Complete Summary

GUIDELINE TITLE

Recommendations for using fluoride to prevent and control dental caries in the United States.

BIBLIOGRAPHIC SOURCE(S)

Recommendations for using fluoride to prevent and control dental caries in the United States. Centers for Disease Control and Prevention. MMWR Recomm Rep 2001 Aug 17;50(RR-14):1-42. [270 references]

COMPLETE SUMMARY CONTENT

SCOPE
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SCOPE

DISEASE/CONDITION(S)

Dental caries

GUIDELINE CATEGORY

Prevention

CLINICAL SPECIALTY

Dentistry
Family Practice
Internal Medicine
Pediatrics
Preventive Medicine

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Dentists
Nurses
Patients
Physician Assistants
Physicians
Public Health Departments

GUIDELINE OBJECTIVE(S)

- To make recommendations to guide dental and other health-care providers, public health officials, policy makers, and the public in the use of fluoride to achieve maximum protection against dental caries while using resources efficiently and reducing the likelihood of enamel fluorosis

TARGET POPULATION

General population in the United States

INTERVENTIONS AND PRACTICES CONSIDERED

Public Health and Clinical Practice

1. Continuation and extension of fluoridation of community drinking water.
2. Counseling parents and caregivers regarding use of fluoride toothpaste by young children, especially those younger than 2 years of age.
3. Targeting mouthrinsing to persons of high risk.
4. Judicious prescription of fluoride supplements.
5. Application of high-concentration fluoride products (e.g., fluoride gel or foam) to persons at high risk for dental caries.

Self-Care

1. Knowing the fluoride concentration in the primary source of drinking water.
2. Frequent use of smaller amounts of fluoride through toothpaste or drinking water.
3. Supervised use of fluoride toothpaste among children aged <6 years.
4. Consideration of additional fluoride or other preventive measures for persons at high risk for dental caries.
5. Use of an alternative source of water for children aged $\leq$8 years whose primary drinking water contains >2 ppm fluoride (i.e., 2 parts fluoride per one million parts water).

Consumer Product Industries and Health Agencies

1. Labeling the fluoride concentration of bottled water.
2. Promoting use of smaller amounts of fluoride tooth paste among children aged <6 years.
3. Developing a low-fluoride toothpaste for children aged <6 years.
4. Collaboration to educate health-care professionals and the public.

MAJOR OUTCOMES CONSIDERED

- Prevalence of dental caries
- Incidence and risk of enamel fluorosis
- Retention of teeth
- Use of resources
- Treatment costs for patients and insurers

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Evidence was drawn from the most relevant English-language, peer-reviewed scientific publications regarding the current effectiveness of fluoride modalities. Additional references were suggested by reviewers.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Members of the work group convened by the U.S. Centers for Disease Control and Prevention used their own methods for critically analyzing articles. A formal protocol for duplicate review was not followed, but members collectively agreed on the grade reflecting the quality of evidence regarding each fluoride modality. Criteria used to grade the quality of scientific evidence (i.e., ordinal grading) was adapted from the U.S. Preventive Services Task Force.

Grading System Used for Determining the Quality of Evidence for a Fluoride Modality:

I. Evidence obtained from one or more properly conducted randomized controlled trials (i.e., one using concurrent controls, double-blind design, placebos, valid and reliable measurements, and well-controlled study protocols).

II-1. Evidence obtained from one or more controlled trials without randomization (i.e., one using systematic subject selection, some type of concurrent controls, valid and reliable measurements, and well-controlled study protocols).

II-2. Evidence from one or more well-designed cohort or case-control analytic studies, preferably from more than one center or research group.

II-3. Evidence obtained from cross-sectional comparisons between times and places; studies with historical controls; or dramatic results in uncontrolled experiments (e.g., the results of the introduction of penicillin treatment in the 1940s).

III. Opinions of respected authorities on the basis of clinical experience, descriptive studies, or reports of expert committees.

