Advances in prevention and treatment of xerostomia
Non fluoride anticaries products
Oral health needs of Canadian prisoners
Er:YAG laser versus SRP

Editorials
What does research have to do with the clinical dental hygienist?
Changing consumer behaviour:
A case for evidence based dental hygiene practice
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- Hygienic Operatory Dispenser

G•U•M® EasyThread™ Floss is available in 2 formats:
- Hygienic Operatory Dispenser
- Convenient Patient Trial Size
What does research have to do with the clinical dental hygienist?

Katherine Zmetana, DpDH, DpD7, EdD

You will note that, although not overtly acknowledged, the underlying theme of this issue, of all issues of CJHJ, is the usefulness and necessity of using research evidence to make good professional decisions.

When we talk about evidence based practice, we are referring to the real life application of research to clinical intervention—whether for direct treatment, preventative measures, or client education. We can see the value of research when it is put into practice, when the stores of knowledge produced and collected by academia go beyond the level of theory and have an impact on human lives.

Clients rely on professional practitioners to provide knowledgeable advice, not only in the care and prevention of gingivitis and periodontitis, which are most closely associated with dental hygiene, but on all concerns related to the oral cavity. Certainly, dental hygienists should not be providing diagnoses on areas outside our scope of practice, but we are responsible for fulfilling the role of an important consultant within the oral healthcare team.

This past century has seen the birth and growth of the “scientific way”. And recent decades have seen technological advances that have been astounding. If we find ourselves doing the same thing, the same way, based on learning and assumptions that date back twenty years, without questioning why, then we need to give our heads a shake and make sure we can justify why, or find out if there’s a better way. Nothing stays the same; that’s why we need research and why we need researchers.

This issue brings a collection of articles from authors who have taken just that route. Curious about a topic of particular interest and unsatisfied with their own lack of solid information to give confident advice, they went in search of answers to their questions.

A compelling letter to the editor on the subject of dysphagia illustrates one dental hygienist’s commitment to continuing competence and professional growth of the practice. Shannon Collins shares her cursory review of the literature on dysphagia and oral health, quality of life, and interprofessional collaboration. Difficulty in swallowing can be an unpleasant side effect of growing older; the dental hygienist may be the first one to become aware of a client’s discomfort and concern. It can be perplexing to know just how to provide care and assistance for this condition. Treatment differs between hospital and clinical practice settings, and depends on etiology and severity. An informed dental hygienist can assist in the referral process and help the client to make his or her own informed choices.

On a similar note, Dr. Jana Rieger, unsatisfied with the seeming lack of effective interventions for sufferers of dry mouth, undertook a review of recent advances in the prevention and treatment of xerostomia. This affliction can be bewildering to cancer patients and to those on certain medications. Improvements in conventional practice have shown promise, particularly in preventing the condition, but finding ways to manage an existing condition can be daunting. Surprisingly, interventions that have been studied and shown effective results include unconventional approaches such as acupuncture. An important finding is that subjective perceptions of dry mouth can be more troubling to the client than the actual severity of hyposalivation. It stands to reason that a dental hygienist who is mindful of such variables can provide better client centred care.

Frieda Pickett has contributed the first article to be featured in our new section, Short Communication. She provided a succinct review and summary of the American Dental Association’s Council on Scientific Affairs recommendations for non fluoride anticaries products. These recommendations are based on a thorough systematic review of the subject. The dental profession has become perhaps complacent in the adoption of fluoride as the mainstay of caries management; yet many clients, for a variety of reasons, may request alternatives. While fluoride toothpaste, topically applied fluorides and fluoridated water are proven strategies, it is important to consider unconventional approaches such as acupuncture. An informed dental hygienist can assist in the referral process and help the client to make his or her own informed choices.

Correspondence to: Dr. Katherine Zmetana, Scientific Editor, CJHJ; ScientificEditor@cdha.ca
proposed. For example, a client with aggressive root caries may be interested to know the consequences of various choices. The question we might better ask is: In what situations would these adjuncts best be used?

From the Student Corner, Erica Zammit considers the somewhat controversial use of lasers in oral hygiene practice. I say controversial, because many practitioners claim that there is still not enough information to merit the use of this expensive equipment, while others who have been using “laser hygiene” are claiming a multitude of immediate benefits for their clients and even more in follow up care. It seems only natural that a review of the literature would be a first step in determining what action to take. Research can at the very least warn of possible complications or assure that no harm is being done. Gaps in available literature may indicate the need for further study—an invitation for future researchers to fill in these gaps.

Andrea Laltooo and Lindsay Pitcher performed a sample study on the oral health needs of Canadian prisoners, a much neglected segment of the population. Decisions made on healthcare intervention for these clients have implications that touch federal and provincial budgets. On a national level, research can contribute to decisions in policy making and government funding. Definitely, more are needed.

Finally, I would like to echo Arlynn Brodie’s message that research is a two way street. Research provides oral health practitioners with evidence that can be put to use in daily decision making. By the same token, observations in everyday practice can be used to formulate questions for study. Our own experience and intuition provide us with knowledge that can be applied and passed on; we need to make good use of that knowledge in putting our theories and practices to test. Research can provide us with hard evidence that supports what we have come to know over the years, and it can help to dispove any areas of doubt with solid rationale.

I encourage you to take up the charge as put forth and do your part. Research is essential.

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† p<0.001
‡ Randomized, 6-month, controlled, observer-blind, parallel-group clinical trial conducted according to American Dental Association guidelines; n=237 healthy subjects with mild-to-moderate gingivitis evaluable at both 3 and 6 months. Subjects rinsed twice daily for 30 seconds with 20 mL at least 4 hours apart. Whole-mouth mean plaque index (PI) scores at 6 months were 1.13 for the group who brushed, flossed and rinsed with COOL MINT LISTERINE® (baseline 2.75) and 2.37 for the brush + floss + control rinse group (baseline 2.78). Whole-mouth mean modifed gingival index (MGI) scores at 6 months were 1.44 for patients who brushed, flossed and rinsed with COOL MINT LISTERINE® (baseline 2.11) and 1.81 for patients who brushed, flossed and rinsed with control rinse (baseline 2.1). Based on home use.


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Changing consumer behaviour: A case for evidence based dental hygiene practice

Arlynn Brodie, MHST, BPE, DipPsM, rDH

Dental hygienists are primary healthcare providers; it is well documented that integrating research in our practice settings is crucial to the development of dental hygiene as a profession. Evidence based decision making has never been so important to the practising dental hygienist. Are dental hygienists in Canada closing the identified research practice gap?1 If so, who is really driving this closure — is it the dental hygienist or the oral healthcare consumer? I suggest a combination of contributions by the dental hygienist and the client exists; each is providing impetus for a need of evidence based practice growth.

The plethora of oral healthcare information available to its consumers on the Internet and from other media sources has added a new dimension to the role of dental hygienist as an oral healthcare provider. In addition, dental hygienists have to be increasingly discriminating in their quest for evidence because there are so many sources claiming to be “research based”.

As educated practitioners, dental hygienists must be able to integrate practitioner expertise with the best available external evidence from research.1,2

As students, we are taught to provide treatment based on evidence; but I wonder how well we transition our skill set to our practice environments. Do practising dental hygienists effectively integrate evidence with the process of care?

Recently, I was informed by an elderly client she was using bar soap to brush her teeth. She believed it was a good idea and had gleaned this advice from a radio talk show. Our subsequent discussion revolved around her need for fluoride and how her current practices of homecare did not provide the protection from root caries that she required. The benefits of fluoride for the elderly has been extensively debated and documented;1,4 so evidence was easily obtained and presented to convince my client, but what about the more challenging questions posed by the public? Are dental hygienists simply replying, “I don’t know”, or referring the question to another member of the oral healthcare team? The responsibility is ours, as professionals, to rise to the new challenges of online information, and to source out the best evidence available to support our practice. By responding to our clients’ health queries, our professional visibility rises with the public we serve and with the oral healthcare team we practise.

In our search for evidence, we will more often reach out to other health professionals; our profile as a valued team player will increase among our interprofessional colleagues, opening opportunities for our further professional growth. Being more visible to our healthcare colleagues and the community will serve to exemplify and illustrate dental hygienists as primary healthcare providers.

The Canadian Dental Hygienists Association supports practice based on current research evidence and has recently modified their “Ends” or goal statement to read, “Members engage in dental hygiene research”. The successful integration of our profession of dental hygiene with the interprofessional healthcare system is contingent on our ability to practise as evidence based professionals.

References

Is this patient in your practice?

