



TITLE: Fluoride Rinse Programs for School Aged Children: A Review of the Clinical Effectiveness and Guidelines

DATE: 14 December 2010

CONTEXT AND POLICY ISSUES

Dental caries (cavities), while entirely preventable, are common in school-aged children.^{1,2} Programs targeted at prevention of dental caries in this population involve multiple components, one of which is the optimal use of fluoride.² Water fluoridation has been available for over 50 years and is considered a cornerstone of caries-preventive strategies.¹ In Canada, the majority of the population is exposed to fluoride through foods that contain trace amounts of fluoride and through fluoridated drinking water.³

Fluoride is also widely available for topical application in toothpastes (dentifrices), mouth rinses, gels and varnishes.¹ Concentrations of topically applied fluoride are higher than those found in water and create a local protective effect on the teeth.¹ Topically, self-applied fluoride is available in toothpaste and mouth rinse formulations.¹ One approach to self-application of fluoride is through mouth rinsing at schools.¹ School fluoride rinse programs generally involve children between the ages of six and eleven years.¹ Once weekly, under supervision, the teeth and mouth are rinsed with a 0.2% solution of sodium fluoride (NaF), then the rinse is expectorated.⁴

In developed countries, the prevalence of dental caries in school-aged children has declined to the point where the additional benefit and cost-effectiveness of wide-spread school-based fluoride rinse programs has been questioned and such programs have been discontinued in many developed countries.¹ Moreover, the potential risks of over-exposure to fluoride (such as fluorosis) from multiple sources (rinses, toothpastes, drinking water) may also be a concern.^{1,2,4} More selective programs that target higher risk children have gained favour.¹

This report will review the evidence of effectiveness of fluoride rinse programs for the prevention of caries in school-aged children and the evidence-based guidelines for fluoride rinse programs and other interventions for the prevention of caries in this population. Such information could be useful when making decisions about strategies to prevent dental caries in school-aged children.

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RESEARCH QUESTIONS

1. What is the clinical effectiveness of fluoride rinse programs for the prevention of caries in school-aged children?
2. What are the evidence-based interventions for the prevention of caries and improvement of dental health in school-aged children?
3. What are the evidence-based guidelines regarding fluoride rinse programs and other interventions for the prevention of caries and improvement of dental health in school-aged children?

KEY MESSAGE

Evidence from nonrandomized studies suggests that participation of school-aged children in school-based fluoride mouth-rinsing programs may reduce the risk and number of decayed, missing, or filled teeth or surfaces. Evidence-based guidelines recommend a number of fluoride-based interventions for the prevention of caries in school aged children.

METHODS

A focused search (main concepts appeared in title, abstract or major subject heading) was conducted on key health technology assessment resources, including PubMed, the Cochrane Library (Issue 11, 2010), University of York Centre for Reviews and Dissemination (CRD) databases, ECRI, EuroScan, international health technology agencies, and a limited Internet search. The search was limited to English language articles published between January 1, 2005 and November 17, 2010. To address question one, no filters were applied. To address question two, filters were applied to limit the retrieval to health technology assessments, systematic reviews, meta-analyses and randomized controlled trials. To address question three, filters were applied to limit the retrieval to guidelines.

SUMMARY OF FINDINGS

Four relevant non-randomized studies⁴⁻⁷ and eight relevant evidence-based guidelines were identified.⁸⁻¹⁵ One guideline was published in two journals.^{8,16} No relevant health technology assessment reports, systematic reviews, meta-analyses, or randomized controlled trials were identified.

Non-randomized studies

The characteristics of the four included non-randomized studies are summarized in Table 1. One study had a quasi-experimental design (controlled non-randomized intervention study with pre- and post-intervention data).⁵ The remaining three studies had observational designs and did not have baseline (pre-intervention) data but compared the prevalence of caries in schools with and without fluoride rinse programs at some point after fluoride rinse programs had been implemented in the program schools.^{4,6,7} The sample sizes of the four studies ranged from 101⁶ to 1333.⁴ Across the four studies there was variation in the concentration of fluoride mouth rinse, frequency of rinsing, and duration of rinsing (e.g. one to two minutes). Length of participation of the children who were assessed was not reported in two studies.^{4,7} One study included tooth brushing lessons as a co-intervention and one study included targeted sealants as a co-

intervention. All studies reported decayed, missing, or filled teeth (DMFT) or decayed, missing, or filled surfaces (DMFS) as outcomes.

