated and emphasized the cognitive abilities associated with the profession.⁵³ Part of this shift also related to strategic issues; funds were available for the articulation of learning outcomes and this allowed for discussions about dental hygiene education. At the national level the discussions continued to revolve around competency statements through the examination organizations and the Commission on Dental Accreditation of Canada (CDAC). In the 2001 revision of the CDAC dental hygiene requirements,

the concept of learning outcomes was included as a synonym with competencies.¹ At that time the competency statements developed through a collaborative approach by dentistry were also embedded in the CDAC requirements.

Defining the outcomes of dental hygiene education was also a national priority through the Association of Canadian Faculties of Dentistry (ACFD), Canadian Dental Hygienists Association (CDHA) and Dental Hygiene Educators Canada (DHEC). ACFD initiated work in this area through the implementation of a strategic planning session directed towards the development of educational standards for dental hygiene and dental assisting education in Canada.⁵⁴ The recommendations from this workshop encouraged national dental hygiene organizations to take further action to support the work of Canadian dental hygiene educators. CDHA revised its practice standards⁵ and developed a Policy Framework for Dental Hygiene Education in 1998.² This was followed by the establishment of a Task Force on Dental Hygiene Education⁵⁵ whose members articulated learning outcomes for dental hygiene education at the diploma, baccalaureate, masters, and doctorate levels. DHEC became involved in validating the CDHA draft learning outcomes by conducting a study directed towards the articulation of learning outcomes for Canadian dental hygiene education at the diploma and baccalaureate level.⁶ The work of both CDHA and DHEC used the learning outcomes language.

Language is used to shape discussions and the dental hygiene profession is ultimately striving to be more fully recognized by other professions and disciplines. Using the learning outcomes language may help communicate more effectively with many of the disciplines whose members often pale when "competencies" are mentioned. On the other hand, the various concepts surrounding the outcomes of education have merged over time as they have been shaped by different professions. This can also lead to communication challenges between dentistry and dental hygiene in Canada given that dentistry adopted competencies at a time when dental hygiene was moving away from this concept; the international discussions about dental hygiene abilities also frame them in terms of competencies.^{56,57} However, communication challenges surrounding these terms are not unique to the dental hygiene profession. To better facilitate communication, many educators now use the term "abilities" and avoid the diverse terms used to describe "outcomes" of learning.

Currently there appears to be an increasing focus on the concept of "competencies" through the federal and provincial ministries, particularly those associated with health care. For example, the Public Health Agency of Canada is currently developing Pan Canadian Core Competencies for Public health, and encouraging all the professions in public health to develop disciplinary competencies to complement these core competencies (http://www.phac-aspc.gc.ca/php-ppsp/core_competencies_for_ph_index_e.html). It appears that health professions in Canada are adopting the competency language, and the language of learning outcomes may be waning perhaps because of its association with accountability movements.

The discourse has now shifted to the development of capacity of people working in the health sector and this appears to have been influenced by the Severe Acute Respiratory Syndrome (SARS) issue as well as other global health safety concerns. People are looking at the commonalities among health professions with regard to abilities while acknowledging that each profession has some unique clinical abilities to bring to client care.

Ultimately the workshop participants were looking at expressing a national standard through the articulation of ability statements. The label selected for these statements was a political rather than a pedagogical decision. While it is important to have a context for understanding ability statements, the actual content of the ability statements involve more challenging issues and questions.

What competencies?

Regardless of the term applied, discussions about the outcomes of learning focus on what learners "know," "value" and are "able to do." The outcomes are described in terms of complex abilities that are multidimensional as opposed to simple, unitary constructs.^{23,39} A main theme in debates about curriculum is the idea of bringing coherence and structure to education.^{24,58-60} This discussion rests on the premise that traditional disciplinary approaches have tended to fragment curricula in ways that may no longer be relevant to our knowledge society. An abilities perspective is viewed as providing a way of realigning the curriculum, implementation and assessment strategies to harmonize these elements.²⁷

The word "competency" or "outcome" places emphasis not so much on the intentions of education, but on the results of the learning experiences.⁶¹ This is not a trivial distinction but a challenging one. This distinction is critical to the understanding of the competency profile arising from this current study. These statements do not reflect the intentions and hopes of educators; they are intended to be entry-to-practice competencies which graduates of dental hygiene programs must reliably demonstrate.

Although consensus has not been achieved regarding the specific terminology to be used, analysis of literature indicates there is some agreement about the general abilities required to live and work in a world of constant change. The most broadly stated abilities are articulated in the UNESCO document *Learning, The Treasure Within*.⁶² Four pillars are described as the foundations for education: learning to know, learning to do, learning to be, and learning to live together. Other literature tends to focus on more specific abilities but generally the abilities reported in the Canadian literature^{44,63,64}, are similar to ones recorded in international documents from the United Kingdom,⁶⁵ Australia,⁶⁶ New Zealand,⁶⁷ the United States⁶⁸⁻⁷³ and Europe.³⁶ An analysis of these documents suggests that they have the following abilities in common:

- Communication (oral, written, technology).
- Interpersonal abilities (working with others).
- Critical thinking and problem solving.
- Managing self (responsibility, ethical approach, flexibility, adaptability).
- Ability to learn independently (accessing information, numeric literacy, computer use, reading and writing).