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Collaboration with health professionals to recognize dysphagia in elderly clients

Dear editor:
The CDJ/D May 2012 issue, volume 46, no.2, brought together excellent articles with a focus on oral-systemic health; these articles encouraged me to share what I had learnt on swallowing difficulties, or dysphagia, from my final project at Camosun College Dental Hygiene Program in British Columbia.

Why I chose to investigate this health condition as a dental hygienist
During a program visit to the Miyagi Advanced Dental Hygienists’ College (MADHC), Japan, in July 2010, I learnt that dysphagia management was included in MADHC’s dental hygiene process of care. The student case studies we observed demonstrated improved swallow function and oral cavity access with dysphagic elderly clients. I was curious to learn how it is managed in Canada, and how dental hygienists integrate this aspect of care in practice.

From a personal perspective, my parents were among the first group of baby boomers to become senior citizens in 2011. I was inspired to learn how becoming more aware of age related health conditions could benefit my clients.

How I gathered information
After a cursory review of the literature, I interviewed three community dental hygienists of Vancouver Island Health Authority (VIHA). My primary mentor provides services in long term care facilities, and I shadowed her as she cared for her client with dysphagia, related to multiple sclerosis. I also observed another dental hygienist at VIHA and asked two clients in a government subsidized group home if I received guidance from the third dental hygienist to utilize VIHA Oral Care Guidelines for Children with Swallowing Difficulties/Dysphagia to form health history questions for my elderly clients at the Camosun College Dental Clinic. I also conducted phone and email interviews with a VIHA speech-language pathologist, a VIHA occupational therapist, a general practice physician, and the senior instructor at MADHC, Japan.

What I learned: Dysphagia etiology, signs, health risks, and treatment
The pathophysiology of dysphagia can be complicated because dysphagia is not a disease itself, it is a sign of an underlying condition. Stroke, gastroesophageal reflux disease, upper gastrointestinal tract cancers, chronic obstructive pulmonary disease (COPD), congestive heart failure, head injury, neurological disorders, and neuromuscular disorders can present as dysphagia. The oral, pharyngeal, and esophageal peristaltic muscles overlap and work in combination; if one group of muscles starts to atrophy, it affects the entire swallowing process. Non pathological, age related transformations in swallowing function are prevalent in the elderly and are called presbyphagia. Presbyphagia results from decreased lingual strength as muscle tissue is gradually replaced by adipose and connective tissue, age related reduced fine motor skills, freedom from discomfort or pain during swallowing.

The foremost signs are choking or coughing during swallowing, and a history of pneumonia mortality rate. Other risks are asphyxiation from upper airway obstruction, increased risk of periodontal disease and cavities from incomplete food clearance, dehydration, weight loss, malnutrition—freedom from comfort or pain during swallowing.

• Skin and mucous membrane integrity of the head and neck—soft tissues can be affected by xenostomia or ill fitting dentures.
• Biologically sound and functional dentures—stagnant food debris increases risk of caries and periodontal disease.
• Freedom from discomfort or pain during swallowing.

Table 1. Considerations for integrating unmet needs related to signs of dysphagia into the dental hygiene process of care. Developed from a cursory review of the literature and opinions of local community dental hygienists who monitored my project.

<table>
<thead>
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Diagnosis of unmet human needs
The following utilizes the Human Needs Theory to diagnose unmet needs related to signs of dysphagia.

• Health risks— Pathological infection or aspiration pathogenic bacteria— Increased risk of periodontal disease and cavities from incomplete food clearance— Asphyxiation from choking— Dehydration, weight loss, malnutrition—Decreased quality of life— Freedom from discomfort or pain during swallowing— Skin and mucous membrane integrity of the head and neck—Soft tissues can be affected by xenostomia or ill fitting dentures.

**Table 1. Considerations for integrating unmet needs related to signs of dysphagia into the dental hygiene process of care.**

- **Assessment:** Collaborate with colleagues to see if health history forms ask about recurrent pneumonia/respiratory infection.
- **When asking clients about swallowing during palpation of the thyroid and larynx in the extra oral exam, ask:**
  - Does it take a while for food to clear the back of your throat?
  - Do you choke while eating or drinking?

**Diagnosis of unmet human needs:**
The following utilizes the Human Needs Theory to diagnose unmet needs related to signs of dysphagia.

- **Health risks:**
  - Respiratory infection from aspirating pathogenic bacteria
  - Increased risk of periodontal disease and cavities from incomplete food clearance
  - Asphyxiation from choking
  - Dehydration, weight loss, malnutrition
  - Decreased quality of life
  - Freedom from discomfort or pain during swallowing
  - Skin and mucous membrane integrity of the head and neck—soft tissues can be affected by xerostomia or ill fitting dentures

- **Biologically sound and functional dentures—stagnant food debris increases risk of caries and periodontal disease.**
- **Conceptualization and problem solving dysphagia health risks**
language pathologists provide individualized care with interventions such as body positioning during eating and drinking, breath holding and swallowing exercises, electrode stimulation, and food texture and temperature recommendations. Environment redesign and body positioning are provided by occupational therapists. Dieticians often collaborate with speech-language pathologists to ensure that recommended foods provide adequate nutritional value. Physicians may prescribe adjunctive pharmacological therapy. The literature recommended daily mechanical disturbance of dental biofilm coupled with professional periodontal maintenance to decrease aspiration pneumonia. I began to get an idea of the complexity of treatments involved in dysphagia management, and realized that dysphagia management is a highly individualized process.

Ideas for integrating dysphagia into the dental hygiene process of care

It is not within the Canadian dental hygiene scope of practice to assess or treat swallowing difficulties. By recognizing signs of dysphagia, however, dental hygienists can help reduce health risks through the dental hygiene considerations listed in Table 1. To help prevent health risks in early dysphagia, these considerations could also be implemented for clients with any of the medical conditions underlying dysphagia.

Conclusion and evaluation of my project

When working towards the goal of achieving a higher quality of life for our aging population, collaboration among health professionals through treatment planning could be beneficial; the massage techniques implemented by MADHC students decreased oral muscle tension enough to facilitate oral care. This demonstrated a benefit of speech-language pathologist therapy directly preceding a dental hygiene appointment.

Limitations of my project were the omission of clinical dysphagia assessment tools, scales for measuring swallowing function, laryngopharyngeal sensory deficits, and not differentiating oral and pharyngeal disorders. I had expected to begin my career in private practice, so my approach focused on dysphagia awareness in a clinical setting and excluded collaboration with caregivers, which many dysphagic stroke patients require for personal hygiene.

During my first year in practice, several of my clients reported swallowing difficulties. The majority were not aware of potential health risks, potential underlying health conditions, or dysphagia treatment options. To enhance care provision for elderly clients, I feel it is important for dental hygienists to be aware of dysphagia signs, educate affected clients of potential health risks, practice aerosol reduction, encourage physician involvement, and inform clients that treatment options exist.  

Yours sincerely,  
Shannon Collins, RDH  
Email: shannon.mae.collins@gmail.com

Planning and implementation

- To help prevent aspiration of potentially fatal pathogens, assist clients in making informed decisions about their professional dental hygiene care and home self care:  
  - Reduce the incidence of aspiration pneumonia by encouraging a preprocedural rinse with 0.12% chlorhexidine gluconate.  
  - Recline clients halfway rather than fully supine to help prevent saliva aspiration.  
  - Avoid creating aerosols by avoiding cavitron use and prophylactic polish.  
  - Recommend a manual toothbrush rather than an electric toothbrush for home care.  
  - The Plak-Vac is a home care toothbrush with a built-in suction to reduce aerosols and is available for purchase online through Trademark Medical. Child-sized toothbrushes can increase access to teeth if oral muscle tension limits self care.  
  - Clients who experience pain, discomfort, or choking during eating or drinking can be referred to their physician.  
  - Recommend that ill-fitting dentures be evaluated by a dentist for adjustment.  
  - Conceptualization of the potential health risks associated with dysphagia can be met through education on awareness and risk reduction.  
  - Problem solving can be attempted through discussing the pros and cons of the above considerations, as they might entail behavioral changes for clients.

Evaluation

- Follow up with clients at continuing care appointments to evaluate any of the above implementations that were carried out.