Table 1: Characteristics of non-randomized studies of school-based fluoride rinsing programs

Study	Location	Sample Size and Age of Participants	School Fluoride Rinse Program Details	Study Design and Duration of Follow-up
Chen et al., 2010 ⁵	Malaysia	n=242 (122 rinsers and 120 nonrinsers) 8 and 9 year olds	10 mL of 0.2% fluoride rinse for 1 minute once weekly. No food, drink or water for 30 minutes following rinsing.	Four schools located in areas of rural Malaysia without water fluoridation. Baseline data collected at all four schools, then fluoride rinse program introduced in two schools (not randomly assigned) Outcomes assessed after three years in all four schools.
Levin et al., 2009 ⁴	Scotland	n=1333 (661 rinsers and 672 nonrinsers) Average Age: 11.4 years (range: 10.7 to 12.7 years)	0.2% fluoride rinse for 2 minutes in children aged 6 to 11 years once every two weeks. Volume of rinse not specified.	Survey data from 35 rinsing and 26 nonrinsing schools.
Nakamura et al., 2009 ⁶	Village – location not reported.	n=55 fluoride rinse n=46 fluoride rinse and targeted sealants Current age: 20 to 21 years. Age during program: 4 years to 15 years (11 year duration)	7 mL of 0.05% fluoride rinse for 1 minute five times weekly in children in nursery school (beginning at age 4 years) 10 ml of 0.2% fluoride rinse once weekly in primary and junior high (duration of rinsing not reported)	Follow-up study at age 20 years of only those students who completed the 11 year program. Comparison of fluoride rinse to fluoride rinse + targeted sealants applied to surfaces with incipient caries. Sealants were checked twice yearly and re-applied throughout primary school.
Pieterse et al.(2006) ⁷	Netherlands	n=124 11 years – 41% 12 years – 54% 13 years – 5%	7 mL of 0.2% fluoride rinse once weekly in children aged 6 to 12. Duration of rinsing not specified. Children also received tooth brushing lessons and could borrow an educational package on oral health.	A 2004 survey of seven schools, three of which had fluoride rinse programs in place for 4 to 6 years and four of which did not. Status of teeth of participating children assessed by a hygienist. Duration of follow-up not specified – survey data from 2004.

The results, conclusions, and limitations of nonrandomized studies which evaluated school-based fluoride rinsing programs are summarized in Table 2. One study reported that the change in average DMFT and DMFS scores over a three year period was lower in children who participated in fluoride rinse programs.⁵ These children lived in areas without water fluoridation. One study reported no difference in average DMFT scores in rinsing and non-rinsing schools, but a lower risk of having a DMFT score greater than zero in schools with fluoride rinse programs.⁴ The schools were located in areas that were socially considered “deprived”. One study compared fluoride rinsing to fluoride rinsing in combination with targeted sealants and found a lower prevalence of caries in those who also received sealants.⁶ The final study found a beneficial effect of fluoride rinsing.⁷

Table 2: Results, conclusions, and limitations of nonrandomized studies which evaluated school-based fluoride rinsing programs