There appears to be general agreement that these abilities are integral aspects of post secondary education ranging from diploma to graduate programs. It is only logical that these abilities also form the foundation for dental hygiene education.

The American literature in health care also provides insights into the abilities that would support graduates to meet the needs of our diverse communities.^{74,75} This was supported by further discussions in the American,^{57,76} as well as the Canadian dental hygiene literature.^{53,55,77} These documents emphasize that health care professionals will be providing care for clients who are culturally diverse and who will present with complex health conditions and needs. They also highlight the need for evidence-based and interprofessional approaches to providing care.

There is an increased emphasis in ability statements with regard to informatics and how to manage the large volume of information available to professionals and the public.^{71,78} Professionals are described as having an increasing role to assist clients in the interpretation of information. There is also an increased focus on issues such as leadership⁷⁹⁻⁸² and entrepreneurship.⁸³ Overall there is substantial literature in the field of ability based education to support the development of national dental hygiene competencies. The challenge is to create a profile that will support the work of diverse national and provincial dental hygiene organizations.

The overall project and this study

The initial idea for this project and this study came from the Board of DHEC. The members of the board were developing a plan to review and revise the learning outcomes which had been developed for diploma and baccalaureate dental hygiene programs.⁶ During discussions with an educational consultant it was decided to broaden the scope of the project and use a collaborative approach to the articulation of these ability profiles. In June 2006, a meeting of national organizations was scheduled in conjunction with the CDHA national conference. Based on the interest expressed at that session, CDHA funded a further meeting of these interest groups in September 2006, in Ottawa.

The Project Planning Committee (PPC) which was established through these two meetings included representatives from the following organizations:

- Canadian Dental Hygienists Association (CDHA),
- Commission on Dental Accreditation of Canada (CDAC),
- Dental Hygiene Educators Canada (DHEC),
- Federation of Dental Hygiene Regulatory Authorities (FDHRA), and
- National Dental Hygiene Certification Board (NDHCB).

This is a collaborative project involving all interest groups as equal partners, and it represents the first such collaboration in Canadian dental hygiene profession. The public also has input through their membership on the various organizations supporting the project. The PPC was involved in designing the project, supported by an educational consultant who was hired to manage the implementation phase. All PPC members have contributed

to the funding of the project and additional funding has been accessed through the Dentistry Canada Fund and the Canadian Foundation for Dental Hygiene Research and Education.

This article presents the findings from the first phase of the collaborative project which was implemented as an action research study. The focus of the study was directed to the articulation of a national entry-to-practice standard for the dental hygiene profession, one that will then be used to develop curriculum, assess programs, examine graduates and develop provincial regulatory standards as well as continuing competency programs.

METHODS

The objective of the study, as well as the overall project, is to articulate entry-to-practice competencies to support dental hygiene education, accreditation, examination and regulation. The study was guided by the following questions:

- What are the essential national abilities for entry-to-practice into the dental hygiene profession in Canada?
- What do new graduates need to know and be able to do to provide appropriate dental hygiene services for the Canadian public?

The development of the competency profile consists of three phases including the following:

Phase 1: workshop. This involved a 3-day workshop in February 2007 with 22 key informants from the dental hygiene profession, described in more detail below.

Phase 2: web-based survey. Phase 2 included a web survey based on a purposeful sampling approach (n=707). Study participants were selected on the recommendations of the national dental hygiene organizations involved in the project. The sample calculation was based on the assumption of an 90 per cent power level to detect a 1.5 difference on a 10-point scale and a 5 per cent alpha.

Phase 3: focus groups. The third phase will involve 3 focus groups (2 for anglophones and 1 for francophones) conducted by teleconferences to assess the data from the survey and finalize the ability statements.

Given the need for the development of a national consensus about these competencies, it was important to include several phases to allow for diverse input. McDougal et al.⁸⁴ found a combination of approaches to be effective in defining health outcomes; participants in the McDougal study expressed a high rate of satisfaction with the outcomes and the process. Others suggest that focus groups are effective in triangulating results from qualitative approaches,⁸⁵ and providing a check in long studies to ensure that the meaning of questions has not changed over time.⁸⁶

The three phases complement each other and are expected to provide diverse and rich data to support the development of the competency profile into a product that will support the work of our national dental hygiene organizations.

This current article is directed to Phase 1 of the project which involved a 3-day workshop directed to the development of the draft profile. The PPC members were asked to submit recommendations for workshop participants

focused on the following characteristics:

- Geographic location.
- Type of practice experience.
- Years since graduation.
- Educational profile.
- Knowledge of the profession based on involvement in professional activities.