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Coding System Used to Classify Recommendation for Use of Specific Fluoride Modalities to Control Dental Caries:

A. Good evidence to support the use of the modality.
B. Fair evidence to support the use of the modality.
C. Lack of evidence to develop a specific recommendation (i.e., the modality has not been adequately tested) or mixed evidence (i.e., some studies support the use of the modality and some oppose it).
D. Fair evidence to reject the use of the modality.
E. Good evidence to reject the use of the modality.

COST ANALYSIS

Cost-Effectiveness of Fluoride Modalities

Documented effectiveness is the most basic requirement for providing a health-care service and an important prerequisite for preventive services (e.g., caries-preventive modalities). However, effectiveness alone is not a sufficient reason to initiate a service. Other factors, including cost, must be considered. A modality is more cost-effective when deemed a less expensive way, from among competing alternatives, of meeting a stated objective. In public health planning, determination of the most cost-effective alternative for prevention is essential to using scarce resources efficiently. Dental-insurance carriers are also interested in cost-effectiveness so they can help purchasers use funds efficiently. Because half of dental expenditures are out of pocket, this topic interests patients and their dentists as well. Potential improvement to quality of life is also a consideration.

The contribution of a healthy dentition to quality of life at any age has not been quantified, but is probably valued by most persons.

Although solid data on the cost-effectiveness of fluoride modalities alone and in combination are needed, this information is scarce. In 1989, the Cost Effectiveness of Caries Prevention in Dental Public Health workshop, which was attended by health economists, epidemiologists, and dental public health professionals, attempted to assess the cost-effectiveness of caries-preventive approaches available in the United States.

All other things being equal, fluoride modalities are most cost-effective for persons at high risk for dental caries. Because persons at low risk develop little dental caries, limited benefit is gained by adding caries-preventive modalities to water fluoridation and fluoride toothpaste, even those demonstrated to be effective among populations at high risk. Members of the Centers for Disease Control and Prevention (CDC) work group reached consensus regarding the populations for which each modality would be expected to have the necessary level of cost-effectiveness to warrant its use.

Community Water Fluoridation

Health economists at the 1989 workshop on cost-effectiveness of caries prevention calculated that the average annual cost of water fluoridation in the United States was $0.51 per person (range: $0.12--$5.41). In 1999 dollars,** this cost would be $0.72 per person (range: $0.17--$7.62). Factors reported to influence the per capita cost included

- size of the community (the larger the population reached, the lower the per capita cost);
- number of fluoride injection points in the water supply system;
- amount and type of system feeder and monitoring equipment used;
- amount and type of fluoride chemical used, its price, and its costs of transportation and storage; and
- expertise of personnel at the water plant.

When the effects of caries are repaired, the price of the restoration is based on the number of tooth surfaces affected. A tooth can have caries at >1 location (i.e., surface), so the number of surfaces saved is a more appropriate measure in calculating cost-effectiveness than the number of teeth with caries. The 1989 workshop participants concluded that water fluoridation is one of the few public health measures that results in true cost savings (i.e., the measure saves more money than it costs to operate); in the United States, water fluoridation cost an estimated average of $3.35 per carious surface saved ($4.71 in 1999 dollars**). Even under the least favorable assumptions in 1989 (i.e., cities with populations <10,000, higher operating costs, and effectiveness projected at the low end of the range), the cost of a carious surface saved because of community water fluoridation ranged from $8 to $12 ($11--$17 in 1999 dollars**), which is still lower than the fee for a one-surface restoration ($54 in 1995 or $65 in 1999 dollars***).

A Scottish study conducted in 1980 reported that community water fluoridation resulted in a 49% saving in dental treatment costs for children aged 4--5 years

and a 54% saving for children aged 11--12 years. These savings were maintained even after the secular decline in the prevalence of dental caries was recognized. The effect of community water fluoridation on the costs of dental care for adults is less clear. This topic cannot be fully explored until the generations who grew up drinking optimally fluoridated water are older.