Study	Results	Authors' Conclusions	Limitations
Chen et al., 2010 ⁵	<p>DMFT Mean Change Score (Baseline to 3 years) Rinsing Schools: 1.24 Nonrinsing Schools: 3.00 p<0.01</p> <p>DMFS Mean Change Score (Baseline to 3 years) Rinsing Schools: 1.85 Nonrinsing Schools: 5.18 p<0.01</p> <p>Proportion Caries Free after 3 years Rinsing Schools: 24.2% Nonrinsing Schools: 11.5% p<0.01</p> <p>Relative Risk of Developing Caries RR=0.48 (95% CI: 0.26 to 0.85) indicating a reduced risk in the rinsing schools.</p>	There was a positive benefit of school-based fluoride rinse programs in schools.	<p>Nonrandomized design has a risk of bias and confounding.</p> <p>Some baseline differences between groups:</p> <ul style="list-style-type: none"> • A larger proportion of participants in the rinsing schools used more than the recommended amount of toothpaste when brushing teeth (47% versus 35%) compared with nonrinsing schools • A larger proportion of participants in the rinsing schools reported consuming sweetened food and drinks more than twice daily (29% versus 13%) compared with nonrinsing schools <p>Lack of blinding of outcome assessors.</p> <p>Lack of information on co-interventions (e.g. professionally applied fluorides, sealants, regular oral exams).</p>
Levin et al., 2009 ⁴	<p>DMFT Mean Score Rinsing Schools: 1.17 Nonrinsing Schools: 1.17 p=0.997</p> <p>DMFT > 0 Rinsing Schools: 52% Nonrinsing Schools: 57% OR*=0.79 (95% CI: 0.65 to 0.96)</p>	Targeting fluoride programs to areas of deprivation improves the status of teeth.	<p>Nonrandomized design has a risk of bias and confounding.</p> <p>Rinsing schools had a higher degree of deprivation (lower socioeconomic status) compared with nonrinsing schools which the authors indicated confounded the results.</p> <p>Potential for selection bias in that</p>

Study	Results	Authors' Conclusions	Limitations
			<p>parents more concerned and motivated about oral health would be more likely to provide consent for their children to participate in the rinsing program.</p> <p>Lack of reporting of co-interventions and intake of caries-promoting foods/drinks.</p> <p>Potential for limited exposure to the fluoride rinse in the rinsing schools for those children that joined a school part way through the program.</p> <p>Duration of participation in the rinsing program was unclear.</p> <p>No information provided regarding water fluoridation in the areas surrounding the rinsing and non-rinsing schools.</p>
<p>Nakamura et al., 2009⁶</p>	<p>DMFT Mean Score FMR + TS: 1.56 FMR: 2.20 p=0.01</p> <p>DMFT > 0 FMR+TS: 28.3% FMR: 60% p=0.001</p>	<p>The caries preventative effect of the school-based program that included FMR + TS extended for more than five years (i.e. until the age of 20 years).</p>	<p>Nonrandomized design has a risk of bias and confounding.</p> <p>Lack of information on water fluoridation in the village.</p> <p>Exclusion of those who participated less than the full 11 years of the program.</p> <ul style="list-style-type: none"> Individuals who completed the 11 year program might not be representative of the entire population of 4 to 15 year olds. This group could potentially be more conscientious with respect to oral health than those who did not complete the 11 year program.
<p>Pieterse et al.(2006)⁷</p>	<p>DMFS Mean Score Rinsing Schools: 0.5 Nonrinsing Schools: 2.0 p<0.05</p> <p>Percentage sound teeth Rinsing Schools: 73% Nonrinsing Schools: 41% p<0.05</p>	<p>Results of this study demonstrate that school-based fluoride rinse programs improved the status of teeth.</p>	<p>Nonrandomized design has a risk of bias and confounding.</p> <p>Participants received co-interventions including professionally applied fluoride and sealants.</p> <p>Fluoride rinse program may have increased attention to oral health in general (i.e. prompted the use of other interventions that could</p>

Study	Results	Authors' Conclusions	Limitations
	<p>Prevalence of tooth erosion with loss of enamel: Rinsing Schools: 2% Nonrinsing Schools: 20% p<0.05</p>		<p>potentially improve outcomes.</p> <p>Unclear as to whether all children surveyed in the rinsing schools participated in the rinse program.</p> <p>Duration of participation in the fluoride rinsing program was not reported.</p> <p>No information provided regarding water fluoridation in the areas surrounding the rinsing and non-rinsing schools.</p>

DMFS – decayed, missing or filled surfaces; DMFT – decayed, missing or filled teeth; FMR – fluoride mouth rinse; TS – Targeted sealant; OR – odds ratio; RR – Relative risk.

