

A Best Practice Approach Report describes a public health strategy, assesses the strength of evidence on the effectiveness of the strategy, and uses practice examples to illustrate successful/innovative implementation.

## I. Best Practice Approach

### Use of Fluoride: School-based Fluoride Mouthrinse and Supplement Programs

#### Summary of Evidence Supporting School-based Fluoride Mouthrinse and Supplement Programs

Research	++
Expert Opinion	+++
Field Lessons	+
Theoretical Rationale	+++

See **Attachment A** for details.

## II. Description

### A. Fluoride Agents: Mouthrinses and Dietary Supplements

Fluoride prevents dental caries (tooth decay) and slows or reverses the progression of caries. Because of its high affinity for calcium, fluoride is mainly associated with calcified tissues (i.e. teeth and bones) (1). Fluoride works best to prevent caries when a constant, low level of fluoride is maintained in the mouth. Its most important preventive effect is after the teeth erupt (post-eruptive) (2). Fluoride enhances remineralization and inhibits demineralization of tooth enamel and also affects the activity of bacteria that cause dental caries (1, 2).

Fluoridated community drinking water and fluoride toothpaste are the most common sources of fluoride in the United States. CDC recommends that all persons drink water with an optimal fluoride concentration and brush their teeth twice daily with fluoride toothpaste (2). Additional fluoride measures, such as fluoride mouthrinses and dietary supplements, should be considered for individuals who are at increased risk of dental caries at the population level (e.g., low socioeconomic status; limited access to dental services, low use of dental care services) or individual level (e.g., active dental caries) (2). Fluoride supplements should not be prescribed for individuals living in communities with optimally fluoridated water (1,2).

#### 1. Fluoride Mouthrinses

The most common fluoride compound used in mouthrinse is sodium fluoride. Over-the-counter solutions of 0.05% sodium fluoride (2.0 mg fluoride in 10 ml) for daily rinsing are available for persons older than 6 years. Solutions of 0.20% sodium fluoride (9.0 mg fluoride in 10 ml) are used in supervised, school-based weekly rinsing programs. Fluoride mouthrinse programs are not recommended for children less than 6 years of age (2).

## 2. Fluoride Supplements

Dietary fluoride supplements are available as tablets that are swallowed or chewed, lozenges that dissolve slowly in the mouth, and liquids (including fluoride-vitamin preparations) (1,2). They provide fluoride for children at increased risk for dental caries and whose primary drinking water has a low fluoride concentration (2). Most supplements contain sodium fluoride. Tablets and lozenges are manufactured with 1.0, 0.5 or 0.25 mg fluoride (2). To maximize the topical effect of fluoride, tablets and lozenges are intended to be chewed or sucked for a minute or two before being swallowed (2).

Dietary fluoride supplements are intended for use among high-risk children between the ages of 6 months and 16 years who are living in non-fluoridated areas (0.6 ppm fluoride or less). In 1986, an estimated 16% of U.S. children aged less than 2 years used fluoride supplements (2,3). Fluoride supplements in the United States require prescription by a dentist or physician. In 1994 the American Dental Association (ADA), the American Academy of Pediatrics (AAP) and American Academy of Pediatric Dentistry (AAPD) jointly revised the schedule of recommended dosage for dietary fluoride supplements (4). The dosage schedule (0.25 mg/day, 0.50 mg/day or 1.0 mg/day) is based on the age of the child and the concentration of fluoride in the drinking water supply. The Fluoride Supplement Dosage Schedule (1994) is available at [http://www.ada.org/public/topics/fluoride/fluoride\\_article01.asp#dosage](http://www.ada.org/public/topics/fluoride/fluoride_article01.asp#dosage). (Also see Appendix B.)

Ingestion of higher than recommended levels of fluoride by young children has been associated with an increase in mild enamel fluorosis (2). Fluorosis may develop when young children repeatedly swallow fluoride toothpaste or use dietary fluoride supplements in communities where the water is already fluoridated. Fluoride supplements should only be prescribed for children living in areas without optimally fluoridated water (2).