Once the data had been compiled, the PCC selected and organized the participants into working groups of three people with one group having four members. This task was accomplished through a PCC teleconference. Each working group included a person with a history of the profession and a person who would bring new ideas and a fresh perspective to the discussions. While each participant did not represent a specific organization, the general profile of the participants was such that our national dental hygiene organizations felt their views were heard. Table 1 gives information about the general profile of participants.

The 2002 framework of the *CDHA Dental Hygiene Definition and Scope*⁵ document was used as the basis for the workshop. The participants were organized into small working groups based on the CDHA defined areas of responsibility including: general professional abilities, clinical therapy, health promotion, education, change agent, research and administration. Workshop participants were assigned to a working group based on their practice experience and knowledge.

The CDHA framework was used to stimulate discussions about entry-to-practice dental hygiene abilities, but participants were encouraged not to be limited by the framework and to shape the profile as needed. Literature was made available to the participants prior to the meeting; workshop participants were assigned to read specific documents and articles to ensure that all the literature had been read by one member of each small working group. Participants were also encouraged to bring their own resources to the workshop.

The workshop commenced with an orientation during which the workshop participants discussed the background of abilities based statements, identified the values that underpin entry-to-practice abilities and brainstormed issues relevant to the development of the profile. It was important for all participants to clearly understand the parameters of the overall project and their role in Phase 1.

This was followed by small group work in the afternoon in the specific CDHA areas of responsibility. The groups were each assigned a room for their work and laptop computers were available for documentation. Two workshop facilitators circulated among the groups.

The files from each working group were collected at the end of the session, analyzed by the workshop facilitators and compiled for the participants to review the next morning. The facilitators identified themes and patterns from each day's work, and proposed a variety of ideas and questions for consideration by the workshop participants. The same schedule applied to the following two days.

Through these discussions emerged a draft profile and a definition of the dental hygiene profession. The final afternoon session included a brainstorming session of ongoing issues that needed to be addressed and the development of a plan to further refine the document. Following the work-

Interest group	Numbers
FDHRA	4
CDAC	2
NDHCB	2
CDHA	2
DHEC / Educators	
Nova Scotia	1
Quebec	2
Ontario	4
Manitoba	1
Saskatchewan	1
Alberta	1
British Columbia	2
Total	22

Table 1: General profile of workshop participants

shop two further feedback loops were implemented with the workshop participants through email. Fourteen participants responded to the first round, and 11 responded to the second round. The resulting draft #5 formed the basis for the Phase 2 web-based survey implemented in the fall of 2007.

Lewin is often cited as the originator of action research more than 50 years ago.⁸⁷⁻⁹¹ His writings included the ideas of "action research", "research in action" and "cooperative research."⁸⁸ His work and the work of others suggest that action research includes a cyclical process directed towards a change intervention. It is often also described as a spiral process of fact finding, conceptualization, planning, action and evaluation of results.^{87,88,91} The activities through the PPC meetings and ongoing emails, and the workshop reflect such iterations, and these are expected to continue in the next phases of the project. The February workshop can be considered the first cycle of an action research project.

Discussions about action research involve interventions and these interventions take many shapes. Acts of communication may take the form of reconceptualising an existing situation or articulating a desired future.⁹¹ The draft competency profile represents such a reconceptualization. However, Susman and Evered⁹¹ also identify how these very communications also limit other possibilities. The decision to focus on entry-to-practice directed attention to dental hygiene curriculum at the foundational level and limited discussions about baccalaureate and graduate dental hygiene curricula; a deliberate decision was made to avoid discussions of credentials and program length in an effort to establish foundational competencies.

The collaborative characteristic involved in action research is often identified as a feature which differentiates it from other applied research approaches.^{88,90,92} This is reflected by the notion of doing research "with people" in contrast to doing research "on them."⁹³ However, the extent of the participants' involvement can vary tremendously.⁸⁷ Sanders and Waterman⁹² talk about the responsive and flexible characteristics of the process. The plan for this project was shaped by the PPC and the workshop participants as Phase 1 was being implemented; as

CDHA areas of responsibility ⁵	Study domains	Harmonizing model ¹⁹
	Core abilities	
Professional	Professional	—
—	Communicator and collaborator	Communication Collaborative practice
Research	Critical thinker	—
Change agent	Advocate	Consultation Cooperation
Administration	Manager	Coordination
	Dental hygiene services	
Clinical therapy	Clinical therapist	—
Education	Oral health educator	—
Health promotion	Health promoter	—

Table 2: Comparison of domain frameworks

well workshop participants provided input to the other elements of the project. They made their own choices with regard to the extent of their involvement as evidenced by the data related to the feedback loops. While the facilitators were not members of a small working group, they participated in the discussions of the small groups as well as the overall group. This article is evidence of the ongoing collaboration between the project coordinator or researcher, the PPC members, the workshop facilitator and the participants.

