



# Quick Reference Guide of Community-Based

## Dental Health Programs

Prepared By  
Alyssa Hayes for the  
Office of the Chief Dental Officer  
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## **Quick Reference Guide of Preventive Options**

This document aims to provide a plain language overview of preventive program options that can be used in communities to prevent decay.

### ***Background***

Tooth decay (cavities) is a disease with many causes that affects all populations to different degrees. Tooth decay results from bacterial attack on the teeth combined with sub-optimal oral hygiene practices and can be prevented. The use of fluoride (in various forms) for preventing tooth decay started in the 1940s and has been proven to be effective, safe and equitable. In combination with a nutritious, well balanced diet (low in sugar), fluoride use has resulted in reduced amounts of decay. Fluoride can now be found in many products including water, toothpastes, dental materials and mouthwashes and occurs naturally in soil, rock and water.

### ***Program options***

- Community water fluoridation
- Tooth brushing program
- Fluoride varnish program
- School sealant program
- Fluoride gel program
- Fluoride rinsing program
- Other (Salt fluoridation, Milk fluoridation, School water fluoridation, Xylitol, Casein derivatives)
- Combinations of programs

## **Community Water Fluoridation (CWF)**

### *What is it?*

- The process by which fluoride is added to the community water source. Fluoride levels are monitored to ensure the fluoride remains within the optimal range for preventing cavities
- The current level recommended for dental health is 0.7mg/L (well below the maximum acceptable concentration of 1.5mg/L).<sup>1</sup>
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### *What is in the literature?*

- Reduces inequalities and benefits everyone despite age, income and education.
- Health Canada endorses water fluoridation at the above mentioned level, and states that “the weight of the evidence from all currently available studies does not support a link between exposure to fluoride in drinking water at 1.5mg/L and any adverse health effects, including those related to cancer, immunotoxicity, reproductive/developmental toxicity, genotoxicity and/or neurotoxicity. It also does not support a link between fluoride exposure and intelligence quotient deficit.”<sup>1</sup>
- The Canadian Dental Association (CDA) “supports fluoridation of municipal drinking water (at minimum levels required for efficacy as recommended by the Federal-Provincial-Territorial Committee on Drinking Water) as a safe, effective and economical means of preventing dental caries in all age groups.”<sup>2</sup>
- Community water fluoridation reduces dental inequalities, especially in those of lower socio-economic status<sup>3</sup>
- There is an additive benefit to water fluoridation above that seen with toothpastes alone<sup>4</sup>

### *What is the amount of caries reduction?*

- The caries reduction associated with CWF ranges from 29.1 to 50.7 percent<sup>5</sup>

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<sup>1</sup> Health Canada. Guidelines for Canadian Drinking Water Quality: Guideline Technical Document- Fluoride. Water, Air and Climate Change Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa 2010

<sup>2</sup> Canadian Dental Association. CDA position on Use of Fluorides in caries prevention. [http://www.cda-adc.ca/files/position\\_statements/Fluorides-English-2010-06-08.pdf](http://www.cda-adc.ca/files/position_statements/Fluorides-English-2010-06-08.pdf). Last accessed 15/7/2011

<sup>3</sup> Riley JC, Lennon MA, Ellwood RP. The effect of water fluoridation and social inequalities on dental caries in 5-year-old children. *Int J of Epidemiol* 1999; 28: 300-305

<sup>4</sup> Report of the Fort Collins Fluoride technical study group. April 2003  
<http://www.healthdistrict.org/fluoridereport/FTSG.htm>. Last accessed 15/7/2011

<sup>5</sup> Guide to Community Services. Preventing dental caries: community water fluoridation.  
[www.thecommunityguide.org/oral/fluoridation.html\(fluoridation.html\)](http://www.thecommunityguide.org/oral/fluoridation.html(fluoridation.html)). Last accessed 15/7/2011

## **Tooth Brushing Program**

### *What is it?*

- A school-based program where students are provided with the opportunity to clean their teeth at least once a day with fluoridated toothpaste. This is done under the supervision of trained staff members.