School Water Fluoridation

Costs for school water fluoridation are similar to those of any public water supply system serving a small population (i.e., <1,000 persons). In 1988, the average annual cost of school water fluoridation was $4.52 per student per year (range: $0.81--$9.72). In 1999 dollars,**** this cost would be $6.37 per person (range: $1.14--$13.69). Use of this modality must be carefully weighed in the current environment of low caries prevalence, widespread use of fluoride toothpaste, and availability of other fluoride modalities that can be delivered in the school setting.

Fluoride Toothpaste

Fluoride toothpaste is widely available, no more expensive than nonfluoride toothpaste, and periodically improved. Use of a pea-sized amount (0.25 g) twice per day requires approximately two tubes of toothpaste per year, for an estimated annual cost of $6--$12, depending on brand, tube size, and retail source. Persons who brush and use toothpaste regularly to maintain periodontal health and prevent stained teeth and halitosis (i.e., bad breath) incur no additional cost for the caries-preventive benefit of fluoride in toothpaste. Because of its multiple benefits, most persons consider fluoride toothpaste a highly cost-effective caries-preventive modality.

Fluoride Mouthrinse

Public health programs of fluoride mouthrinsing have long been presumed to be cost-effective, especially when teachers can supervise weekly rinsing in classrooms at no direct cost to the program. In other programs, volunteers or hourly workers provide supervision. Under these circumstances, administrators of fluoride mouthrinsing programs have claimed annual program costs of approximately $1 per child ($1.41 in 1999 dollars****). This figure likely is an underestimate because indirect costs are not included. 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.

Dietary Fluoride Supplements

Dietary fluoride supplements prescribed to persons cost an estimated $37 per year. Fluoride supplements in school programs have direct costs of approximately $2.50 per child ($3.52 in 1999 dollars****) for the tablet or lozenge; program administrative costs and considerations are similar to those in school mouthrinsing programs.

Professionally Applied Fluoride Compounds

High-concentration fluoride gel and varnish are effective in preventing dental caries, but because application requires professional expertise, they are inherently more expensive than self-applied methods (e.g., drinking fluoridated water or brushing with fluoride toothpaste). For groups and persons at low risk for dental caries, professionally applied methods are unlikely to be cost-effective. In the NPDDP study, prophylactic cleaning and gel application costs were $23 per year ($66 in 1999 dollars*****) for semiannual applications, which prevented 0.03--0.26 decayed surfaces per year. A Swedish study claimed that fluoride varnish was cost-effective, but few supporting data were presented. Varnish might be cost-effective in Scandinavian school dental services, in which dental professionals regularly examine and treat each student, but the cost-effectiveness of fluoride varnish in public health programs in the United States remains undocumented. Whether fluoride varnish or gel would be most efficiently used in clinical programs targeting groups at high risk for dental caries or should be reserved for individual patients at high risk is unclear.

Combinations of Fluoride Modalities

Because the caries-preventive effects of a combination of fluoride modalities are only partially additive, estimates of the cost-effectiveness when adding a modality (e.g., fluoride mouthrinse for a group already drinking fluoridated water and using fluoride toothpaste) should take into account these smaller, incremental reductions in caries. This consideration is particularly relevant for groups and persons at low risk for caries. The scarcity of research on the costeffectiveness of combinations limits the ability to draw more detailed conclusions.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

These recommendations were developed by a group of 11 specialists in fluoride research or policy convened by the U.S. Centers for Disease Control and Prevention during the late 1990s and reviewed by an additional 23 specialists.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Before promoting a fluoride modality or combination of modalities, the dental-care or other health-care provider must consider a person's or group's risk for dental caries, current use of other fluoride sources, and potential for enamel fluorosis. Although these recommendations are based on assessments of caries risk as low or high, the health-care provider might also differentiate among patients at high risk and provide more intensive interventions as needed. Also, a risk category can change over time; the type and frequency of preventive interventions should be adjusted accordingly.