*Adjusted for age, sex, and deprivation category

Guidelines and recommendations

The identified evidence-based guidelines (Table 3) provided recommendations about the following interventions for the prevention of caries or improvement in dental health of school-aged children: the use of fluorides (water fluoridation, toothpaste, varnishes, fluoride supplements, and mouthrinses) and the use of sealants. Regular oral health exams are also recommended.

Most guidelines did not provide the level of evidence supporting their recommendations, with the exception of those produced by the American Dental Association^{8,11} and the European Academy of Paediatric Dentistry,¹² a description of which can be found in the appendix. Two of the guidelines made recommendations about the use of fluoride mouth rinses, neither of which were specific to school-based programs.^{9,13} In both guidelines, the recommendation to use fluoride mouth rinses in school-aged children was reserved for those who were at high risk of caries.^{9,13} Water fluoridation was recommended as a general public health measure by the American Academy of Pediatric Dentistry¹² and the European Academy of Paediatric Dentistry.¹⁰ The use of fluoride toothpaste in an amount appropriate for the child's age was endorsed in the guidelines.^{9,12,13,15} Where water fluoridation is absent or insufficient, fluoride supplementation was recommended by the guidelines as well.^{9,10,14,15} Guidelines with recommendations specific to the professional application of sealants¹¹ and topical fluorides were also identified.^{8,9,13}

Table 3: Guidelines for caries prevention and oral health

Group, Year of Guideline Publication	Method of Guideline Formulation	Interventions Identified in the Guideline and Recommendation
Institute for Clinical Systems Improvement, 2010 ¹⁵	Statements based upon systematic review of the literature	<p>Recommendations for 2-18 years</p> <ul style="list-style-type: none"> • “Parents should be advised to have children brush teeth daily with toothpaste containing 1,000 to 1,500 ppm of fluoride. • Use a pea-sized amount of fluoride toothpaste for children over two years of age. • Consider fluoride varnish for patients at high risk of cavities if mechanisms to successfully and consistently deliver this in the clinic setting are available. • Provide daily fluoride supplements of 1 mg of fluoride for those patients over six years of age who do not have fluoride in their water supply already. • Encourage regular dental visits. • Consider daily flossing. • Children at high risk for dental caries should be referred to the appropriate health care source. • Encourage healthy eating habits to reduce the risk of dental caries. In particular, avoidance of frequent sugar intake.” p.28¹⁵
American Academy of Family Physicians (AAFP), 2009 ¹⁴	Statements based upon systematic review of the literature	<p>Fluoride supplementation</p> <p>“The AAFP strongly recommends ordering fluoride supplementation to prevent dental caries based on age and fluoride concentration of patient’s water supply for infants and children age 6 months through 16 years residing in areas with inadequate fluoride in the water supply (less than 0.6 ppm).”¹⁴</p>
New Zealand Ministry of Health, 2009 ¹³	Statements based upon systematic review of the literature which included other evidence-based guidelines. Evidence was summarized and recommendations made based upon consensus of experts.	<p>Fluoride toothpaste</p> <ul style="list-style-type: none"> • “Toothpaste should be labelled in parts per million (ppm) fluoride • Toothpaste of at least 1000 ppm is recommended for all ages and should be used twice daily • Parents and caregivers should be advised that a smear of fluoride toothpaste is recommended until 5 years of age. From age 6 years, a pea-sized amount should be used • For children aged under 6 years living in fluoridated areas who are at low risk of dental caries, fluoride toothpaste less than 1000 ppm may be considered to reduce total fluoride intake • In deciding whether to provide low fluoride toothpaste, parents and caregivers should be advised of the issues associated with reduced fluoride exposure (lesser dental caries protection) versus the risk of fluorosis • Children should be supervised when using toothpaste • Toothpaste should not be eaten <p>Fluoride varnishes</p> <ul style="list-style-type: none"> • Professionally-applied, high-concentration fluoride varnishes are not recommended in people with low risk of