### *What is in the literature?*

- A trial which mailed-out free toothpaste and toothbrushes resulted in 16 percent reduction in decayed, missing, filled teeth (dmft) scores<sup>6</sup>
- A 2-year school toothbrushing program resulted in 32 percent to 56 percent fewer carious lesions in the children's first permanent molars<sup>7</sup>
- The use of fluoridated toothpaste is the most common way to control tooth decay rates<sup>8</sup>
- The benefit of using toothpastes is greater in communities with higher decay rates<sup>8</sup>
- Early results from the 'Fit for School' initiative in the Philippines have shown a 40 percent reduction in dental caries and a 60 percent reduction in caries progression into the dental pulp<sup>9</sup>

### *What is the amount of caries reduction?*

- Toothpastes containing at least 1000 ppm of fluoride reduced the Decayed, Missing, Filled Surfaces (DMFS) by 23 percent<sup>10</sup>
- School programs have shown 32 percent to 56 percent reduction in caries<sup>7</sup>

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<sup>6</sup> Davies GM *et al.* A randomised controlled trial of the effectiveness of providing free fluoride toothpaste from the age of 12 months on reducing caries in 5-6-year old children. *Community Dental Health* 2002; 19: 131-136

<sup>7</sup> Curnow MMT *et al.* A randomised controlled trial of the efficacy of supervised toothbrushing in high-caries-risk-children. *Caries Res* 2002; 36: 294-300

<sup>8</sup> Marinho VCC, Higgins JPT, Logan S, Sheiham A. Fluoride toothpastes for preventing dental caries in children and adolescents. *Cochrane Database of Systematic Reviews* 2003, Issue 1. Art No.: CD002278. DOI: 10.1002/14641858.CD00278

<sup>9</sup> Fit For School website. <http://www.fitforschool.ph/toothbrushing.html>. Last accessed 17/10/11

<sup>10</sup> Walsh T, Worthington HV, Glenny AM, Marinho VCC, Shi X. Fluoride toothpastes of different concentrations for preventing dental caries in children and adolescents. *Cochrane Database of Systematic Reviews* 2010, Issue 1. Art No.: CD007868. DOI: 10.1002/14651858.CD007868.pub2.

## **Fluoride Varnish Program**

### *What is it?*

- It is the process of painting on a topical fluoride varnish by a trained team member. Once the varnish is applied, the patient cannot eat or drink for a designated time (according to manufacturer's instructions) to allow maximum uptake of the fluoride into the teeth.

### *What is in the literature?*

- A study conducted in the Sioux Lookout Zone (SLZ), using fluoride varnish application along with caregiver counselling resulted in a 24.5% reduction in caries. Also those who received only counselling were nearly 2 times more likely to develop tooth decay.<sup>11</sup>
- An Australian study of Aboriginal children living in remote communities showed that those who received fluoride varnish as well as health promotion activities, had 24 to 36 percent less tooth surfaces affected by dental caries over a 2 year period (compared to those who did not receive any intervention)<sup>12</sup>
- Bi-annual application is sufficient to achieve caries prevention<sup>13</sup>

### *What is the amount of caries reduction?*

- An average 46 percent reduction in DMFS was seen for adult teeth. While an average of 33 percent reduction in DMFS was seen for baby teeth<sup>14</sup>

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<sup>11</sup> Lawrence HP *et al.* A 2-year community-randomized controlled trial of fluoride varnish to prevent early childhood caries in Aboriginal children. *Community Dent Oral Epidemiol* 2008; 36: 503-516

<sup>12</sup> Slade GD *et al.* Effect of health promotion and fluoride varnish on dental caries among Australian Aboriginal children: Results from a community-randomized controlled trial. *Community Dent Oral Epidemiol* 2011; 39: 29-43

<sup>13</sup> Azarpazhooh A, Main PA. Fluoride varnish in the prevention of dental caries in children and adolescents: A systematic review. *JCDA* 2008; 74(1): 73-79j

<sup>14</sup> Marinho VCC, Higgins JPT, Logan S, Sheiham A. Fluoride varnishes for preventing dental caries in children and adolescents. *Cochrane Database of Systematic Reviews* 2002, Issue 1. Art No.: CD00279. DOI: 10.1002/14651858.CD002279

## **School Sealant Program**

### *What is it?*

- It is the process of applying a protective coating on the chewing surfaces of newly erupted adult teeth to prevent dental decay. This process is performed by a dental provider.