Table 1. continued

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** Key words: xerostomia IMRT; cytoprotective agents; acupuncture; hyperbaric oxygen therapy; submandibular gland transfer

**ABSTRACT**

**Objective:** Xerostomia—whether a result of treatment for head and neck cancer, or disease states such Sjögren’s, or side effects of medication—has a devastating impact on quality of life. Thus, it is imperative that health professionals who work with patients affected by xerostomia understand the most current interventions, both preventive and therapeutic. **Method:** A Medline search was undertaken to understand advances in this field. Forty-five journal articles, which reported on recent advances in the prevention and treatment of xerostomia, were reviewed in the literature from January 2008 to July 2011. **Results:** Interventions, described in the literature during this period, included surgery, pharmaceuticals, advanced radiotherapy, salivary substitutes, acupuncture, electrostimulation, and hyperbaric oxygen therapy. In preventing xerostomia, surgical and advanced radiation systems appear to be most promising. In treating xerostomia, the results suggest that many of the interventions promote salivary flow; however, this does not always result in a change in the patient’s perception of dry mouth. **Conclusion:** While some of these interventions hold more promise than others, regenerative medicine techniques are currently being applied in animal studies, and may be an important future consideration in the battle against xerostomia.

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**METHODS**

A Medline search was conducted for the period between January 2008 and July 2011. After screening, a total of forty-five articles were included for this review.

**OBJECTIONS**

Salivation is overlooked as an essential component of normal function of the human body. However, when this seemingly simple function fails and hypoplastic function results, the impact is far reaching. Hyposalivation results from a multitude of causes, the most common being radiation therapy for head and neck cancer, Sjögren’s syndrome, and medication side effects. Xerostomia, the perception of a dry mouth, is one complication of hyposalivation. While xerostomia is not always necessarily accompanied by hyposalivation, when salivary flow decreases by 50 per cent or more, xerostomia almost always results. The impact of xerostomia on a patient is multifaceted (Figure 1). At the most basic level is the physical impact—the alterations in the normal state of the oral cavity. These impacts include periodontitis, oral pain and discomfort, and, in the case of head and neck cancer patients, radiation caries. Stemming from these physical events are manifestations that are linked intricately to function. These include consequences such as tooth loss, dysphagia, and cachexia. The functional deficits often lead to psychosocial impacts such as avoidance of social contact and events, and poor sleep—all of which have the potential to lead to an overall reduced quality of life.

**RESUMÉ**

Objet : La xérostomie — qu’elle résulte du traitement d’un cancer de la tête ou du cou, d’un état histopathologique comme le syndrome de Sjögren ou des effets secondaires d’un médicament — a un impact dévastateur sur la qualité de vie. Il est donc impératif pour les professionnels de santé soignant des patients affectés par la xérostomie d’en bien connaître les interventions préventives et thérapeutiques les plus courantes. Méthode : L’on a entrepris une recherche médicale pour comprendre les progrès dans ce domaine. Quarante-cinq articles de journaux traitant de la prévention et du traitement de la xérostomie ont fait l’objet d’une revue de la littérature entre les mois de janvier 2008 et juillet 2011. Résultats : Les interventions, décrites dans la littérature de cette période, comprennent la chirurgie, les produits pharmaceutiques, la radiothérapie de pointe, les substituts salivaires, l’acupuncture, l’électrostimulation et l’oxygénothérapie hyperbare. Pour prévenir la xérostomie, la chirurgie et les systèmes de protonthérapie semblent être les mesures les plus prometteuses. Pour traiter la xérostomie, les résultats suggèrent que plusieurs des interventions favorisent l’écoulement salivaire; cependant, cela ne modifie pas toujours la perception de la bouche sèche par le patient. Conclusion : Alors que certaines interventions sont plus prometteuses que les autres, les techniques de la médecine régénératrice sont actuellement appliquées dans les études chez les animaux, et pourraient faire éventuellement l’objet d’importantes considérations dans la lutte contre la xérostomie.

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Surgical intervention

The submandibular gland transfer (SGT) is a simple and relatively inexpensive treatment modality. During radiation therapy, where salivary glands are often in the target volume while sparing the surrounding normal tissue, the protective mechanism of amifostine is related to its accumulation in normal versus malignant cells, and to its ability to scavenge for oxygen free radicals that cause DNA damage. It was demonstrated that patients who received pilocarpine had significantly better parotid flow outcomes than patients who received placebo.8–10

Amifostine has been studied as a cytoprotective agent for several years. In a five year study that compared the SGT to no intervention, radiation therapy (RT) for nasopharyngeal carcinoma, Liu et al.10 demonstrated that patients who received SGT had significantly better parotid flow outcomes than those who received no intervention. In order to answer how the SGT compares to other preventive treatments, Jha et al.11 completed a Phase III randomized study, where the SGT was compared to oral pilocarpine administered as a cytoprotective agent. These investigators demonstrated that patients who had received the SGT maintained significantly better parotid flow as compared to the oral pilocarpine group.12

In a subset of the patients who were studied for functional outcomes assessed by videofluoroscopy, this translated into better swallowing ability in the SGT group.13 While these results are promising, the SGT is not oncologically feasible for certain individuals, including those with cancer of the oral cavity or those with submandibular or submental nodes involved with metastatic cancer. Other preventive modalities, such as pharmaceutical or radiotherapeutic interventions, have been considered as alternatives.

Pharmaceutical intervention

Medical treatments for xerostomia have been used for many years, such as saliva substitutes like pilocarpine. Several studies have investigated the use of amifostine during RT to study its protective effects. The protective mechanism of amifostine is related to its accumulation in normal versus malignant cells, and to its ability to scavenge for oxygen free radicals that cause DNA damage. It was demonstrated that patients who received pilocarpine had significantly better parotid flow outcomes than patients who received placebo.8–10

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salivary flow rate when compared to placebo. Finally, it would appear that rebamipide also acts as a mucosal protector—something that scavenges free radicals—when compared to placebo, affects neither salivary flow rate nor subjective perceptions of dry mouth in patients with Sjögren’s syndrome.

Finally, pharmaceutical preparations have been trialled in individuals who have dry mouth of unknown etiology. Pilocarpine has been administered, revealing their efficacy in increasing salivary flow and in improving perception of dry mouth. Specifically, with ptyalostimine, a parasympathomimetic alcoholic, there was six fold rise in rating and as a result a fold increase in salivary flow. Sixty-six per cent of patients improved on ratings of xerostomia after one month of treatment with pilocarpine.

Thus, it would appear that the pharmaceuticals used to treat xerostomia are proficient at stimulating salivary flow, and so satisfy a physiological deficit. However, they are less likely to change perceptions of dry mouth. More work, such as that of Dawes, is needed to elucidate the mechanisms that lead to a perceived dry mouth. In addition, consideration of patient population, and degree of salivary gland dysfunction will be important when interpreting results of these interventions.

Saliva substitutes

The use of saliva substitutes has been studied in several prospective trials, including Sjögren’s, head and neck cancer, the elderly, diabetics, and those with medication induced xerostomia. When an oral lubricant was compared to placebo in a single blind crossover study by Montaldo et al, it was found that patients rated both as having a positive effect on xerostomia, with no differences between ratings related to burning tongue, plaque, or their general health. However, by the conclusion of the study, there was a slight overall preference for the lubricant.

Likewise, Gil-Montoya et al. found that artificial saliva was rated as equally good or equally bad at relieving xerostomia when assessed in elderly patients in a randomized, double blind, crossover study. Although the previous studies showed no effects of saliva substitutes on ratings of xerostomia, their effects on other aspects of oral health have been investigated. For example, Montaldo et al. studied the effects of saliva substitutes on oral health in diabetic patients. They found that dry mouth and xerostomia were improved in quality of life and health. However, by the end of the study, they had a higher risk of gingivitis, positive yeast counts and plaque.

Their findings could have been influenced by the design of the study as the experimental group was given specific instructions on how to brush their teeth whereas the control group of diabetic patients was not. In another study, Oh et al. examined the effect of saliva substitutes on a heterogeneous group of patients with xerostomia.

In this pre test-post test study, they found that the use of saliva substitutes had no significant effect on xerostomia, number of artificial saliva used, or gold standard ratings of dryness and effect on daily life. However, there was no control group or placebo administered, making it difficult to reach a conclusion about the efficacy of the formulation used in the study.

The literature would suggest that there are improvements in xerostomia frequently reported with the use of saliva substitutes. However, when a placebo is included in the assessment, there is frequently little difference between the salivary substitute and placebo.

Acupuncture

A relatively old form of alternative medicine is emerging as a new treatment in the battle against xerostomia. In the past three years, two series of studies have been conducted to assess the efficacy of acupuncture in relieving dry mouth.