Enamel fluorosis is a change in the appearance of teeth. This is a cosmetic condition that does not affect a person's health. Almost all cases of fluorosis in the United States are mild with lacy, white specks on the tooth surface. Children 6 years of age and older are considered past the age that fluoride ingestion can cause cosmetically objectionable fluorosis (2).

## B. School-based Fluoride Mouthrinse and Supplement Programs

### 1. School-based Fluoride Mouthrinse Programs

The most convenient schedule for school-based public programs is weekly administration to an entire class of children after obtaining parental consent. The procedure consists of vigorously rinsing for 60 seconds with a fluoride solution (5 ml for Grade K and 10 ml for Grade 1 and higher). After rinsing, the fluoride solution is expectorated into a cup, a napkin is used to absorb the solution and both are disposed (1). Fluoride mouthrinse programs are not recommended for preschool children in the United States (1).

Caries reductions from daily rinsing are only slightly greater than those from weekly rinsing (5,6). The slight differences do not compensate for the greater practicality and lower cost of weekly rinsing in a school-based program (7).

Experts recommend that fluoride mouthrinse be targeted to groups and persons at high risk of caries (1,2). Fluoride mouthrinse has resulted in only limited reductions in caries experience among schoolchildren, especially as their exposure to other sources of fluoride has increased (2).

Fluoride mouthrinses may be more cost-effective when targeted to school children with high caries (1,8,9). Cost estimates in 1988 ranged from \$0.52 to \$1.78 per child per school year for fluoride mouthrinsing, depending on whether paid staff or volunteers supervised the procedure (10). On average, fluoride mouthrinse programs cost about \$1.00 per child (\$1.41 in 1999 dollars).

Thirty-seven state and one territorial oral health programs reported having programs for **fluoride mouthrinsing** during 2000-2002 (1, 11). Public health programs of fluoride mouthrinsing have long been presumed to be cost-effective, especially when teachers or volunteers can supervise weekly rinsing in classrooms at no direct cost to the program. Fluoride mouthrinsing is a reasonable procedure for groups and persons at high risk for dental caries, but its cost-effectiveness as a universal, population-wide strategy in the modern era of widespread fluoride exposure is questionable (2).

## **2. School-based Fluoride Supplement Programs**

In a school-based fluoride supplement program, a child receives a tablet and chews it under supervision each school day. The child chews and swishes for 30 seconds before swallowing the supplement tablet. The procedure can be carried out for a classroom of children having parental consent. Supervision is needed to ensure that the children let the tablet dissolve slowly and provide appropriate topical fluoride exposure time (1, 2).

The cost of a school-based fluoride supplement program is considered low because equipment is not needed and the chew and swish procedure does not take much time for a class of children. A 1988 survey of school-based fluoride supplement programs found an average direct cost of approximately \$2.53 (\$3.52 in 1999 dollars) per child per school year (10). The cost ranged from \$0.81 to \$5.40 depending on whether paid personnel or volunteers supervised the procedure with the children. Twenty state and three territorial oral health programs reported having programs for **fluoride supplements** during 2000-2002 (11).

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## **III. Guidelines & Recommendations from Authoritative Sources**

### **A. Centers for Disease Control and Prevention (CDC)**

During the late 1990s, CDC convened a work group to develop recommendations for using fluoride to prevent and control dental caries in the United States. The work group recommended targeting fluoride mouthrinsing to groups and persons at high risk for caries, prescribing fluoride supplements for children who are at high risk for dental caries and whose primary drinking water has a low fluoride concentration, and when practical, prescribing chewable tablets or lozenges to maximize topical effects of fluoride (2).

### **B. Surgeon General's Report on Oral Health**

The Surgeon General's Report on Oral Health identified school fluoride mouthrinse and supplement programs as effective strategies to prevent dental caries. Experts recommend that these programs target high-risk individuals and groups (1). Fluoride mouthrinse programs are not recommended for preschool children in the United States (1).

### **C. American Academy of Pediatric Dentistry (AAPD)**

The American Academy of Pediatric Dentistry (AAPD) endorses whenever water fluoridation is not feasible, the supplementation of a child's diet with fluoride according to the dose scheduled approved by the Council on Dental Therapeutics of the American Dental Association. AAPD also supports and encourages the appropriate use of topical fluoride containing preparations (12).