Like other types of research, the goal of action research is to create new knowledge^{88,92} with an emphasis on understanding and learning.⁹⁴ Action research has been identified as a valuable methodology for redesigning curriculum.⁹⁵ The workshop participants were engaged in a melding of knowledge from the literature and their diverse practice experiences similar to the project implemented by Booth⁹⁶ for the development of gerontology clinical guidelines in nursing. Booth describes the mix of nurses from diverse practice context as being a major strength of the study's methodology. The PPC strove to achieve such diversity by including people from clinical practice, public health, hospital settings as well as from educational and academic contexts.

Overall the project involves longitudinal knowledge construction with its emphasis on gradual learning.⁸⁷ Action research provides a way of developing new knowledge which is situational and futuristic;⁹¹ hence it is well adapted to the goal of this project.

RESULTS

The product of this study is the draft competency profile which emerged from the workshop discussions. Having a clear definition of the dental hygiene profession was an integral component of this project. The following definition emerged:

Dental hygienists “are primary oral health care providers guided by the principles of social justice who specialize in services related to:

- clinical therapy,
- oral health education, and
- health promotion.

Dental hygienists provide culturally sensitive oral health services for diverse clients throughout their life cycle. They work collaboratively with clients, guardians and other professionals to enhance the quality of life of their clients and the public.”

Participants developed the entry-to-practice competencies by clustering ability statements under domain headings. Together the domains and their associated abilities form the entry-to-practice profile. The domains were divided into core abilities and abilities related to the client services provided by dental hygienists. The core category includes abilities which are common to the provision of all dental hygiene services and which are shared by other oral health and health care professions. The description of these core abilities is then followed by the client service abilities which articulate the specialized services provided by dental hygienists, shown in Table 2.

During the course of the Phase 1 workshop participants shifted away from the CDHA areas of responsibility and explored domain headings used in a variety of the reference documents. Four domain headings in the core abilities were shaped to better align with the literature in the health professions. Table 2 shows a comparison between the study domains, the CDHA's areas of responsibility and the harmonizing model¹⁹ which was developed from the analysis of ability statements in several Canadian health professions. There were seven small working groups and eight domains articulated.

Each of the domains includes 14-15 ability statements to support the domain role. The inclusion of all the ability statements is beyond the scope of this article. However, Table 3 provides an example related to the role of communicator and collaborator, a role which received more emphasis than in previous Canadian dental hygiene documents.

The draft competency profile is currently nine pages long, with an introductory page supported by eight domains, each one page in length. This draft formed the basis for the questions in the Phase 2 web-based survey implemented in the fall of 2007.

DISCUSSION

During the PPC meetings the focus of the initial project shifted from the revision of diploma and baccalaureate abilities, to the articulation of entry-to-practice abilities without reference to a particular Canadian educational model. What do new graduates need to know and be able to do to provide appropriate dental hygiene services for the Canadian public? This parameter was frequently reinforced and discussed during the workshop; it made the work more challenging as every item needed to be oriented to this entry-to-practice criterion. Participants wanted to create a meaningful profile, one that was relevant to current dental hygiene practice and would be useful for a variety of purposes.

The facilitators were mindful that it was important to provide some structure to the activities associated with the workshop. However, the participants were frequently

reminded not to let the structure dominate their vision and their work. During the course of three days, participants gradually moved away from the CDHA framework identified in the *Dental Hygiene Definition and Scope*⁵ document and integrated elements of the harmonizing model developed by Verma et al.¹⁹ This harmonizing model was developed through an analysis of ability statements in medicine, nursing, occupational therapy and physiotherapy in Ontario. This work is now being continued with other health professionals such as pharmacy, dentistry and social work with the objective of identifying shared abilities to support interprofessional education (email communication with Dr. Verma, January 12, 2007). Some of the domains of the harmonizing model appeared to align well with the ability statements created during the workshop but a plethora of other documents were also referenced. The domain themes found in health professional literature were viewed as being more appropriate for the articulation of entry-to-practice abilities than some of the currently identified CDHA areas of responsibility.

The alignment of language to the competency model and the integration of aspects of the harmonizing model¹⁹ were also viewed as prudent political decisions to better position the dental hygiene profession in the context of other health professions in Canada. The dental hygiene profession needs to identify the shared abilities we have with other professions. As with many other health care professionals, dental hygiene education often occurs in isolation with a subsequent expectation that all professionals will then work collaboratively in various settings. As Carlisle et al.¹⁷ questioned in their article title: *Do none of you talk to each other?* A document to support discussions about shared competencies was deemed to be important for furthering intra- and inter-professional educational opportunities for dental hygiene students. It also appears prudent to align ourselves with other health care professionals so that we can encourage greater understanding of the respective profession roles, and ultimately provide comprehensive client care.