In support of acupuncture as a treatment for xerostomia, a systematic review of the literature is evident in increasingly robust evidence that ties neurological outcomes directly to physiological function in response to needling in normal subjects. Specifically, Deng et al. found that sham needling resulted in no activation of regions of interest in the brain as assessed by magnetic resonance imaging (MRI). In contrast, real acupuncture led to activation of the insular and operculum regions of the brain. Furthermore, real needling led to significantly higher amounts of saliva production in normal subjects.

Most of the clinical intervention studies have focused on head and neck cancer patients. Cho et al. found that while salivary flow increased somewhat for both sham and real acupuncture, there were no differences between groups. Likewise, while there was a statistically significant improvement in subjective scores of xerostomia for the real acupuncture group, there were no significant differences between groups on this measure either. This suggests that the sham acupuncture group improved somewhat on the subjective measures, but not to the same degree as the real group.

One acknowledged flaw of this study was a chance difference at baseline in subjective scores of xerostomia and time since radiation therapy between the real and sham acupuncture groups.

Garcia et al. and Meidell et al. completed longitudinal studies of acupuncture in head and neck cancer and hospice patients respectively. Both groups of researchers found that subjective ratings of xerostomia improved over the course of their studies—at 8 weeks and after 5 treatments respectively—but that salivary flow rates did not change. There were no sham interventions in either study to which results could be compared. On the other hand Simcock and Fallowfield found that 50 per cent of patients receiving acupuncture had increases in salivary flow. Improvement was not limited to xerostomia items related to xerostomia in a longitudinal study of group acupuncture.

A meta-analysis of the literature between 1985 and 2009 on acupuncture for relief of xerostomia in head and neck cancer revealed that patients do seem to receive a subjective and artificial sense of relief following acupuncture and that this benefit is maintained at least into the sham condition before any firm conclusions can be drawn. Furthermore, while MRI evidence suggests that therapeutic responses are elicited by acupuncture, the tie between such neurological responses and salivary production in damaged glands has not been studied.

Electrostimulation

Another relatively new area of study in the treatment of xerostomia involves electrostimulation of the peripheral nerves related to the salivary reflex arc by sending a signal through peripheral nerves in the oral cavity to central mechanisms of the salivary gland. Using a mouthpiece that delivers an electrical current through the oral mucosa upon patient activation with a remote control, researchers have tested the hypothesis that a dental implant supported crown that is also activated by a remote control. Results from the mouthpiece study revealed that there were no differences in symptoms of xerostomia than a sham condition. Furthermore, longitudinal results of the active device revealed significant improvements in oral dryness, speech difficulty, sleeping difficulty, and resting salivary flow rate over time. While the mouthpiece device has been tested on a fairly large group of patients, the study on the dental implant supported electrostimulator only included one patient. That patient reported improvements in oral wetness as well as a concomitant increase in salivary flow.

Hyperbaric oxygen therapy

Speculation about the role that hyperbaric oxygen (HBO) therapy could play in the treatment of xerostomia has stemmed from its previously demonstrated effects on antigenesis and revascularization of tissues. Gerfal et al. studied the effect of HBO on xerostomia in a consecutive series of twenty-one patients with head and neck cancer at one and two years post administration of HBO. Their results revealed a significant improvement in symptoms of xerostomia and saliva quantity at the one year mark. However, at the two year mark, patients had received HBO within one year of RT than those who received HBO more than one year after RT. However, there was neither a control group nor randomization of HBO condition, which may have revealed that HBO was effective at increasing saliva flow and not simply some degree of recovery or adaptation on the patients’ part to their changing circumstances. In an attempt to investigate the effect of a standardized protocol of HBO delivered beginning two days within completion of treatment on symptoms of xerostomia, Better scores than controls on questions related to xerostomia. While this study was randomized, there was no sham HBO condition, which may have revealed whether or not a Hawthorne effect influenced the results.

Conclusion

The literature on the prevention and treatment of xerostomia reveals the advancements in understanding this complex condition made in recent years. One of...
the most promising developments in the prevention of xerostomia is the advent of IMRT. Additionally, the SGT is a low cost alternative for certain patients with head and neck cancer who are treated at facilities where the advanced technology needed for IMRT is not available.

With respect to the treatment of xerostomia, several advances have been made. Whether considering medical treatment, alternative treatments such as acupuncture, or medical treatments such as HBRT, a distinction must be made between promoting salivary flow versus altering patient perception of dry mouth. While salivary flow may be necessary to maintain certain aspects of oral health, the patient's perception of dry mouth is more important than not, the subjective feeling of xerostomia and its detriment to quality of life. Intentional outcomes, must be interpreted in the context of perceptional outcomes. One new item on the market that has the potential to relieve the discomfort associated with xerostomia, especially in night, is the XEROS dry mouth pump. The device is currently only substantiated by patient testimonials and requires the rigor of scientific evaluation before any conclusions can be drawn regarding its efficacy.

Finally, exciting new areas of regenerative medicine are opening up new possibilities related to salivary gland regeneration using stem cells. While the research is still focused on animal models, future application in human clinical trials will be important in the field of prevention and treatment of xerostomia.

Conflict of Interest

The author has no conflict of interest to report.

REFERENCES

Clinical practice recommendations for non fluoride anticaries products: review and summary

Frieda A. Pickett, RDH, MS

ABSTRACT
Objective: The American Dental Association Council on Scientific Affairs selected an expert panel to review the science regarding efficacy for non fluoride anticaries products and to assist practitioners with decisions on the use of non fluoride caries preventive agents to arrest, prevent or reverse caries. The purpose of this paper is to review and summarize the most important aspects of the panel’s report. Methods: The expert panel conducted a systematic review of the literature to answer the following clinical questions: 1. In the general population, does the use of a non fluoride caries preventive agent reduce the incidence, arrest or reverse caries? 2. In individuals at higher caries risk, does the use of a non fluoride caries preventive agent reduce incidence, arrest or reverse caries? Findings: The majority of non fluoride agents—xylitol, chlorhexidine, amorphous calcium or casein derivatives—have weak evidence as anticaries agents and most were not recommended for use. Those recommended were to be used as adjuncts in individuals at high risk of developing caries. Conclusion: Only one product, chlorhexidine/thymol varnish, received a recommendation for reducing root caries. One product was graded as having weak evidence for implementation—sucrose free polyol—xylitol only or polyol combinations chewing gum—for coronal caries reduction. The panel strongly recommended that practitioners first implement evidence based anticaries products or practices—fluoride, sealants, dietary practices limiting sugar consumption—before attempting to use non fluoride adjunctive therapies.

INTRODUCTION
A standard of care for health professions is to develop clinical practice guidelines based on the most reliable science. As well, health professionals must develop skills as scientists to identify reliable study designs and correctly interpret data presented within studies. In addition, oral health professionals must be aware that product claims may not represent product efficacy. The current trend is to be aware of best practices for intraoral procedures for delivery of optimal clinical care to clients. Clients expect the clinician to be aware of new therapies with improved outcomes when compared to older, traditional therapies, to offer effective treatment options, and to consider the financial burden to the client. Information changes over the years and new evidence based treatment options must be considered. The systematic review (SR) is the highest level of evidence for scientific investigation.

The American Dental Association, Council on Scientific Affairs formed an expert panel of eighteen additional scientists, policy experts and committees. The panel evaluated studies of sucrose free polyol chewing gums, xylitol dentifrices, chlorhexidine, chlorhexidine in combination with thymol, calcium containing agents, phosphate containing agents, casein derivatives, sialogogues, iodine and triclosan. This panel presented evidence based clinical recommendations for products, but stipulated they be used as adjuncts to primary anticaries.

Key words: caries, preventive dentistry, non fluoride caries prevention

RESUMÉ

Vinucidal. Bactericidal. Tuberculocidal. Just not harmful to you or your patients.OPTIM® disinfecting wipes kill germs on surfaces fast — up to 10 times faster than other leading cleaners, OPTIM® cleans supreme using a patented formulation based on Hydrogen Peroxide that has virtually no odor. Also, the solution readily biodegrades into water and oxygen after disinfection. So OPTIM® is eco-friendly and people friendly. In fact, it’s really only germs that aren’t too fond of it. Take control, because the stakes are too high.

For more information, please visit www.scican.com

It’s 99.9999% deadly.
Just not to you.
strategies and in individuals at high risk of caries. A summary of findings regarding the efficacy of non-fluoride agents in three areas of caries arrest or arresting or reversing the progression of caries was published. The recommendations are not to be considered a standard of care but should serve as a guideline for practitioners. This paper will review the recommendations of the expert panel completing the SR and the levels of evidence for products.