## D. American Academy of Pediatrics

The American Academy of Pediatrics endorses and accepts as its policy the [CDC's] *Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States* (13).

## E. American Dental Association

The American Dental Association, American Academy of Pediatrics and American Academy of Pediatric Dentistry revised the Fluoride Supplement Dosage Schedule in 1994 (4).

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# IV. Research Evidence

## A. Fluoride Mouthrinses

Sufficient evidence exists from studies conducted before 1985 to support the effectiveness of 0.2 percent sodium fluoride mouthrinses in preventing coronal caries in school populations (1). Most studies collectively show that regular use of sodium fluoride mouthrinses reduces caries increments in children by 20% to 35% over 2 to 3 years (7,14,15). Two studies reported benefits of fluoride mouthrinsing programs approximately 2.5 and 7 years after completion of school-based mouthrinsing programs (2, 16, 17), but a more recent study did not find benefits 4 years after completion of a mouthrinsing program (2,18).

The National Preventive Dentistry Demonstration Program (NPDDP), conducted in ten U.S. cities to compare the cost and effectiveness of caries-prevention procedures, found only a limited reduction in dental caries attributable to fluoride mouthrinse especially when children were also exposed to fluoridated water (2,19).

## B. Fluoride Supplements

The research evidence on the effectiveness of school-based fluoride supplement programs is strong (1). Well-conducted randomized clinical trials with placebos and blind examiners have shown that fluoride supplements can have benefits in school-aged children (7). Studies in which the supplements were chewed, swished and swallowed under supervision have reported caries reductions of 20% to 28% over 3 to 6 years (20, 21). Higher caries reduction were reported from a study in which children initially aged 5.5 years, from lower socioeconomic groups, sucked a 1.0 mg fluoride tablets, or a placebo, under supervision in schools every school day for 3 years (22).

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# V. Best Practice Criteria

For the best practice approach of **School-based Fluoride Mouthrinse and Supplement Programs**, the ASTDD Best Practices Committee has proposed the following **initial review standards** for five best practice criteria:

### 1. Impact/Effectiveness:

- High-risk children are targeted for program services (e.g., fluoride deficient communities and schools with high proportion of children from low-income families)
- Provider training (e.g., volunteers, paid staff) incorporated in the program
- Assurance of appropriate service delivery through program evaluation and monitoring
- Documentation of service/program benefits or outcomes

### 2. Efficiency:

- Tracking of unit cost for each child enrolled in the program and/or service provided through the program

### 3. Demonstrated Sustainability:

- The program or service has a consistent funding source without time limitation (e.g., funding limitation of a 2-year grant), and/or has a plan for fund-raising or long-term funding

### 4. Collaboration/Integration:

- Integration, collaboration and/or coordination with chronic disease and/or MCH programs
- Partnerships to leverage resources

### 5. Objectives/Rationale:

- Linking of program goals/objectives to state and national oral health goals/objectives (e.g., state oral health improvement plan, state policy agenda, health agency's priorities, HP 2010 and/or Surgeon General's Report on Oral Health)

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## VI. State Practice Examples

During the first phase of the ASTDD Best Practices Project, states submitted descriptions of their successful practices to share their experiences and implementation strategies. The following practice examples illustrate various elements or dimensions of the best practice approach for **School-based Fluoride Mouthrinse and Supplement Programs**. These reported success stories should be viewed in the context of the state's and program's environment, infrastructure and resources. End-users are encouraged to review the practice descriptions (click on the links of the practice names) and adapt ideas for a better fit to their states and programs.

### A. Summary Listing of Practice Examples

See **Figure 1**. Each practice name is linked to a detailed description report.