The group developed a new domain framework for dental hygiene competencies based on the literature in interprofessional education. The core abilities reflect the shared abilities dental hygienists have with other health professionals but they are fleshed out within a dental hygiene context. Verma¹⁹ et al. suggest that shared abilities identify the elements of the social contract between the public and self regulating professionals. This is supported by *Codes of Ethics* at the provincial, national and international level which highlight dental hygiene responsibilities. These documents address issues of professionalism, accountability, advocacy and general beneficence at the individual and community level.^{97,98}

The description of these core abilities is then followed by the client service abilities which articulate the specialized services provided by dental hygienists. These roles come more directly from the CDHA framework.⁵ However, they have also been modified to a degree. The education focus was directed to "oral health" to better reflect our content expertise. The health promoter role was shaped more broadly to reflect our focus on oral and general health promotion. This then highlights the reality that

Study domain: the dental hygienist as a communicator and collaborator

The entry-level dental hygienist has reliably demonstrated the ability to:

1. Use effective verbal, non-verbal, visual, written, and electronic communication.
2. Demonstrate active listening and empathy to support client services.
3. Select communication approaches based on clients' characteristics, needs, and linguistic and health literacy levels.
4. Consider the views of clients about their values, health and decision-making.
5. Facilitate confidentiality and informed decision-making in accordance with applicable legislation.
6. Use computer technology to access electronic resources, and enhance communication.
7. Investigate the role of governments and community partners in promoting oral health.
8. Inform other professionals about dental hygienists' scope of practice.
9. Respect others' scope of practice in relationship to that of dental hygienists.
10. Work with others to assess, plan, implement, and evaluate services for clients.
11. Foster team relationships to support client services.
12. Function effectively within oral health and interprofessional teams and settings.
13. Apply knowledge of common risks to inform public policy and educate practitioners and the public.
14. Act as a knowledge source for clients, professionals and the public to gain knowledge about oral health and access to oral health care.

Table 3: Example of abilities to support the domain role of communicator and collaborator

dental hygienists perform a supporting role for the health promotion initiatives of other professionals.

As with any typology there are overlapping areas and limitations: the domains do not reflect discrete roles. In essence our entire scope of practice could be articulated within the context of professionalism. That is what happened during the workshop. The professional domain became so large that the small working group clustered abilities into themes within this domain. The size of this domain made it challenging to understand. Hence elements were shifted among the various domains and the domain itself was subdivided as well. The current document still includes many areas of overlap and perhaps redundancies. However, it was recognized that further validation activities would involve a larger group who could shed light on these issues and further shape the competency profile.

The areas of communication and collaboration were extracted from the professional domain. The preference was for a one-theme domain, but it presented challenges as the participants could not decide which of the roles to

emphasize—the role of communicator or collaborator. Communication is a broad ability extending beyond the notion of collaboration. However, the group also wanted to clearly emphasize the collaborator role. Adding another domain to the competency profile was rejected given that it enlarged the overall profile. The best solution was to use both terms in one domain, placing the larger ability first.

The development of a domain in the area of leadership was also explored. While the participants recognized that leadership could take many forms, both formal and informal, they were also concerned with authentic measurement issues within the context of the entry-to-practice level. The solution was to embed this role within the context of advocacy in particular but other domains as well. While this role is present, its emphasis as a domain was considered to be unrealistic at an entry-to-practice level.

The workshop participants shifted their thought patterns towards the themes in the health professions' literature as they believed these themes more accurately reflected entry-to-practice, domains. The CDHA areas of "research and administration" were perceived to be more reflective of career paths for dental hygienists rather than entry-to-practice level abilities. The decisions in these domains were probably the most controversial and challenging as they moved the focus away from the CDHA framework⁵ in a substantive manner. The move from "change agent" to "advocate" was more of an operational shift to support clarity. However, the combination of shifts does represent an important change in the way Canadian dental hygienists articulate their roles.

The initial competency profile developed in the 1980s was focused on discrete clinical skills such as instrumentation and fluoride application. The shift to learning outcomes resulted in the creation of broader ability statements^{6,55} with more emphasis on the critical thinking processes that were not as readily evident in the initial national competency document. This current competency profile reflects a shift towards more detail, but not the same type of detail as in the initial competency document. It reflects a balance among the previous national documents.

CONCLUSION

This study was the first step in creating overarching ability statements that reflect a national standard for entry-to-practice into the dental hygiene profession. The product created aligns with current literature in the health professions with a particular emphasis on the articulation of shared abilities. The profile is, of course, in an embryonic phase and requires further validation by a larger group of dental hygienists.

If validated, the competency profile does represent a substantive shift away from the CDHA areas of responsibility so it has the potential of creating a ripple effect of change in many organizations, particularly educational organizations which often rely heavily on the CDHA framework. The competency profile is anticipated to support the work of various provincial and national organizations. These organizations will need to further shape the profile given that each organization may require a different level of specificity for its work. The profile has

the potential to be a positive force to support greater consistency of educational, and possibly regulatory, standards across Canada.