Group, Year of Guideline Publication	Method of Guideline Formulation	Interventions Identified in the Guideline and Recommendation
		<p>dental caries</p> <ul style="list-style-type: none"> • Professionally-applied, high-concentration fluoride varnishes may be used for people aged over 12 months who are at high risk of dental caries <ul style="list-style-type: none"> • Fluoride varnish applications should be applied at 6-monthly intervals as part of a preventive oral health plan • Fluoride varnish should be applied to all erupted teeth • Health practitioners applying fluoride varnish should have appropriate training <p>Fluoride mouthrinses</p> <ul style="list-style-type: none"> • Fluoride mouthrinses are not recommended for children aged under 6 years or people aged 6 years and over who are at low risk of dental caries • Fluoride mouthrinse may be used by people aged 6 years and over who are at high risk of developing dental caries • After rinsing, mouthrinse should be spat out, not swallowed • Fluoride mouthrinse should be used as part of a preventive oral health plan <p>Topical fluoride gels and foams</p> <ul style="list-style-type: none"> • Professionally-applied, high-concentration fluoride gels and foams are not recommended for children aged under 6 years or people aged 6 years or over who are at low risk of dental caries • Professionally-applied, high-concentration fluoride gels and foams may be used for people aged 6 years and over who are at high risk of dental caries <ul style="list-style-type: none"> • Fluoride gel applications should be applied at 3- to 6-monthly intervals as part of a preventive oral health plan • Neutral gels are preferable to acidulated gels in people with porcelain and composite restorations <p>Fluoride tablets</p> <ul style="list-style-type: none"> • Fluoride tablets are not recommended as a population health measure in New Zealand • Fluoride tablets may be recommended for people aged 3 years and over at high risk of dental caries • Tablets should be chewed or sucked, or dissolved in drinking liquid” p.vii – viii¹³
European Academy of Paediatric Dentistry (EAPD), 2009 ¹²	Evidence-based methodology developed by the Scottish Intercollegiate Guidelines Network (SIGN)	<p>Water Fluoridation</p> <ul style="list-style-type: none"> • Support for water fluoridation by the EAPD is reaffirmed as a community-based strategy for the prevention of caries. <p>Fluoridated toothpaste</p>

Group, Year of Guideline Publication	Method of Guideline Formulation	Interventions Identified in the Guideline and Recommendation
		<ul style="list-style-type: none"> Recommended for all and should be promoted to individuals and caregivers <p>Fluoridated milk, salt, tablets, drops</p> <ul style="list-style-type: none"> “Fluoridated milk and fluoridated salt could be a public health measure in target groups with a high caries prevalence and low compliance for tooth brushing in areas without water fluoridation. Fluoride tablets and fluoride drops could be considered on an individual basis for children at high risk of caries (Grade of recommendation: C)” p.131¹²
American Dental Association, 2008 ¹¹	Expert panel development of clinical recommendations based upon systematic review of the literature.	<p>Pit and Fissure Sealants for Caries Prevention</p> <ul style="list-style-type: none"> “Placement of resin-based sealants on the permanent molars of children and adolescents is effective for caries reduction (Ia). Reduction of caries incidence in children and adolescents after placement of resin-based sealants ranges from 86 percent at one year to 78.6 percent at two years and 58.6 percent at four years (Ia). Sealants are effective in reducing occlusal caries incidence in permanent first molars of children, with caries reductions of 76.3 percent at four years, when sealants were reapplied as needed. Caries reduction was 65 percent at nine years from initial treatment, with no reapplication during the last five years (Ib). Pit-and-fissure sealants are retained on primary molars at a rate of 74.0 to 96.3 percent at one year and 70.6 to 76.5 percent at 2.8 years (III). There is consistent evidence from private dental insurance and Medicaid databases that placement of sealants on first and second permanent molars in children and adolescents is associated with reductions in the subsequent provision of restorative services(III). Evidence from Medicaid claims data for children who were continuously enrolled for four years indicates that sealed permanent molars are less likely to receive restorative treatment, that the time between receiving sealants and receiving restorative treatment is greater, and that the restorations were less extensive than those in permanent molars that were unsealed (III).”p262¹¹
American Academy of Pediatric Dentistry (AAPD), 2008 ¹⁰	Statements based upon systematic review of the literature, expert opinion and best practice	<p>Water Fluoridation</p> <ul style="list-style-type: none"> “The AAPD endorses and encourages the adjustment of fluoride content of domestic community water supplies to optimal levels where feasible.”p.34¹⁰ <p>Fluoride Supplementation</p> <ul style="list-style-type: none"> “When fluoride levels in community water supplies are suboptimal, and after consideration of sources of dietary fluoride, the AAPD endorses the supplementation of a child’s diet with fluoride