### *What is in the literature?*

- Median 60 percent decrease in decay (on the chewing surface of molars and premolars) for 6 to 17 year olds<sup>15</sup>
- Sealants can be placed in both baby and adult teeth<sup>16</sup>
- Glass ionomer cement and resin-based fissure sealants are equally effective for the prevention of decay<sup>17</sup>

### *What is the amount of caries reduction?*

- Only 27 percent of teeth sealed had decayed versus 77 percent of unsealed teeth in the 9 years after placement<sup>18</sup>
- Caries reduction ranged from 87 percent (12 months post placement) to 60 percent (48 to 54 months post placement)<sup>18</sup>

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<sup>15</sup> Guide to Community Preventive Services. Preventing dental caries: school-based or-linked sealant delivery programs. [www.communityguide.org/oral/schoolsealants.html\(schoolsealants.html\)](http://www.communityguide.org/oral/schoolsealants.html(schoolsealants.html)). Last accessed 15/7/2011

<sup>16</sup> Beauchamp et al. Evidence-based clinical recommendations for the use of pit-and-fissure sealants: A report of the American Dental Association Council on Scientific Affairs. J Am Dent Assoc 2008; 139(3): 257-267

<sup>17</sup> Yengopal V, Mickenautsch S, Bezerra A, Leal SC. Caries-preventive effect of glass ionomer and resin-based fissure sealants on permanent teeth: a meta analysis. Journal of Oral Sci 2009; 51(3): 373-382

<sup>18</sup> Ahovuo-Saloranta A et al. Pit and fissure sealants for preventing dental decay in the permanent teeth of children and adolescents. Cochrane Database of Systematic reviews 2008, Issue 4. Art No.:CD001830. DOI: 10.1002/14651858.CD001830.pub3.

## **Fluoride Gel Program**

### *What is it?*

- It is the process of applying fluoride gel to the teeth in a dental setting by a dental provider.

### *What is in the literature?*

- Fluoride gels are recommended for clients with a moderate-high risk of dental decay<sup>19</sup>
- Best results seen with bi-annual applications<sup>20</sup>
- Effective in reducing occlusal caries if sealants are not an option<sup>21</sup>
- A 4-minute application recommended<sup>20</sup>

### *What is the amount of caries reduction?*

- 21 percent reduction in DMFS<sup>19</sup>

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<sup>19</sup> Marinho VCC, Higgins JPT, Logan S, Sheiham A. Fluoride gels for preventing dental caries in children and adolescents. Cochrane Database of Systematic Reviews 2002, Issue 1. Art No.: CD002280. DOI: 10.1002/14651858.CD002280

<sup>20</sup> Hawkins R, Locker D, Noble J. Prevention Part 7: Professionally applied topical fluorides for caries prevention. *BDJ* 2003; 195(6): 313-317

<sup>21</sup> Joost Larsen M, Kirkegård E, Fejerskov O, Poulsen S. Prevalence of dental fluorosis after fluoride-gel treatments in a low-fluoride area. *J Dent Res* 1985; 64(8):1076-1079

## **Fluoride Rinsing Program**

### *What is it?*

- It is the process of having children rinse with liquid containing fluoride at school (once a week) under the supervision of a trained staff member.