The coding system used to classify recommendations for use in specific fluoride modalities to control dental caries (A-E) and the grading system used for determining the quality of evidence for a fluoride modality (I-III) are defined at the end of the Major Recommendations.

Public Health and Clinical Practice

Continue and Extend Fluoridation of Community Drinking Water

Community water fluoridation is a safe, effective, and inexpensive way to prevent dental caries. This modality benefits persons in all age groups and of all socioeconomic status (SES), including those difficult to reach through other public health programs and private dental care. Community water fluoridation also is the most cost-effective way to prevent tooth decay among populations living in areas with adequate community water supply systems. Continuation of community water fluoridation for these populations and its adoption in additional United States communities are the foundation for sound caries-prevention programs.

In contrast, the appropriateness of fluoridating stand-alone water systems that supply individual schools is limited. Widespread use of fluoride toothpaste, availability of other fluoride modalities that can be delivered in the school setting, and the current environment of low caries prevalence limit the appropriateness of fluoridating school drinking water at 4.5 times the optimal concentration for community drinking water. Decisions to initiate or continue school fluoridation programs should be based on an assessment of present caries risk in the target school(s), alternative preventive modalities that might be available, and periodic evaluation of program effectiveness.

Counsel Parents and Caregivers Regarding Use of Fluoride Toothpaste by Young Children, Especially Those Aged <2 Years

Fluoride toothpaste is a cost-effective way to reduce the prevalence of dental caries. However, for children aged <6 years, especially those aged <2 years, an increased risk for enamel fluorosis exists because of inadequately developed control of the swallowing reflex. Parents or caregivers should be counseled regarding selfcare recommendations for toothpaste use for young children (i.e., limit the child's toothbrushing to $\leq$2 times a day, apply a peasized amount to the toothbrush, supervise toothbrushing, and encourage the child to spit out excess toothpaste).

For children aged <2 years, the dentist or other healthcare provider should consider the fluoride level in the community drinking water, other sources of fluoride, and factors likely to affect susceptibility to dental caries when weighing the risk and benefits of using fluoride toothpaste.

Target Mouthrinsing to Persons at High Risk

Because fluoride mouthrinse has resulted in only limited reductions in caries experience among schoolchildren, especially as their exposure to other sources of fluoride has increased, its use should be targeted to groups and persons at high risk for caries. Children aged <6 years should not use fluoride mouthrinse without

consultation with a dentist or other health-care provider because enamel fluorosis could occur if such mouthrinses are repeatedly swallowed.

Judiciously Prescribe Fluoride Supplements

Fluoride supplements can be prescribed for children at high risk for dental caries and whose primary drinking water has a low fluoride concentration. For children aged <6 years, the dentist, physician, or other health-care provider should weigh the risk for caries without fluoride supplements, the caries prevention offered by supplements, and the potential for enamel fluorosis. Consideration of the child's other sources of fluoride, especially drinking water, is essential in determining this balance. Parents and caregivers should be informed of both the benefit of protection against dental caries and the possibility of enamel fluorosis. The prescription dosage of fluoride supplements should be consistent with the schedule established by American Dental Association (ADA), the American Academy of Pediatric Dentists (AAPD), and the American Academy of Pediatrics (AAP). Supplements can be prescribed for persons as appropriate or used in school-based programs. When practical, supplements should be prescribed as chewable tablets or lozenges to maximize the topical effects of fluoride.

Apply High-Concentration Fluoride Products to Persons at High Risk for Dental Caries

High-concentration fluoride products can play an important role in preventing and controlling dental caries among groups and persons at high risk. Dentists and other health-care providers must consider the risk status and age of the patient to determine the appropriate intensity of treatment. Routine use of professionally applied fluoride gel or foam likely provides little benefit to persons not at high risk for dental caries, especially those who drink fluoridated water and brush daily with fluoride toothpaste.