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CHDA staff

WORK STRESS AMONG HEALTH CARE PROVIDERS¹

In 2003, health care providers comprised 6 per cent of the Canadian work force aged 18-75 years. Nearly half of these workers reported that most days on the job were “quite” or “extremely” stressful. This compared with 31 per cent of all other employed people. One in five (19 per cent) dental hygienists suffered high job stress, and at the upper end of the scale were head nurses with two-thirds (67 per cent) reporting stressful work conditions.

Work-related factors

1. The likelihood of high work stress was positively related to income. About half of health care providers whose personal income was \$40,000 or more reported high work stress, compared with 28 per cent of those with incomes less than \$20,000, and 42 per cent of those in the \$20,000 to \$39,999 range.
2. Logistical features of the job, such as shifts and number of hours worked.
3. Work stress peaked at ages 35 to 54 accounting for 50 per cent of health care providers in this age group, owing to greater responsibilities.
4. Three-quarters (75 per cent) of health care providers who were “dissatisfied” or “very dissatisfied” with their lives reported high work stress.

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GOVERNMENT DRUG POLICIES IN CANADA OFFER NO COST ADVANTAGE OVER US DRUG POLICIES

News release from the Fraser Institute, British Columbia, November 26, 2007

On average, Canadians are spending about the same percentage of their incomes on prescription drugs as Americans, according to The Cost Burden of Prescription Drug Spending in Canada and the United States. Using the most recent publicly available data from 2006, the study found that prescription drug expenditures made up roughly the same percentage of income before taxes in both countries – in Canada 1.5 per cent of per capita gross domestic product (GDP) compared to 1.6 per cent for Americans. The study also found that the number of prescriptions dispensed per capita is approximately the same. In 2006, 13 prescriptions were dispensed per person in Canada versus 12.3 prescriptions in the United States.

“Even though Canadian prices for brand name drugs are lower than US prices for identical drugs, consumers in both countries spend roughly the same percentage of their personal disposable income on drugs because the price of Canadian generics is more than double US prices for identical drugs” says B.Skinner, Director, Health, Pharmaceutical and Insurance Policy Research, the Fraser Institute.

DIAGNOSTIC RINSE FOR PERIODONTAL DISEASE

Excerpts from *Ensuring Continued Trust* (suppl). Dispatch. November/December 2007

Oral rinse samples, with a diagnostic agent added, from clients with varying degrees of periodontal disease are placed against the standard colour swatch depicting disease levels – darker degrees of blue correspond to higher inflammation and periodontal disease present in the client’s mouth. This simple and rapid method for the quantification of neutrophil levels in the oral environment utilizes a 30-second oral rinse collected from the client.¹

How would this diagnostic test benefit dental hygiene care? This test is currently in clinical trials but its potential for future use may help in multiple clinical settings:

- In long-term care facilities.
- In primary care medical setting for physicians treating diabetes.
- In clinical practice.

Reference

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QUITTING SMOKING CAN HELP YOU SAVE MORE THAN YOUR HEALTH

News release December 4, 2007 /CNW

According to a Leger Marketing Research Series on Smoking Behaviours, the main reasons people quit smoking are health and money. It is not surprising that health is the number one reason, given that strong medical evidence suggests that smoking tobacco is related to more than two dozen diseases and conditions including cancer, cardiovascular diseases, and respiratory diseases and symptoms.¹ But how many smokers have actually looked at how much this daily expense adds up to over time?

With the cost of cigarettes alone being from \$76.37 - 93.08 per carton across Canada, there is no doubt that it affects the health of a smoker’s wallet. The average 45-year old smoker, who quits today and puts the money into savings, could have more than \$100,000 to spend during retirement, while enjoying smoke free health. “I knew that smoking was expensive as I was spending over \$125 per week,” said Carl Deleuze, an ex-smoker. “But I had no idea two packs a day could account for almost \$365,161 if I put that money into savings over the next 25 years.”

The financial impact is even more pronounced when considering smokers tend to have lower earnings than non-smokers (\$54,757 versus \$64,017 per year), and are more likely to have children under the age of 19 still living at home.

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Thank you, reviewers

Reviewers, as much as authors, contribute to the success and integrity of our peer-reviewed journal in defining the quality of content in manuscripts.

In this issue, we publish names of our past reviewers, and acknowledge their efforts and goodwill in volunteering their time, expertise, and love for their profession in enhancing the authorship of another.

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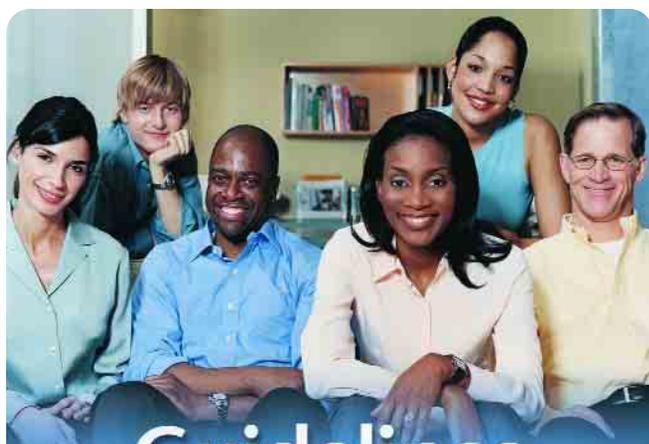
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THE CANADIAN DENTAL HYGIENISTS ASSOCIATION
L'ASSOCIATION CANADIENNE DES HYGIÉNISTES DENTAIRE