Group, Year of Guideline Publication	Method of Guideline Formulation	Interventions Identified in the Guideline and Recommendation
		<p>according to the guidelines jointly recommended by the AAPD, the American Academy of Pediatrics, and the American Dental Association (ADA) and endorsed by the Centers for Disease Control and Prevention.”p.34¹⁰</p>
<p>American Academy of Pediatric Dentistry (AAPD), 2008⁹</p>	<p>Statements based upon systematic review of the literature, expert opinion and best practice</p>	<p>Fluoride Supplementation</p> <ul style="list-style-type: none"> • “Fluoride supplements should be considered for all children drinking fluoride-deficient (<0.6 ppm) water. After determining the fluoride level of the water supply or supplies (either through contacting public health officials or water analysis), evaluating other dietary sources of fluoride, and assessing the child’s caries risk, the daily fluoride supplement dosage can be determined using the Dietary Fluoride Supplementation Schedule. To optimize the topical benefits of systemic fluoride supplements, the child should be encouraged to chew or suck fluoride tablets.”p.143⁹ <p>Professionally-applied topical fluoride treatment</p> <ul style="list-style-type: none"> • Professional topical fluoride treatments should be based on caries-risk assessment. • Children at moderate caries risk should receive a professional fluoride treatment at least every 6 months; those with high caries risk should receive greater frequency of professional fluoride applications (ie, every 3-6 months). Ideally, this would occur as part of a comprehensive preventive program in a dental home. • When a dental home cannot be established for individuals with increased caries risk as determined by caries risk assessment, periodic applications of fluoride varnish by trained non-dental healthcare professionals may be effective in reducing the incidence of early childhood caries.”p.144⁹ <p>Fluoride-containing products for home use</p> <ul style="list-style-type: none"> • “Therapeutic use of fluoride for children should focus on regimens that maximize topical contact, preferably in lower-dose, higher-frequency approaches. • Fluoridated toothpaste should be used twice daily as a primary preventive procedure. • To maximize the beneficial effect of fluoride in the toothpaste, rinsing after brushing should be kept to a minimum or eliminated altogether. • Additional at-home topical fluoride regimens utilizing increased concentrations of fluoride should be considered for children at high risk for caries. These may include over-the-counter or prescription strength formulations. • Fluoride mouth rinses or brush-on gels may be