### *What is in the literature?*

- The effect of fluoride mouth rinses is present even when toothpaste and CWF exist within the community<sup>22</sup>
- Increased popularity of mouth rinses due to commercial marketing<sup>22</sup>

### *What is the amount of caries reduction?*

- 26 percent reduction in Decayed, Missing, Filled Surfaces levels was seen for the duration of the mouth rinsing program<sup>22</sup>

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<sup>22</sup> Marinho VCC, Higgins JPT, Logan S, Sheiham A. Fluoride mouthrinses for prevent dental caries in children and adolescents. Cochrane Database of Systematic Reviews 2003, Issue3. Art No.: CD002284. DOI: 10.1002/14651858.CD002284

## **Salt Fluoridation**

### *What is it?*

- The process of adding fluoride to any form of salt intended for human ingestion
- Do not recommend increase in salt consumption for dental benefits rather the passive effect of fluoridated salt is accepted<sup>23</sup>

### *What is in the literature?*

- Salt is present in all diets and the addition of fluoride is compatible with iodine (already added to salt)<sup>24</sup>
- If fluoridated at levels of 250 mg/kg with the consumption of table salt ranging between 1 to 4g/day then a person would consume 1mg of fluoride daily (optimal dose)<sup>24</sup>
- Salt fluoridation is at least as effective as water fluoridation, **if** majority of salt for human use is fluoridated<sup>23</sup>

### *What is the amount of caries reduction?*

- In various countries, reductions have ranged from 13.3 to 89.5 percent<sup>25</sup>

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<sup>23</sup> Jones, Burt BA, Petersen PE, Lennon MA. The effective use of fluorides in public health. Bulletin of the World Health Organization 2005; 83(9): 670-676

<sup>24</sup> Gillespie G et al. Salt fluoridation for preventing dental caries. Cochrane Database of Systematic Reviews 2007, Issue 4. Art No.: CD006846. DOI: 10.1002/14651858.CD006846

<sup>25</sup> Pan American Health Organization. Promoting oral health: the use of salt fluoridation to prevent dental caries. Washington D.C.: PAHO 2005

## **Milk Fluoridation**

### *What is it?*

- The process of adding fluoride to milk for delivery in school programs

### *What is in the literature?*

- Fluoridated milk needs to be started before 4 years of age and continued until the first permanent molars are erupted (around the age of 6)<sup>26</sup>
- There are many studies, however; there are very few randomized-control trials available
- Difficulty in coordinating production and distribution when multiple dairies present

### *What is the amount of caries reduction?*

- Single study reported 78.4 percent reduction in DMFT (after 3 years of milk consumption)<sup>27</sup>
- Another isolated study reported 35.5 percent reduction in DMFT (after 4 years consumption)<sup>27</sup>

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<sup>26</sup> Bánóczy A, Petersen PE, Rugg-Gunn AJ (Editors). Milk fluoridation for the prevention of dental caries. World Health Organization 2009

<sup>27</sup> Yeung A *et al.* fluoridated milk for preventing dental caries. Cochrane Database of Systematic Reviews 2005, Issue 3. Art No.: CD003876. DOI: 10.1002/14651858.CD003876.pub2.

## **School Water Fluoridation**

*What is it?*

- The process of adding fluoride to school water supplies (if school water supply is separate from community water supply)

*What is in the literature?*

- Only for communities where there is no communal water supply<sup>28</sup>
- Started in the Virgin Islands (1954) with 2.3 ppm fluoride added to school water supply<sup>29</sup>
- Not longer in widespread use

*What is the amount of caries reduction?*

- 21.9-38.9% reduction in DMFT (with varying fluoride concentrations in the school water supply)<sup>29</sup>

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<sup>28</sup> Calderon JJ (Chairman). Community and school water fluoridation: Summary and recommendations. *J Public Health Dentistry* 1984; 44(1): 43-46

<sup>29</sup> Avery KT, Shapiro S, Biggs JT. School water fluoridation. *J Sch Health* 1979; 49(8): 463-465

## **Xylitol**

### *What is it?*

- A naturally occurring alcohol sugar that has anti-cavity properties which prevent tooth decay. Available in gum, syrup or candy form.