METHODS
The systematic review included an evidence summary for 66 studies, with authors described 51 randomized controlled trials (RCTs) and 15 non-randomized studies assessing the efficacy of various non-fluoride caries preventive agents. Most studies were conducted in countries outside the United States and Canada, in communities with low levels of fluoride in the water supply. Limitations of the review of studies were that participants often used fluoride-containing toothpaste, or had received regular dental care that included in-office fluoride therapies, or had been subjected to both events.

Process for developing clinical recommendations
Evidence statements were based on the body of evidence and on the level of certainty of the evidence—graded high or moderate or low—on the basis of a standardized grading system to reflect the quality of scientific evidence to support the recommendations developed from this evidence. Adverse events reported in the trials were assessed, and the panel discussed any potential adverse events that could be associated with the intervention or that could be predicted based on knowledge of the existing literature. A simple majority vote was used to make final determinations when a consensus could not be reached in interpreting evidence for clinically relevant recommendations, or when recommendations were made based largely on expert consensus. The recommendation in this case was given as "expert opinion" level of strength. Definitions for the various levels of evidence are included in the clinical guideline.

Primary anticaries strategies
An important component of the SR was the recognition of reliable evidence supporting products or dietary strategies that provide anticaries benefits. The report began with the statement, “The use of fluoride-containing toothpastes, other topically applied fluorides, fluoride-maintained varnishes, along with dietary improvement, remain mainstays of caries management. These modalities, which are based on high quality evidence, are the first choice for prevention and control of dental caries.” It is essential to note these proven strategies are to be the first choice when planning an anticaries program practice. Adjunctive agents are recommended for individuals with a high risk of caries.

RESULTS
Recommendations for non-fluoridated products
Sucrose free polyol chewing gums versus no gum
Fifteen trials were reviewed, including nine RCTs, to assess the efficacy of sucrose free, polyol chewing gums for caries prevention. The polyol gums used in trials included sorbitol only, xylitol only or polyol combinations. Trial designs entailed both controlled and uncontrolled trials and used different intervention schemes that was not given gum. A limitation of all 15 studies was that participants were not enrolled based on individual caries risk. When quality of study design was assessed, two studies were rated to be of good quality, four studies of fair quality, and the remaining studies were judged to be of poor quality. Nonetheless, a meta-analysis (MA) was performed. Six studies were excluded from the MA for incomplete reporting of data or for comparisons to sealants, toothpaste or to a non comparable outcome measure. These limitations also determined to need further studies assessing the efficacy of various non-fluoride caries preventive agents. Most studies were conducted in communities outside the United States and Canada, in communities with low levels of fluoride in the water supply. Limitations of the review of studies were that participants often used fluoride-containing toothpaste, or had received regular dental care that included in-office fluoride therapies, or had been subjected to both events.

Polysaccharide, lozenges, syrup
Four studies were selected evaluating the effects of xylitol in candy, lozenges, or tablets, and one study evaluating xylitol syrup. One study comparing xylitol lozenges to fluoride varnish was not included in the MA; it specifically enrolled high risk subjects and reported non significant difference between the xylitol and fluoride arms. The level of judgment used was a meta-analysis of xylitol dose forms to no candy, and to find statistically significant effect in favor of xylitol. Participants sucked xylitol lozenges for 10 minutes each day for 15 days. Participants were not assessed for caries risk. Of the three studies, one was judged to be of good quality, one, and the third of poor quality. Based on the limited number of studies and on expert opinion the panel concluded with low certainty, “In children reporting caries experience, consumption of xylitol containing lozenges or hard candy reduces incidence of caries.”

When the evidence for xylitol syrup was examined, one of two studies found no significant difference. This study reported a statistically significant anticaries effect for children aged 2 or younger. However, since only one study was found the panel concluded, “There is insufficient evidence that xylitol syrup prevents caries in children under 2 years of age.” A conclusion of “insufficient” evidence does not mean that the intervention is ineffective, but rather that not enough evidence exists to support a recommendation.

Table 1. Summary of recommendations from American Dental Association expert panel for non fluoride caries preventive agents

<table>
<thead>
<tr>
<th>Non-fluoride agent</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sucrose free polyol gum (sorbitol, xylitol)</td>
<td>Moderate certainty</td>
</tr>
<tr>
<td>Sucrose free polyol containing lozenges, candy, mint</td>
<td>Without any recommendation for or against based on expert opinion</td>
</tr>
<tr>
<td>Chlorhexidine/ thymol varnish</td>
<td>Moderate certainty</td>
</tr>
</tbody>
</table>

Xylitol dentifrice
Two large scale RCTs comparing 10 per cent xylitol in fluoride dentifrice with fluoride dentifrices without xylitol were included in the pooled analysis. One study comparing xylitol lozenge to fluoride varnish was not included in the MA; it specifically enrolled high risk subjects and reported non significant difference between the xylitol and fluoride arms. The level of judgment used was a meta-analysis of xylitol dose forms to no candy, and to find statistically significant effect in favor of xylitol. Participants sucked xylitol lozenges for 10 minutes each day for 15 days. Participants were not assessed for caries risk. Of the three studies, one was judged to be of good quality, one, and the third of poor quality. Based on the limited number of studies and on expert opinion the panel concluded with low certainty, “In children reporting caries experience, consumption of xylitol containing lozenges or hard candy reduces incidence of caries.”

Antibacterial agents (triclosan and iodine)
The panel found no published literature evaluating the effects of triclosan alone on caries prevention. Therefore, the panel recommended using moderate certainty evidence that triclosan lowers incidence of caries.

Iodine reduces Streptococcus mutans concentrations in saliva and results in reductions in caries. One study evaluated 10 percent povidone-iodine on coronal caries in pre school and school aged children. Three studies assessed caries using a visual examination. One study used laser fluorescence for diagnosis and reported quantitative laser fluorescence scores. Two studies were judged to be of fair quality and two studies of good quality. All studies were relatively small, concluding that there is insufficient evidence because of differences in outcome measures reported in the studies. The panel concluded, “There is insufficient evidence that use of iodine lowers incidence of caries.”

Topical chlorhexidine (CHX) products
Mineralization of demineralized enamel has been suggested by CHX products. The panel included in a summary of the products, the varying delivery mechanisms, differing study designs and the varied results made determination of efficacy for each agent difficult. The panel was unable to group them into an
MA. The panel concluded, "There is insufficient evidence from clinical trials that use of agents containing calcium and/or phosphates with or without casein derivatives lowers incidence of either coronal or root caries." 

Mother to child transmission of caries promoting factors
Four studies evaluated the use of caries preventive agents in mothers aimed at positively affecting the caries status of their children. One RCT evaluated 10 percent CHX varnish and 40 percent CHX varnish compared to fluoride varnish; it reported that use of xylitol gum significantly lowered the incidence of caries in children. One RCT evaluated 10 percent CHX varnish and reported a non significant difference in caries increment while the other controlled trial evaluated 1 percent CHX gel and reported a statistically significant reduction in caries experience. The fourth study evaluated the reduction in caries with calcium supplementation in mothers and its effect on children. Authors reported a 27 percent reduction in risk of developing caries. Two studies were judged to be of fair quality while the other two were of poor quality. Based on these four trials which were conducted on different agents the panel concluded, "There is insufficient evidence that use of xylitol gum, chlorhexidine varnish or gel or calcium supplementation in mothers lowers incidence of caries in children." The panel noted that pregnant women were not included in any of the studies for non fluoridated products, so products have not been shown to be safe for this population.

CONCLUSION
The panel reported weak evidence for sucrose free polyol chewing gum to be recommended to parents and caregivers of children ≥5 years old for coronal caries prevention. Xylitol only gum or polyol combinations were recommended for children and should be chewed for 10 to 20 minutes, after meals. Expert opinion supported advising adults to chew polyol gum for caries prevention and also recommending for use of xylitol candy or hard lozenges in adults and children ≥5 years. If xylitol hard candy or mints is advised, the patient should be told to consume 5 to 8 grams divided into 2 or 3 doses each day. The panel found insufficient evidence to recommend xylitol syrup, xylitol in dentifrices, triclosan, iodine, sylogogues, and calcium phosphate/ACP or casein derivative products for caries prevention. None of the non fluoridated agents should be advised for use in pregnant mothers as agents have not been studied in this group.

Evidence was weak, however, in the in office application of 1:1 mixture of chlorhexidine/thymol varnish was recommended every three months for the reduction of root caries, but not for coronal caries. Other forms of CHX—0.5 to 1% CHX gel or CHX gel combined with fluoride—were not recommended for root caries prevention, and neither were 0.12 percent CHX rinses, alone or in combination with fluoride. No CHX product was recommended for coronal caries prevention.