If the U.S. Food and Drug Administration (FDA) approves the use of fluoride varnish to prevent and control dental caries, its indications for use will be similar to those of fluoride gel. Such varnishes have practical advantages for children aged <6 years at high risk.

Self-Care

Know the Fluoride Concentration in the Primary Source of Drinking Water

All persons should know whether the fluoride concentration in their primary source of drinking water is below optimal, optimal, or above optimal. This knowledge is the basis for all individual and professional decisions regarding use of other fluoride modalities (e.g., mouthrinse or supplements). Parents and caregivers of children, especially children aged <6 years, must know the fluoride concentration in their child's drinking water when considering whether to alter the child's fluoride intake. For example, in nonfluoridated areas where the natural fluoride concentration is below optimal, fluoride supplements might be considered, whereas in areas where the natural fluoride concentration is >2 ppm, children should use alternative sources of drinking water. Knowledge of the water's fluoride concentration is also key in public policy discussions regarding community water fluoridation.

Frequently Use Small Amounts of Fluoride

All persons should receive frequent exposure to small amounts of fluoride, which minimizes dental caries by inhibiting demineralization of tooth enamel and facilitating tooth remineralization. This exposure can be readily accomplished by drinking water with an optimal fluoride concentration and brushing with a fluoride toothpaste twice daily.

Supervise Use of Fluoride Toothpaste Among Children Aged <6 Years

Children's teeth should be cleaned daily from the time the teeth erupt in the mouth. Parents and caregivers should consult a dentist or other health-care provider before introducing a child aged <2 years to fluoride toothpaste. Parents and caregivers of children aged <6 years who use fluoride toothpaste should follow the directions on the label, place no more than a pea-sized amount (0.25 g) of toothpaste on the toothbrush, brush the child's teeth (recommended particularly for preschool-aged children) or supervise the toothbrushing, and encourage the child to spit excess toothpaste into the sink to minimize the amount swallowed. Indiscriminate use can result in inadvertent swallowing of more fluoride than is recommended.

Consider Additional Measures for Persons at High Risk for Dental Caries

Persons at high risk for dental caries might require additional fluoride or other preventive measures to reduce development of caries. This additional fluoride can come from daily use of another fluoride product at home or from professionally applied, topical fluoride products. Other preventive measures might include dental sealants and targeted antimicrobial therapies. Parents and caregivers should not provide additional fluoride to children aged <6 years without consulting a dentist or other health-care provider regarding the associated benefits and potential for enamel fluorosis. Persons should seek professional advice regarding their risk status or that of their children.

Use an Alternative Source of Water for Children Aged ≤8 Years Whose Primary Drinking Water Contains >2 Parts per Million (ppm) Fluoride

In some regions in the United States, community water supply systems and home wells contain a natural concentration of fluoride >2 ppm. At this concentration, children aged ≤8 years are at increased risk for developing enamel fluorosis, including the moderate and severe forms, and should have an alternative source of drinking water, preferably one containing fluoride at an optimal concentration.

In areas where community water supply systems contain >2 ppm but <4 ppm fluoride, the U.S. Environmental Protection Agency (EPA) requires that each household be notified annually of the desirability of using an alternative source of water for children aged ≤8 years. For families receiving water from home wells, testing is necessary to determine the natural fluoride concentration.

Consumer Product Industries and Health Agencies

Label the Fluoride Concentration of Bottled Water

Producers of bottled water should label the fluoride concentration of their products. Such labeling will allow consumers to make informed decisions and dentists, dental hygienists, and other health-care professionals to appropriately advise patients regarding fluoride intake and use of fluoride products.

Promote Use of Small Amounts of Fluoride Toothpaste Among Children Aged <6 Years

Labels and advertisements for fluoride toothpaste should promote use of a pea-sized amount (0.25 g) of toothpaste on a child-sized toothbrush for children aged <6 years. Efforts to educate parents and caregivers and to encourage supervised use of fluoride toothpaste among young children can reduce inadvertent swallowing of excess toothpaste.