2008 Calendar of events



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



January 26, 2008 **CDHA 2nd Independent Practice Workshop**
Admiral Radisson Hotel, Toronto, Ontario



May 26-28, 2008 **Navigating the Imagination: A Leadership Invitational**
Rimrock Resort Hotel, Banff, Alberta



June 21, 2008 **CDHA's Product Showcase Goes Live**
Toronto, Ontario



October 2008 **CDHA's Student Summit**
Toronto, Ontario

November 1, 2008 **CDHA 3rd Independent Practice Workshop & Student Summit**
Vancouver, British Columbia

For further information, please contact CDHA, info@cdha.ca or visit our website cdha.ca

Continuing professional development this year

that important sense of belonging, camaraderie, and mentorship, while offering planned opportunities to reach out to the community. Consider adding "getting involved" to your 2008 vision.

Use your networking and negotiating skills to enhance what's in your practice and create new ways to promote oral health for your clients such as in-office oral health counselling for small groups – pregnant women, new parents, older adults, clients with diabetes, adults caring for elderly family members, and adults caring for family members. Negotiate outreach into your private practice environment. Instead of having them come to you, reach out to others with your dental team...hold a brush-in at a local daycare, provide free screenings at a long term care facility, offer an oral health care session for health care aides, or even set up an oral health display at your local mall. Add "reaching out" to the top of your 2008 vision.

Translate visions to meaningful realities.

Happy New Year. 🍷

Une autre année de perfectionnement professionnel continu

choses. Comme l'a dit si éloquemment Margaret Mead : « Ne doutez jamais qu'un petit groupe de personnes engagées peut changer le monde. D'ailleurs, cela a toujours été la seule façon d'agir. » La participation active aux activités de votre

association professionnelle vous donnera une voix et la capacité d'influer sur l'avenir, car votre contribution provoquera certes le changement. Votre engagement comporte aussi d'autres avantages importants. Avec autant de cliniciennes travaillant seules à titre d'hygiénistes dentaires en pratique privée, les rencontres régulières peuvent vous procurer un important sentiment d'appartenance, la camaraderie et le mentorat souhaité, tout en vous offrant des possibilités planifiées d'atteindre la collectivité. Songez à ajouter « Mon engagement » à vos résolutions pour 2008.

Utilisez vos contacts et vos talents de négociation pour améliorer les éléments de votre pratique et créer de nouvelles façons de promouvoir la santé buccodentaire auprès de votre clientèle : conseils professionnels en petits groupes au bureau – femmes enceintes, nouveaux parents, aînés, clientèle diabétique, adultes prenant soin des membres âgés ou autres de la famille. Négociez du travail de proximité dans votre voisinage. Plutôt que d'attendre que les gens viennent à vous, allez vers eux avec votre équipe dentaire... offrez une séance sur le brossage des dents dans une garderie du voisinage, des examens de dépistage dans les établissements de soins de longue durée, une séance d'information sur les soins buccodentaires aux aidants naturels, ou encore une exposition sur la santé buccodentaire au centre commercial. Inscrivez « Atteindre les gens » en tête de votre liste pour 2008.

Sachez transformer vos résolutions en véritables réalités.

Bonne et Heureuse Année! 🍷

Cultural diversity

CDHA staff

Canadian health professionals in all disciplines are gaining awareness of the enormous influence that culture may have on their clients' attitudes and beliefs about health and health care. Darby and Walsh¹ state, "Cultural diversity is evident in different languages, foods, dress, daily cultural practices, motivational factors, cultural beliefs and values and cultural influences on disease and health behaviors."

Canada has become an ethno-diverse society, attracting a growing number of new Canadians from non-traditional sources such as Asia, Africa, Central America, and the Caribbean. Current levels of immigration suggest that our multicultural diversity will continue to flourish well into the twenty-first century with much of this growth concentrated in Montreal, Vancouver, and Toronto. According to the 2006 census, Statistics Canada reports that 1 out of every 5 Canadians is an allophone. The allophone population is very heterogeneous, with more than 200 different languages reported in response to the question on mother tongue.² The United Nations recognizes Toronto as the most multicultural city in the world.

KISS, BOW OR SHAKE HANDS?

How does this growing cultural and ethnic diversity effect dental hygienists?

The CDHA *Code of Ethics, Principle I: Beneficence* states that dental hygienists should "provide services to their clients with respect for their individual needs, values and life circumstances." Providing such individualized preventive, therapeutic and supportive oral therapy is the foundation of the dental hygiene process of care. This obligation to act without discrimination and to effectively interact with varied populations demands that the dental hygienist be sensitive to cultural differences and be competent in multicultural communication skills.