REFERENCES
EVIDENCE FOR PRACTICE

Oral health needs of Canadian prisoners as described by formerly incarcerated New Brunswickers
Andrea B.E. Lalto, RNC, DipDH, RDH, Lindsay M. Pitcher, DipDH, RDH

ABSTRACT
Background: The oral health of prison populations in several countries has been shown to be compromised. However, little published research on Canadian prison populations is available. The purpose of this research paper is to determine whether such populations in Canada also suffer from compromised oral health.

Methods: A convenience sample of forty-one formerly incarcerated individuals participated in the study in three New Brunswick urban centres. The study consisted of a questionnaire administered as a structured interview.

Results: Reported risk factors included tobacco use (74% of respondents), type 2 diabetes (13%), drug or alcohol dependency (38%), and consumption of cariogenic foods and beverages (100%). One hundred percent of the sample reported access to toothbrushes and dentifrice, while 42% reported access to dental floss or floss picks. Seventy-six per cent reported toothbrushing frequency ≤ twice daily; 68 per cent reported “never” flossing. Fifty-four per cent reported having had dental treatment while incarcerated. The majority of the respondents (85%) expressed interest in a complimentary dental cleaning.

Conclusion: The findings were consistent with the results of studies from Australia and the UK. Dental hygienists may help prisoners meet their specific oral health needs once these are properly identified through appropriate research such as clinical studies.

Key words: oral health; health behaviour; public health; dental anxiety; tobacco; substance related disorders; dental health services

RESUMÉ
Contexte: La santé bucco-dentaire de la population carcérale s’avère compromise dans plusieurs pays, mais peu de publications en font état au Canada. Le présent article cherche donc à établir si la santé bucco-dentaire de ce type de population est aussi compromise dans notre pays.

Méthodes: Un échantillon de volontaires de quarante et un anciens prisonniers de divers centres urbains du Nouveau-Brunswick a participé à l’étude où un questionnaire a été présenté sous forme d’entretien structuré.

Résultats: Les facteurs de risque rapportés comprenaient le tabagisme (74% des répondants), la diabétologie de type 2 (13%), la dépendance à la drogue et l’alcool (38%) et la consommation de produits alimentaires et de boissons cariogènes (100%). Un taux de 100% de la population du groupe a indiqué l’existence d’un dents et d’une brosse à dents. La population de l’échantillon a indiqué un intérêt pour une consultation de soins bucco-dentaires gratuites.

Conclusion: Les résultats sont identiques à ceux obtenus dans des études similaires réalisées en Australie et au Royaume-Uni. Les hygiénistes dentaires peuvent aider les prisonniers à répondre à leurs besoins spécifiques de soins bucco-dentaires, sous réserve d’une étude plus approfondie des conditions de soins à l’intérieur des prisons.

Key words: santé bucco-dentaire; santé publique; tabagisme; diabétologie; consommation de produits alimentaires et de boissons cariogènes; soins bucco-dentaires gratuits

The Corrections and Conditional Release Act mandates the provision of dental care to prisoners in federal facilities, and CSC’s policies define dental care as an essential health service.3 CSC reports state that a functioning dental program is considered a basic necessity for prisoners.3 Inmates of institutions under CSC’s jurisdiction may receive preventive and restorative care, in addition to emergency treatment,4 while prisoners in provincial institutions may receive emergency treatment only (New
government administered institutions, the authors were unable to survey incarcerated individuals serving their time at these facilities. They tried to augment the information obtained in this study by contacting several key informants by entering participants into draws for a free dental cleaning at Oulton College Dental Hygiene Clinic and a gift. Participants were invited to call the respective respondents via the CSC website contact form, and the NB Director of Public Safety Institutional Services was contacted. Through several direct contact attempts, it was only clear to the interviewers that many of their responses were fabricated; thus their information was omitted by one respondent.

Bias and limitations

The authors identified several limitations of this study and contributors to bias in the research design that should be taken into consideration:

- Face to face interviews may have influenced the respondents’ answers. Though it is believed that this method of questionnaire administration contributed to an overall higher degree of validity, the respondents may have been reluctant to answer sensitive questions honestly or may have provided answers that they believed would please the interviewers. A letter to the respondents regarding the importance of the study may have been printed in the newspapers, and a newsletter was later inserted into the prison’s newsletter.

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Risk factors and disease

Risk factors and disease

- Time restrictions and due process within the Oulton College Ethics Committee, a pilot study of six questionnaires was conducted at Community Chaplaincy for Ex-Offenders, Moncton. Following this pilot study, minor alterations to the questionnaire were made. The pilot questionnaires were included in the final calculations to increase sample size, as the content of the questionnaire was essentially unchanged. Amendments to the questionnaire (see Supplementary information) were as follows:

  - The question regarding date, institution, and length of incarceration was streamlined to expedite data collection; it provided multiple Atlantic region institutions as check box options, as well as an option to write in unlisted institutions. The same format was applied to the question regarding what dental services were accessed while incarcerated.

  - Negative responses were added to check box lists, for example, “none of the above” or “never.”

  - Wordings for the Likert scale of 1 to 5 used to evaluate attitudes towards dental services was simplified, for example, from “very poor” to “strongly disagree.”

  - The limited number of female respondents should be taken into consideration: for example, from “very poor” to “strongly disagree.”

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  - The limited number of female respondents should be taken into consideration: for example, from “very poor” to “strongly disagree.”

  - The question regarding date, institution, and length of incarceration was streamlined to expedite data collection; it provided multiple Atlantic region institutions as check box options, as well as an option to write in unlisted institutions. The same format was applied to the question regarding what dental services were accessed while incarcerated.

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in 1995 reported tobacco use, which is over twice the expected prevalence based on Canadian males of similar ages.13 Heidari et al. also found self reports of tobacco use similar to this study—78 per cent prevalence for an average of fifteen years.12

The data obtained from this study’s reports of sexually transmitted infections (STIs) are unlikely to reflect accurately the sexual status of the sample, partially due to the vague nature of the term “STI” and the lack of a clearly communicated definition during the interviews. It is recommended that future studies adopt CSC’s Infectious Disease Surveillance System definition (documenting HIV and HCV independently of STIs)12 and communicate a specific definition of the term “STI” to respondents.

This study indicated high prevalence of drug or alcohol dependence while incarcerated; this finding may still underestimate actual prevalence. The prevalence of drug or alcohol abuse at intake among CSC prisoners has been found to approximate 70 per cent.10 Illicit drug use, with less indication of dependency, was reported by 83 per cent in the sample of Heidari et al.14 CSC data state that 11 per cent of inmates reported injecting drugs since being admitted into custody.15 Collection of data on drug and alcohol use within prisons may be confounded by the illicit nature of these activities; for example, prisoners may be unwilling to report drug use when surveyed.

Prisoners’ access to cariogenic foods and beverages has been noted in the USA and the UK.16,17 It is recommended that future studies consider frequency of cariogenic diet as well as overall nutritional value of cariogenic foods.

**Oral hygiene habits and denture use**

Questions regarding respondents’ access to oral hygiene supplies and their toothbrushing and flossing habits were not answered by one respondent; therefore, the statistics regarding oral hygiene habits are based on only thirty-eight respondents’ reports. All other statistics are based on thirty-nine included responses. One hundred per cent (38/38) of the respondents reported having access to a toothbrush, all (38/38) to dentifrice, and 42 per cent (16/38) to dental floss or floss picks while incarcerated. Seventy-six per cent (29/38) of respondents reported toothbrushing frequency greater than or equal to twice daily, and 11 per cent (4/38) reported frequency less than once per day while incarcerated. However, 68 per cent (26/38) reported never using interdental aids, and only 16 per cent (6/38) reported frequency of using an interdental aid greater than or equal to once daily while incarcerated. An interesting discovery was that boredom was cited informally as a factor contributing to poor toothbrushing technique, did not respond truthfully to the examiners’ questionnaire, or have high exposure to cariogenic diet between toothbrushing. These findings illustrate the need for clinical research within Canadian correctional facilities.