Develop a Low-Fluoride Toothpaste for Children Aged <6 Years

Manufacturers are encouraged to develop a dentifrice for children aged <6 years that is effective in preventing dental caries but alleviates the risk for enamel fluorosis. A "child-strength" toothpaste with a fluoride concentration lower than current products could reduce the risk for cosmetic concerns associated with inadvertent swallowing of toothpaste.

Collaborate to Educate Health-Care Professionals and the Public

Professional health-care organizations, public health agencies, and suppliers of oral-care products should collaborate to educate health-care professionals and trainees and the public regarding the recommendations in this report. Broad collaborative efforts to educate health-care professionals and the public and to encourage behavior change can promote improved, coordinated use of fluoride modalities.

Table. Quality of Evidence, Strength of Recommendation, and Target Population of Recommendation for each Fluoride Modality to Prevent and Control Dental Caries

Modality*	Quality of evidence (grade)	Strength of recommendation (code)	Target population**
Community water fluoridation	II-1	A	All areas
School water fluoridation	II-3	C	Rural, nonfluoridated areas
Fluoride toothpaste	I	A	All persons

Fluoride mouthrinse	I	A	High risk***
Fluoride supplements:			
• Pregnant women	I	E	None
• Children younger than 6 years	II-3	C	High risk
• Children aged 6 to 16 years	I	A	High risk
• Persons older than 16 years	#	C	High risk
Fluoride gel	I	A	High risk
Fluoride varnish	I	A	High risk

* Modalities are assumed to be used as directed in terms of dosage and age of user.
** Quality of evidence for targeting some modalities to persons at high risk is grade III (i.e., representing the opinion of respected authorities) and is based on considerations of cost-effectiveness that were not included in the studies establishing efficacy or effectiveness.
*** Populations believed to be at increased risk for dental caries are those with low socioeconomic status or low levels of parental education, those who do not seek regular dental care, and those without dental insurance or access to dental services. Individual factors that possibly increase risk include active dental caries; a history of high caries experience in older siblings or caregivers; root surfaces exposed by gingival recession; high levels of infection with cariogenic bacteria; impaired ability to maintain oral hygiene; malformed enamel or dentin; reduced salivary flow because of medications, radiation treatment, or disease; low salivary buffering capacity (i.e., decreased ability of saliva to neutralize acids); and the wearing of space maintainers, orthodontic appliances, or dental prostheses. Risk can increase if any of these factors are combined with dietary practices conducive to dental caries (i.e., frequent consumption of refined carbohydrates). Risk decreases with adequate exposure to fluoride.

[#] No published studies confirm the effectiveness of fluoride supplements in controlling dental caries among persons aged >16 years.

Definitions:

Coding System Used to Classify Recommendation for Use of Specific Fluoride Modalities to Control Dental Caries:

A. Good evidence to support the use of the modality.
B. Fair evidence to support the use of the modality.
C. Lack of evidence to develop a specific recommendation (i.e., the modality has not been adequately tested) or mixed evidence (i.e., some studies support the use of the modality and some oppose it).
D. Fair evidence to reject the use of the modality.
E. Good evidence to reject the use of the modality.

Grading System Used for Determining the Quality of Evidence for a Fluoride Modality:

I. Evidence obtained from one or more properly conducted randomized controlled trials (i.e., one using concurrent controls, double-blind design, placebos, valid and reliable measurements, and well-controlled study protocols).

II-1. Evidence obtained from one or more controlled trials without randomization (i.e., one using systematic subject selection, some type of concurrent controls, valid and reliable measurements, and well-controlled study protocols).

II-2. Evidence from one or more well-designed cohort or case-control analytic studies, preferably from more than one center or research group.

II-3. Evidence obtained from cross-sectional comparisons between times and places; studies with historical controls; or dramatic results in uncontrolled experiments (e.g., the results of the introduction of penicillin treatment in the 1940s).