**Figure 1.**

**State Practice Examples of  
School-based Fluoride Mouthrinse and Supplement Programs**

<b>Item</b>	<b>Practice Name</b>	<b>State</b>	<b>Practice #</b>
1	<a href="#">Idaho School Fluoride Mouthrinse Program</a>	ID	15001
2	<a href="#">New Jersey “Save Our Smiles” Fluoride Mouthrinse Program</a>	NJ	33004
3	<a href="#">New York State School-based Supplemental Fluoride Program</a>	NY	35004
4	<a href="#">King Fluoride School-Based Rinse/Tablet Program</a>	OR	40001
5	<a href="#">Fluoride Mouthrinse Program</a>	VT	51003
6	<a href="#">School Fluoride Mouthrinse Program</a>	VA	53003

**B. Highlights of Practice Examples**

- ID [Idaho School Fluoride Mouthrinse Program](#) (Practice #15001)  
The Idaho Department of Health and Welfare Oral Health Program (OHP) funds a statewide school-based fluoride mouthrinse program since 1976. The program targets elementary-age children, grades 1-6, at schools with  $\geq$  30 percent of children on the Free/Reduced National School Lunch Program in fluoride-deficient communities. The OHP contracts with seven District Health Departments to coordinate and conduct the rinse program at eligible schools. During school year 2001, participation totaled 33,383 students in grades 1 through 6 at 160 schools.
- NJ [New Jersey “Save Our Smiles” Fluoride Mouthrinse Program](#) (Practice #33004)  
The majority of New Jersey residents do not have the benefit of optimally fluoridated drinking water. The “Save Our Smiles” program provides weekly fluoride mouthrinses. The program is funded by the New Jersey Department of Health and Senior Services (DHSS). Schools targeted for participation include “high-need” districts as determined by “Criteria for Eligibility in the Fluoride Mouthrinse Program,” developed by a county health department. The program began in 1981 serving 20,000 children. Today, the program serves over 70,000 children in more than 300 schools.
- NY [New York State School-based Supplemental Fluoride Program](#) (Practice #35004)  
The Supplemental Fluoride Program provides preventive dental services to the most severely underserved children in fluoride-deficient areas of New York State. The Fluoride Supplement Program consists of a school-based fluoride mouthrinse program, which serves elementary school children grades 1-8, and a preschool preventive fluoride tablet program, which serves three and four year old children in Head Start centers. Well over 100,000 children are participating in these programs. The fluoride supplies for each school are ordered by the program, purchased by the New York State Department of Health and shipped directly from the manufacturer to the participating school. The program is under the general supervision of a volunteer supervising dentist or school physician and provides either the daily use of a fluoride tablet, or weekly fluoride

mouth rinse solution. The major goal of this program continues to be prevention of dental caries among targeted groups of children at high risk for dental disease.

- OR [King Fluoride School-Based Rinse/Tablet Program](#) (Practice #40001)  
The Oregon Department of Human Services, Oral Health Program (OHP) administers the King Fluoride Program, a school-based program providing weekly fluoride mouthrinses or daily chewable fluoride tablets, as well as oral health education, to children in grades K-6. The program began statewide in 1974 with fluoride mouthrinses and chewable tablets were added as an option in 1987. Schools with 30% or more of their students participating in the Free and Reduced Lunch Program living in communities with  $\leq 0.3$  ppm fluoride levels in the drinking water are eligible for the program. Program supplies and training materials are provided at no cost to the participating schools. During the 2000-01 school year, a total of 17,300 children from 118 grade schools and 6 Pre-Kindergarten/Head Start programs (located in 27 of 36 counties in the state) participated in the fluoride school-based rinse/tablet program.
- VT [Fluoride Mouthrinse Program](#) (Practice #51003)  
The Vermont Department of Health, Dental Health Services administers a Fluoride Mouthrinse Program targeting public schools in communities with drinking water below optimal fluoride level. The program provides weekly 0.2% sodium fluoride mouthrinse for children in grades 1 through 8. Of the 193 eligible schools, 173 schools with 17,829 students are participating in the program during the 2001-02 school year. Three Dental Educators (dental hygienists) from Dental Health Services manage the program, each devoting 25% of their time. The Dental Educators communicate with the schools, provide a fluoride ordering protocol to the schools, train new school nurses and school fluoride coordinators to conduct weekly rinses, and track participation.
- VA [School Fluoride Mouthrinse Program](#) (Practice #53003)  
The Division of Dental Health, Virginia Department of Health administers a school fluoride mouthrinse program for primary school age children in the 1<sup>st</sup> to the 5<sup>th</sup> grades in non-fluoridated areas. There are approximately 50,000 children presently participating in 210 schools. The Division provides all of the materials, supplies including the pre-mixed fluoride solution, and monitors each school. The Division also provides training for persons administering the program in the individual schools.