**Attitudes towards dental services**

Twenty-nine per cent (9/39) of the respondents reported having dental fear or anxiety. Thirty-three per cent per cent (13/39) of the respondents felt that their access to dental care had improved since release, 23 per cent (9/39) felt that it had deteriorated and 44 per cent (17/39) felt that it had remained the same. Eighty-five per cent (33/39) felt that it was over twice the expected prevalence based on Canadian males of similar ages.13 Self reported toothbrushing frequency were similar to reported frequencies for the general population.13 Similar findings were noted in the UK—77 per cent of a sample of prisoners at Her Majesty’s Prison (HMP) Leeds, HMP Waelstun, and Wetherby Young Offenders’ Institution, and 70 per cent of a sample at HMP Brixton reported brushing twice per day.12,26 However, it should be noted that the same HMP Brixton sample population was also found to exhibit high plaque levels, decayed/ missing/ filled tooth index (DMFT) scores, and periodontal disease prevalence. A study in Australia also recorded self reports of high toothbrushing frequency—50 per cent of respondents brushing twice in one day—with high DMFT scores and higher extraction rates than the general Australian population.13 The authors of the study at HMP Brixton do not discuss possible reasons for the discrepancy between reported toothbrushing frequency and dental treatment, if it may be that prisoners have poor toothbrushing technique, did not respond truthfully to the examiners’ questionnaire, or have high exposure to cariogenic diet between toothbrushing. These findings illustrate the need for clinical research within Canadian correctional facilities.

**Consumer Corner** – Laltoo and Pitcher

**Figure 1:** Consumption of listed cariogenic foods and beverages reported by the sample population (N=39).

<table>
<thead>
<tr>
<th>Food or beverage</th>
<th>Number of respondents reporting consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breath mints</td>
<td>35</td>
</tr>
<tr>
<td>Cough drops</td>
<td>30</td>
</tr>
<tr>
<td>Cookies</td>
<td>25</td>
</tr>
<tr>
<td>Chips</td>
<td>20</td>
</tr>
<tr>
<td>Crackers</td>
<td>15</td>
</tr>
<tr>
<td>Coffee/tea with sugar</td>
<td>10</td>
</tr>
<tr>
<td>Pop, juice, Tang</td>
<td>5</td>
</tr>
<tr>
<td>Energy drinks</td>
<td>0</td>
</tr>
<tr>
<td>Sports drinks</td>
<td>0</td>
</tr>
<tr>
<td>Chocolate</td>
<td>0</td>
</tr>
</tbody>
</table>

**Mean rating of Likert scale of 1 to 5 shown with corresponding standard deviation**

- **Cleanliness**
  - Atlantic provincial institutions: 4.2 (0.4)
  - Atlantic federal institutions: 4.0 (0.5)

- **Explanation**
  - Atlantic provincial institutions: 3.9 (0.8)
  - Atlantic federal institutions: 3.5 (1.0)

- **Addressing all concerns**
  - Atlantic provincial institutions: 4.0 (0.6)
  - Atlantic federal institutions: 4.0 (0.6)

- **Wait time (from request to treatment)**
  - Atlantic provincial institutions: 2.9 (0.8)
  - Atlantic federal institutions: 2.4 (0.8)

- **Comfort**
  - Atlantic provincial institutions: 4.5 (0.6)
  - Atlantic federal institutions: 4.5 (0.6)

- **Overall quality of care**
  - Atlantic provincial institutions: 4.5 (0.6)
  - Atlantic federal institutions: 4.5 (0.6)

**Figure 2:** Attitudes towards providing dental services among respondents accessing dental services while incarcerated in federally operated Atlantic region facilities, 33 per cent (7/21) in provincially operated Atlantic region facilities, and 14 per cent (3/21) in other Canadian or American facilities.

**Student Corner – Laltoo and Pitcher**

**Oral health needs of Canadian prisoners**

Con / Dent Hygiene 2012, 46, no.3: 173–180
towards these dental services conveyed by respondents who engaged in dental services while incarcerated. However, when incarcerated, dental care is primarily provided at federally administered and provincially administered correctional facilities within Atlantic Canada. Eighty-six per cent (86%) reported dental services were paid for by prison confinement, 10 per cent (2/21) by Ministry of Indian Affairs and Northern Development, and 14 per cent (3/23) by social services.

This study found that extraction was the most frequently reported service accessed at respondents’ most recent dental visit, followed by routine cleaning. However, when incarcerated extraction was the most common dental treatment received by 49 per cent of respondents. Extraction was also the most reported dental treatment among inmates. The extraction rate among all inmates was 85% of whom 81% reported having extracted teeth. Inmates who had extracted teeth were more likely to be male, younger, and of lower income.

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Conclusion

Discussion

Acknowledgements

CONCLUSION
Summary of findings

Recommendations for future research

Significance of findings to Dental Hygiene Researchers

Otto et al. recommended that oral health education and services are important public health opportunities to improve the health status of prisoners, including oral health. The incorporation of oral health education and services in this group in good oral health care practices and provide the necessary treatment. Other recommendations in the literature include increased access to dental care, oral hygiene and diet counselling programmes to decrease dental decay among prisoners and additional periodontal care to create healthy diets in the prison system based on treatment needs.

Numerous strategies have been explored to provide dental services to prisoners. Tactics employed in the United States include permanent staffing by US Public Health Service dentists, private contractors, partnerships between academic institutions and prisons to provide dental and dental hygiene services, and employing prisoners themselves as dental assistants.

In Canada, arrangements for dental treatment have involved salaried part time dental staff, prisoners trained to fabricate dentures, and services provided by local dentists. However, by Canadian standards, it may in fact be somewhat high: a recent survey of 1101 Canadians indicated that 15.3 per cent of the general adult population is expected to be at least somewhat afraid of the dentist. The results of the present study did not indicate clearly whether former prisoners’ access to dental services was perceived to be changes and improvement. However, CSC data suggest that federally incarcerated individuals visit the dentist more frequently than those outside. Their respondents generally rated their oral health as poor and thought they needed dental services and have increased dental treatment needs when compared to those with higher incomes.

To the findings of Heidari et al. that prisoners made extraction the most frequent treatment performed by US Public Health Service dentists, private contractors, partnerships between academic institutions and prisons to provide dental and dental hygiene services, and employing prisoners themselves as dental assistants. The legal mandate for dental services in Canadian correctional facilities could provide increased opportunities for dental hygienists to provide oral health promotion and screening services, access to dental and clinical services, to a population with multiple oral health risk factors. There may also be partnerships formed with private sector corporations or educational institutions for which hygienists could act as administrators.

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Conclusions

This study was relatively small compared to the total number of prisoners in Canada. However, the results were consistent with the findings of previous studies. The results of this study suggest that the dental care needs of prisoners are similar to those of the general population. The findings also highlight the importance of providing dental care to prisoners to improve their oral health and reduce the risk of dental disease.

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Dental digital radiography

The introduction of dental digital radiography has provided expanded opportunities for the use of computerized diagnostic tools in dental healthcare. What once was an expensive and rare piece of technology is now commonplace in private practice. But do advanced technologies translate to improved patient care? How has digital technology impacted treatment modalities, patient health, and technology upgrades for dental hygienists? The following titles of peer reviewed articles were selected from PubMed using the terms “digital dental radiography”, “mandibular x-ray”, “dental hygiene”, “oral hygiene”, “periodontology” and “computer aided diagnostics.” They explore the questions we asked that might capture your reading interest as a key player in the oral health profession. Links to the articles follow the titles, not all links open to full articles especially those published recently, and you may have to use resources from your universities or employers to access the full article in the pursuit of continuing professional development (CPD). Take your comments to journal@cdha.ca as a “letter to the editor” for consideration in the journal.

1. Digital imaging in dentistry

2. Facilities update: new spaces, new technologies

3. Tele-dentistry-assisted, affiliated practice for your comments to journal@cdha.ca as a “letter to the editor” for consideration in the journal.

4. Panoramic radiography: digital technology fosters efficiency

5. Intraoral digital radiography: a safe, cost-efficient imaging solution

6. Utility and effectiveness of computer-aided diagnosis of dental caries

7. Computers—they’re ubiquitous!

8. Is the current generation of technology facilitating better dentistry?

9. Comparative dental radiographic identification using flat panel CT

10. Electronic dental records: start taking the steps.

11. Enterprise-wide implementation of digital radiography in oral and maxillofacial imaging
    The University of Florida dentistry system

12. Comparison of Er:YAG laser debondment versus conventional scaling and root planing
    Erica R. Zammit, RDH, BDS(cH)

   **Abstract**
   Objective: Although scaling and root planing (SRP) with manual and ultrasonic scalers is the traditional approach for non surgical periodontal therapy, limitations related to difficulty in accessing furcations, grooves, and deep pockets have led to the exploration of other therapeutic modalities. The aim of this review was to investigate whether the Er:YAG laser is more efficacious than conventional SRP in the treatment of chronic periodontitis.