Cultural sensitivity or awareness is defined by Spector as: "The knowledge of and constructive attitudes towards health traditions observed among diverse cultural groups found in the practice setting."

Spector further describes cultural competence as the ability to understand and attend to the total context of the client's situation.³ Possessing these positive qualities enables dental hygienists to work effectively with their clients to achieve mutually acceptable oral health goals. While cultural sensitivity is thought to promote client cooperation and compliance with therapy, it is equally important from an ethical perspective to provide interventions in such a way that clients' autonomy, including cultural values, is respected.

The Crandell et al. model of communication theory describes levels of cultural communication competence.⁴

Level of competence	Behaviors related to level of competence
Level 1: Unconscious incompetence	No insight about the influence of culture on health care
Level 2: Conscious incompetence	Minimal emphasis on culture in health setting
Level 3: Conscious competence	Acceptance of roles of cultural beliefs, values and behaviors on health, disease and treatments
Level 4: Unconscious competence	Incorporation of cultural awareness into daily health care practice
Level 5: Unconscious supercompetence	Integration of attention to culture into all areas of professional life.

The movement towards cultural competence promotes a skill-focused paradigm over one of mere sensitivity. A pilot study of dental hygienists completed in the 1990s concluded that age and years of clinical experience had no significant effect on the levels of multicultural knowledge.⁵ This suggests that dental hygiene program curricula need to be planned to include the knowledge and skills necessary to provide care that respects ethno diversity.

For practicing dental hygienists, competence-building activities include using self-assessment tools, developing skills through training, implementing goals, and being responsive to their clients' diversity. Providing culturally effective health care is a developmental process that requires an honest assessment of one's biases and an ongoing commitment to learning and practice.

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5. Morey P and Leung J (1993) The Multicultural Knowledge of Registered Dental Hygienists: A pilot Study. *Journal of Dental Hygiene*. 67(4):180-185.

Writing for a peer-reviewed journal

CDHA staff

Many high profile, peer-reviewed journals have a rejection rate of over 90 per cent. Therefore, it is in the author's interest to submit a complete, well-structured manuscript with sound content for peer-review. The author is a major stakeholder in the published article – funding or grants being made available for research, internal departmental promotions, deputation to acclaimed institutions, travel for seminars or collaborative research, increased authorship and recognition... .

With online submission processes, editorial offices are swamped by daily arrival of fresh manuscripts worldwide, and like to use their external reviewer base effectively. The author has to be mindful of courtesy to both the journal and its reviewers – a badly-drafted submission, poorly documented, no page numbers, missing author(s) information, verbose text instead of concise tables or graphs, grainy images, uncited references do the author no credit. Here are a few websites that are good resources for the author.

http://www.kdp.org/pdf/membership/writing_for_peerreviewed_journal.pdf

It answers frequently asked questions on refereed journals, the peer-review system, organizing the manuscript, and reacting to review comments.

<http://www.epeerview.com/Resources/biomedical.html>

While free online help is useful, there are books on biomedical writing that merit closer inspection, and that offer the prospective author good value. A small investment may go a long way.

<http://www.columbia.edu/cu/biology/ug/research/paper.html>

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http://pubs.acs.org/subscribe/journals/ci/31/special/02sb_inet.html

Internet resources for scientific writing - *"In order to understand how best to improve writing, we would do well to understand better how readers go about reading."* George D. Gopen, Judith A. Swan

<http://www.biomedcentral.com/info/ifora/abstracts>

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<http://www.gly.uga.edu/railsback/writing1.html>

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http://www.colby.edu/biology/BI17x/writing_papers.html

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http://biology.unm.edu/ccouncil/Useful_Links/Tools/Writing_Scientific_Papers.doc

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<http://www.wisc.edu/writing/Handbook/ScienceReport.html>

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<http://abacus.bates.edu/~ganderso/biology/resources/writing/HTWgeneral.html>

Communication of your results contributes to the pool of knowledge within your discipline and very often provides information that helps others interpret their own experimental results. Most journals accept papers for publication only after peer review by a small group of scientists who work in the same field and who recommend the paper be published (usually with some revision).

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INTERNATIONAL

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ABOUT THE COVER

People through the ages did spend time trying to take care of their teeth and oral hygiene. The front covers of Volume 42 will feature herbs used as remedies in dental treatments during the Renaissance period, and this note provides a historical perspective of their traditional use in oral or dental care and hygiene.



Vol. 42.1, Jan-Feb 2008 issue, cover picture: Common sage (*Salvia officinalis*), credit: ©iStockphoto.com/Nicolette Neish

"For teeth that are yellow

Take sage and salt, of each alike, and stamp them well together, then bake it till it be hard, and make a fine powder thereof, then therewith rub the teeth evening and morning and it will take away all yellowness."

Gervase Markham, *The English Housewife* (1615), ed. Michael R Best (McGill-Queen's University Press, 1986: 20)