Group, Year of Guideline Publication	Method of Guideline Formulation	Interventions Identified in the Guideline and Recommendation
American Dental Association, 2006 and 2007 ^{8,16}	Expert panel development of clinical recommendations based upon systematic review of the literature.	<p>incorporated into a caries-prevention program for a school-aged child at high risk.”p.144⁹</p> <p>Professionally Applied Topical Fluoride</p> <ul style="list-style-type: none"> • “Fluoride gel is effective in preventing caries in school-aged children (Ia). • Patients whose caries risk is low, as defined in this document, may not receive additional benefit from professional topical fluoride application (Ia). • There are considerable data on caries reduction for professionally applied topical fluoride gel treatments of four minutes or more (Ia). • In contrast, there is laboratory, but no clinical equivalency, data on the effectiveness of one-minute fluoride gel applications (IV). • Fluoride varnish applied every six months is effective in preventing caries in the primary and permanent dentition of children and adolescents (Ia). • Two or more applications of fluoride varnish per year are effective in preventing caries in high-risk populations (Ia). • Fluoride varnish applications take less time, create less patient discomfort and achieve greater patient acceptability than does fluoride gel, especially in preschool-aged children (III). • Four-minute fluoride foam applications, every six months, are effective in caries prevention in the primary dentition and newly erupted permanent first molars (Ib). • There is insufficient evidence to address whether or not there is a difference in the efficacy of NaF versus APF gels (IV).”p. 396⁸

Limitations

The literature search did not identify any health technology assessments, meta-analyses, systematic reviews, or randomized controlled trials that evaluated the clinical effectiveness of school-based fluoride rinse programs. Four studies were identified, three of which were observational,^{4,6,7} and subject to a number of important limitations as noted in Table 2. Importantly, three of the four included studies did not report on water fluoridation in the schools and surrounding areas.^{4,6,7} The level of water fluoridation could have an important influence on study outcomes. Further, two studies did not report on the duration of participation of the students who were assessed in the fluoride rinse program.^{4,7} This could also impact study outcomes and generalizability of the study results. As the majority of Canadians are exposed to fluoride,³ it is not clear if a similar benefit would be expected across the entire population or in just those areas without water fluoridation.

Eight evidence-based guidelines were identified, but most provided little detail about the methods used in their development, other than that they were based upon systematic review of the literature with an expert panel used to formulate the recommendations. Recommendations

were made in two guidelines about the use fluoride mouth rinses in school-aged children, but neither were specific to school-based programs. No Canadian evidence-based guidelines were identified.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING:

Evidence from three of the four included nonrandomized studies suggests a benefit of fluoride rinse programs in the prevention of caries in school-aged children. The fourth study found a greater benefit with targeted sealants combined with fluoride mouth rinse than fluoride mouth rinse alone. The one included study that had a quasi-experimental design was carried out in an area without water fluoridation and the authors suggested targeting of fluoride rinse programs to such areas. The three remaining studies were observational, subject to numerous methodological limitations, and did not report on water fluoridation, which makes their results more difficult to interpret.

Two evidence-based guidelines support the use of fluoride mouth rinses in school-aged children, but these recommendations were specific to those at high risk of caries. The identified guidelines did not support the use of fluoride mouth rinses across the entire population of school-aged children. Other interventions for the prevention of caries which were recommended in evidence-based guidelines included water fluoridation, various types of fluoride supplementation, and topical fluorides from toothpastes and professional application. Regular dental exams and the use of sealants were also identified in the guidelines.

Based on the included literature (non-randomized studies with methodological limitations), participation in school-based fluoride mouth rinse programs reduced the prevalence of caries in children who are at an increased risk. This is consistent with two evidence-based guidelines that endorse the use of fluoride mouth rinse in children who are at high risk of caries. Lack of water fluoridation increases the risk of caries in children¹ and, as such, might be a consideration in the decision to use fluoride mouth rinses at home or in school-based programs.

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APPENDIX: Grading of Evidence Used in Included Guidelines

American Dental Association Grading of Evidence^{8,11}

Grade	Description
Ia	Evidence from systematic reviews of randomized controlled trials
Ib	Evidence from at least one randomized controlled trial
IIa	Evidence from at least one controlled study without randomization
IIb	Evidence from at least one other type of quasi-experimental study
III	Evidence from nonexperimental descriptive studies, such as comparative studies, correlation studies, cohort studies and case-control studies
IV	Evidence from expert committee reports or opinions or clinical experience of respected authorities(p. 261) ¹¹

SIGN (Scottish Intercollegiate Guidelines Network) Grading of Recommendations Used by the European Academy of Paediatric Dentistry¹⁷

Grade	Description
A	At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+
C	A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+