### *What is in the literature?*

- Looking at early childhood caries in the Marshall Islands, daily consumption of 8 g of xylitol syrup (2 divided doses) reduced decay by 70 percent in 9 to 15 month olds<sup>30</sup>
- When in combination with school tooth brushing and varnish applications, children receiving xylitol candies had 50 percent less decay than those who received only varnish<sup>31</sup>
- Xylitol chewing gum well accepted by children but less so by teachers<sup>32</sup>

### *What is the amount of caries reduction?*

- 62% Decayed, Missing, Filled Surfaces reduction after 2 years of chewing xylitol gum (3x/day) in isolated studies<sup>33</sup>
- 70% reduction with 8 g daily xylitol syrup<sup>30</sup>

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<sup>30</sup> Milgrom *et al.* Xylitol pediatric topical oral syrup to prevent dental caries: a double blind, randomized clinical trial of efficacy. *Arch Pediatr Adolesc Med* 2009; 163(7): 601-607

<sup>31</sup> Milgrom P, Tut O. Evaluation of Pacific Islands early childhood caries prevention project: Republic of the Marshall Islands. *J Public Health Dentistry* 2009; 69(3): 201-203

<sup>32</sup> Autio JT, Courts FJ. Acceptance of the xylitol chewing gum regimen by preschool children and teachers in a Head Start program: a pilot study. *Pediatric Dentistry* 2001; 23 (1): 71-74

<sup>33</sup> Kandelman D, Gagnon G. A 24-month clinical study of the incidence and progression of dental caries in relation to consumption of chewing gum containing xylitol in school preventive programs. *J Dent Res* 1990; 69(5): 1771-1775

## **Casein Derivatives**

### *What is it?*

- A milk-based product that has been approved for the treatment of sensitivity but has shown promise in re-mineralizing early carious lesions

### *What is in the literature?*

- Known as CPP-ACP (casein phosphopeptide-amorphous calcium peptide) made from cow's milk protein. CPP-ACP has been shown to help with hardening teeth after acid attacks<sup>34</sup>
- Early studies are promising however there is insufficient evidence to recommend the long-term effectiveness of casein derivatives (CPP-ACP)<sup>35</sup>

### *What is the amount of caries reduction?*

- Not currently available

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<sup>34</sup> Recaldent™ website. [http://www.recaldent.com/p\\_welcome.asp](http://www.recaldent.com/p_welcome.asp) Last accessed 15/7/2011

<sup>35</sup> Azarpazhooh A, Limeback H. Clinical efficacy of casein derivatives: A systematic review of the literature. J Am Dent Assoc 2008; 139: 915-924

## **Combined Fluoride Therapies**

### *What is it?*

- The process of using one or more of the above therapies, as part of comprehensive preventive dental programming

### *What is in the literature?*

- Significant effects seen with the combined use of fluoride varnish plus toothpaste versus toothpaste alone; fluoride varnish plus toothpaste versus fluoride varnish alone; fluoride gel plus mouthrinse versus gel alone<sup>36</sup>
- Fluoride varnish combined with pit and fissure sealant programs regarded as most promising<sup>37</sup>

### *What is the amount of caries reduction?*

- An additional 15 percent reduction in decayed and filled tooth surfaces in favour of the combined use of fluoride varnish and toothpaste versus toothpaste alone for deciduous teeth<sup>36</sup>
- Combinations of toothpaste with gels, varnishes, mouthrinses is associated with an additional 10 percent reduction in decayed, missing, filled tooth surfaces<sup>36</sup>

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<sup>36</sup> Marinho VCC, Higgins JPT, Sheiham A, Logan S. Combinations of topical fluoride (toothpastes, mouthrinses, gels, varnishes) versus single topical fluoride for preventing dental caries in children and adolescents. Cochrane Database of Systematic Reviews 2004, Issue. Art No.: CD002781. DOI: 10.1002/14651858.CD0027841.pub2.

<sup>37</sup> Whelton H, O'Mullane D. The use of combinations of caries preventive procedures. J Dent Educ 2001; 65(10): 1110-1113