III. Opinions of respected authorities on the basis of clinical experience, descriptive studies, or reports of expert committees.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified for specific recommendations (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

The potential benefits of fluoride use as recommended in the guideline are:

- Lower prevalence of dental caries
- Less enamel fluorosis
- Longer retention of teeth
- More efficient use of resources
- Considerable cost saving for patients and insurers

Subgroups Most Likely to Benefit:

Persons who are at increased risk for dental caries include those with low socioeconomic status (SES) or low levels of parental education, those who do not seek regular dental care, and those without dental insurance or access to dental services.

Persons can be at high risk for dental caries even if they do not have these recognized factors. Individual factors that possibly increase risk include active dental caries; a history of high caries in older siblings or caregivers; root surfaces exposed by gingival recession; high levels of infection with cariogenic bacteria; impaired ability to maintain oral hygiene; malformed enamel or dentin; reduced salivary flow because of medications, radiation treatment, or disease; low salivary buffering capacity (i.e., decreased ability of saliva to neutralize acids); and the wearing of space maintainers, orthodontic appliances, or dental prostheses. Risk can increase if any of these factors are combined with dietary practices conducive to dental caries (i.e., frequent consumption of refined carbohydrates).

POTENTIAL HARMS

Risk for enamel fluorosis.

Subgroups Most Likely to be Harmed:

Children aged $\leq$8 years, especially those aged <2 years.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

Although the recommendations were developed specifically for the United States, aspects of this report could be relevant to other countries. The recommendations guide health-care providers and the public on efficient and appropriate use of fluoride modalities, direct attention to fluoride intake among children aged younger than 6 years to decrease the risk for enamel fluorosis, and suggest areas for further research. This report focuses on critical analysis of the scientific evidence regarding the efficacy and effectiveness of each fluoride modality in preventing and controlling dental caries and on the use of multiple sources of

fluoride. The safety of fluoride, which has been documented comprehensively by other scientific and public health organizations (e.g., U.S. Public Health Service, National Research Council, World Health Organization, and Institute of Medicine) is not addressed.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Recommendations for using fluoride to prevent and control dental caries in the United States. Centers for Disease Control and Prevention. MMWR Recomm Rep 2001 Aug 17;50(RR-14):1-42. [270 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2001 Aug

GUIDELINE DEVELOPER(S)

Centers for Disease Control and Prevention - Federal Government Agency [U.S.]

SOURCE(S) OF FUNDING

United States Government

GUIDELINE COMMITTEE

Fluoride Recommendations Work Group

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Primary Authors: William G. Kohn, D.D.S.; William R. Maas, D.D.S., M.P.H.; Dolores M. Malvitz, Dr. P.H.; Scott M. Presson, D.D.S., M.P.H.; Kerald K. Shaddix, D.D.S., M.P.H.

Working Group Members: Steven M. Adair, D.D.S., M.S.; William H. Bowen, Ph.D.; Brian A. Burt, B.D.S., M.P.H., Ph.D.; Jayanth V. Kumar, D.D.S., M.P.H.; Steven M. Levy, D.D.S., M.P.H.; David G. Pendrys, D.D.S., Ph.D.; R. Gary Rozier, D.D.S., M.P.H.; Robert H. Selwitz, D.D.S., M.P.H.; John W. Stamm, D.D.S., D.D.P.H.; George K. Stookey, Ph.D., D.D.S.; Gary M. Whitford, Ph.D., D.M.D.

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

An update is not in progress at this time.

GUIDELINE AVAILABILITY

Electronic copies: Available from the Centers for Disease Control and Prevention (CDC) Web site:

- HTML version
- Portable Document Format (PDF) version

Print copies: Available from the Centers for Disease Control and Prevention, MMWR, Atlanta, GA 30333. Additional copies can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325; (202) 783-3238.

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

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