   Method: Electronic databases searches of EBSCOHost, Pubmed, and the Cochrane Central Register of Controlled Trials (CENTRAL) were performed, identifying articles from 2000 through to end of search on June 30, 2011. A total of 413 papers were identified, of which six met review criteria. Results: Five randomized controlled clinical trials and one meta analysis were retrieved. Results for periodontal pocket depth reduction and clinical attachment level gain varied in significant difference between the two treatment groups. Only one study found significant differences between the two modalities of treatments of gingival recession and bleeding on probing, while none of the studies found a significant difference among treatment modalities for plaque and gingival index levels.

   Conclusion: The available data indicate that both the Er:YAG laser and conventional SRP are effective for periodontal therapy; yet the data were inconclusive in demonstrating that the Er:YAG laser is more efficacious than conventional SRP.

   **Objective**

   With increased use of lasers in cosmetic dentistry over the past two decades, clinicians and researchers have considered the use of lasers for periodontal therapy. The ability of the erbium-yttrium-aluminum-garnet (Er:YAG) laser to prevent thermal damage while performing hard tissue ablation makes this an ideal tool for periodontal debridement. In vitro studies have demonstrated the effectiveness of the Er:YAG laser in removing subgingival calculus. The conventional instruments for periodontal debridement, manual and ultrasonic scalers, have difficulty reaching furcations, grooves, and deeper root surfaces. Clinically, the Er:YAG laser has been shown to reach areas that are difficult to access without causing trauma, making it an alternative instrument for debondment. It is thought that the heat generated with the Er:YAG laser rest in its ability to access intricate anatomical areas along with its bactericidal function.

   All studies have shown that the Er:YAG laser is safe and functional for periodontal debondment, an evidence based decision to use this laser as an alternative to conventional therapy. However, the studies have not considered efficacy in relation to clinical outcomes. Much of the early research on the Er:YAG laser was performed through
in vitro studies and did not allow for the evaluation of clinical outcomes. Over the last decade, researchers have conducted controlled clinical trials to investigate the clinical effects of the Er:YAG laser as a periodontal therapeutic modality. The purpose of this review was to address the following focused question: When considering periodontal therapy for clients with chronic periodontitis (periodontal pocket depth ≥ 4mm), is the use of the Er:YAG laser more efficacious than conventional scaling and root planing (SRP)? Variables analyzed included pocket depth (PD), clinical attachment level (CAL), gingival recession (GR), bleeding on probing (BOP), plaque index (PI), gingival index (GI) and microbiological data.

**RESULTS**

The search strategy resulted in sixty-one potential papers based on titles with abstracts (Figure 1). Papers not relevant to the focused question and duplicate papers were removed, resulting in eight papers for full text examination. Upon examination, two papers did not meet the eligibility criteria, and the paper included a systematic review without meta-analysis, and the other explored all of the pertinent clinical parameters, without comparison of the Er:YAG laser with manual or ultrasonic SRP alone. The six papers included in the review consisted of five split mouth randomized clinical trials and one meta-analysis.

**DISCUSSION**

**Periodontal Pocket Depth (PD)**

Six studies examined pocket depth and indicated that both SRP and Er:YAG laser treatment resulted in significant differences in pocket depth reduction. However, the results varied in significant difference between the two treatment groups for PD reduction:

- **no significant difference between groups at one, three, six and twelve months after treatment,**
- **no significant difference between groups at three and six months after treatment,**
- **a significant difference between groups at three months, and at one and two years after treatment,**
- **the SRP group showed PD reduction at three months but with little improvement thereafter, whereas the Er:YAG laser group continued to show improvement in PD for up to two years, with pocket reduction being more significant in PD≥7mm,**
- **significant difference between groups at one and two years after treatment with PD≥7mm showing the greatest change,**
- **the Er:YAG laser group had significantly better PD reduction at one month after treatment, but at four months after treatment there was no further improvement in the laser group and no significant differences between groups,**
- **a reduction in PD for both treatment groups, but with no significant difference between treatment groups at six and twelve months after treatment.**

The differences in findings among studies for pocket depth reduction could be related to variation in the mean initial pocket depth. As well, only two of the studies divided the periodontal pockets into sub groups according to depth to allow for comparison of pocket depth reduction to initial pocket depth. These studies found that there was a greater probability of PD reduction with pockets that were deeper at baseline. Since the results for pocket depth reduction varied, future studies need to analyze this clinical outcome in detail and remove confounding factors.

**Gingival Recession (GR)**

Similar to PD reduction, six of the studies indicated that both the SRP and Er:YAG laser treatment groups led to significant CAL gain but with varied results in significant difference between treatment groups. A summary of results of the studies shows in CAL is as follows:

- **no significant difference between the two treatment groups for all time periods,**
- **no significant difference in CAL gain between the two groups at three and six months after treatment,**
- **significant difference in CAL gain between the two groups at one month after treatment only,**
- **significant difference in CAL gain between the two groups where PD≥5mm for all time periods, the SRP group did not have significant CAL gain after three months whereas the Er:YAG laser group continued to show improvement up to two years after treatment,**
- **the Er:YAG laser group had significantly more CAL gain than the SRP group at two years after treatment, with sites of deeper pocket depth having more CAL gain,**
- **no significant differences between groups at six and twelve months after treatment.**

The variance in findings among studies for changes in CAL could be related to a difference in the mean initial pocket depth, similar to the findings for pocket depth reduction.

**Bleeding on Probing (BOP)**

Similar to the results for gingival recession, three studies found that while both treatments were capable of reducing BOP, there was no significant difference between the two treatment groups, while one study did find a significant difference between the two groups. The findings of the studies for BOP are as follows:

- **a significant reduction in BOP within groups for all time periods but the comparison of results between groups was not clearly documented,**
- **results for changes in BOP were similar at three and six months for both groups,**
- **both treatments were capable of significantly reducing BOP in all three groups after four months after treatment, but without significant differences between groups,**
- **both groups displayed a greater significant reduction in BOP at one year after treatment,**
- **but the Er:YAG laser group had a more significant reduction in comparison to the SRP group.**

**Plaque Index (PI)**

Five studies measured plaque index levels and found no significant difference in plaque reduction between the SRP and Er:YAG laser groups in PI:

- **a significant reduction in PI levels for both groups at three, six and twelve months after treatment, with no significant difference between groups,**
- **PI reduction was similar for both groups at three and six months after treatment,**
- **no significant difference within or between groups for PI at one month after treatment,**
- **no significant difference between or within groups for PI levels at one and four months after treatment,**
- **no significant difference between or within groups at one and two years after treatment.**

**Gingival Index (GI)**

Three studies investigated gingival index levels as a clinical outcome and found no significant difference between the two treatments. The following data lists the results of the studies related to changes in gingival index:

- **a significant reduction in GI levels at three, six and twelve months after treatment for the SRP group only with no significant difference between the two groups,**
- **significant differences within each group at three months and one year after treatment; with no significant difference between groups at any time period,**
- **significant differences within groups at one and two years after treatment with no significant difference in GI levels between the SRP and Er:YAG laser group.**

**Microbiological Analysis (MA)**

Three studies performed microbiological analysis on subgingival plaque samples, and the results were:

- **the Er:YAG laser group had a significant reduction in: Aggregatibacter actinomycetemcomitans (Aa) at twelve days and one, six and twelve months; Porphyromonas gingivalis (Pg) at twelve days and one, three and twelve months; and Prevotella nigrescens (Pn) and Tannerella forsythia (Tf) at twelve days and one month**
Conflict of Interest
The author declares that there was no funding for this review and no conflict of interest.

REFERENCES
14. CDHA
The Canadian Journal of Dental Hygiene (CJDH) provides a forum for the dissemination of dental hygiene research to enrich the body of knowledge within the profession. Further, the intent is to increase interest in, and awareness of, research within the dental hygiene community.

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2. **Abstract:** Abstract should be limited to 150 words. All authors should have participated sufficiently in the work to be accountable for the results. Abstract may include 100 references. Abstract within 250 words.
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**Submission checklist:**
- Using standardized fonts such as Arial, New Times Roman, Verdana in 10–12 points.
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- Manuscript has standard margins of 1 inch (2.5 cm) at top, bottom, left and right.
- Manuscript has 25 references, and 3 authors. Abstract of 100 words.
- Editor: – 6–10 key words or short phrases from the text for indexing purposes. Terms from the Medical Subject Headings (MeSH) index are preferred. Provided signed permissions for any text or pictures of any type, including figures, tables, graphs, and photos, separately attached.
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2. **Abstract:** Abstract should be limited to 150 words. All authors should have participated sufficiently in the work to be accountable for the results. Abstract may include 100 references. Abstract within 250 words.
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