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## ATTACHMENT A

### Strength of Evidence Supporting Best Practice Approaches

The ASTDD Best Practices Committee took a broader view of evidence to support best practice approaches for building effective state and community oral health programs. The Committee evaluated evidence in four categories: research, expert opinion, field lessons and theoretical rationale. Although all best practice approaches reported have a strong theoretical rationale, the strength of evidence from research, expert opinion and field lessons fall within a spectrum. On one end of the spectrum are promising best practice approaches, which may be supported by little research, a beginning of agreement in expert opinion, and very few field lessons evaluating effectiveness. On the other end of the spectrum are proven best practice approaches, ones that are supported by strong research, extensive expert opinion from multiple authoritative sources, and solid field lessons evaluating effectiveness.

<u>Promising</u> <u>Best Practice Approaches</u>					<u>Proven</u> <u>Best Practice Approaches</u>	
Research	+		⇒		Research	+++
Expert Opinion	+		⇒		Expert Opinion	+++
Field Lessons	+				Field Lessons	+++
Theoretical Rationale	+++				Theoretical Rationale	+++
<u>Research</u>						
+	A few studies in dental public health or other disciplines reporting effectiveness.					
++	Descriptive review of scientific literature supporting effectiveness.					
+++	Systematic review of scientific literature supporting effectiveness.					
<u>Expert Opinion</u>						
+	An expert group or general professional opinion supporting the practice.					
++	One authoritative source (such as a national organization or agency) supporting the practice.					
+++	Multiple authoritative sources (including national organizations, agencies or initiatives) supporting the practice.					
<u>Field Lessons</u>						
+	Successes in state practices reported without evaluation documenting effectiveness.					
++	Evaluation by a few states separately documenting effectiveness.					
+++	Cluster evaluation of several states (group evaluation) documenting effectiveness.					
<u>Theoretical Rationale</u>						
+++	Only practices which are linked by strong causal reasoning to the desired outcome of improving oral health and total well-being of priority populations will be reported on this website.					

## ATTACHMENT B

### Fluoride Supplement\* Dosage Schedule - 1994

Approved by the American Dental Association, American Academy of Pediatrics and American Academy of Pediatric Dentistry

<u>Age</u>	<u>Fluoride Ion Level in Drinking Water (ppm)**</u>		
	<0.3 ppm	0.3-0.6 ppm	>0.6 ppm
Birth-6 months	None	None	None
6 months-3 years	0.25 mg/day	None	None
3-6 years	0.50 mg/day	0.25 mg/day	None
6-16 years	1.0 mg/day	0.50 mg/day	None

\* Sodium fluoride (2.2 mg sodium fluoride contains 1 mg fluoride ion).

\*\* 1.0 parts per million (ppm) = 1 mg/liter.

#### Important Considerations When Using Dosage Schedule:

- If fluoride level is unknown, drinking water should be tested for fluoride content before supplements are prescribed. For testing of fluoride content, contact the local or state health department.
- All sources of fluoride should be evaluated with a thorough fluoride history.
- Patient exposure to multiple water sources can make proper prescribing complex.
- Ingestion of higher than recommended levels of fluoride by children has been associated with an increase in mild dental fluorosis in developing, unerupted teeth.
- Fluoride supplements require long-term compliance on a daily basis.

Sources: American Dental Association, Fluoride and Fluoridation, The Fluoride Supplement Dosage Schedule - 1994. Available from: [http://www.ada.org/public/topics/fluoride/fluoride\\_article01.asp#dosage](http://www.ada.org/public/topics/fluoride/fluoride_article01.asp#dosage)

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