Prevention of Dental Caries in Preschool Children: Recommendations and Rationale

U.S. Preventive Services Task Force

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This statement summarizes the U.S. Preventive Services Task Force (USPSTF) recommendations on the primary care clinician's role in the prevention of dental disease among preschool children based on the USPSTF's examination of evidence specific to dental disease in young children. It updates the 1996 recommendations contained in the *Guide to Clinical Preventive Services*, second edition.[1] Explanations of the ratings and strength of overall evidence are given in Appendix A and Appendix B, respectively. The complete information on which this statement is based, including evidence tables and references, is available in the summary article, "Systematic Review of Physician's Roles in Preventing Dental Caries in Preschool Children: A Summary of the Evidence for the

U.S. Preventive Services Task Force."[2] and in the Systematic Evidence Review, "Dental Caries Prevention: The Physician's Role in Oral Health."[3] The USPSTF recommendations, the accompanying summary article, and the complete Systematic Evidence Review are available through the USPSTF web site (http://www.preventiveservices.ahrq.gov). The summary article and the USPSTF recommendations and rationale statement are available in print through the AHRQ Publications Clearinghouse (call 1-800-358-9295 or e-mail).

SUMMARY OF RECOMMENDATIONS

The USPSTF recommends that primary care clinicians prescribe oral fluoride supplementation at currently recommended doses to preschool children older than 6 months of age whose primary water source is deficient in fluoride. **B recommendation.**

The USPSTF found fair evidence that, in preschool children with low fluoride exposure, prescription of oral fluoride supplements by primary care clinicians leads to reduced dental caries. The USPSTF concluded that the benefits of caries prevention using oral fluoride supplementation outweigh the potential harms of dental fluorosis, which in the United States are primarily observed as a mild cosmetic discoloration of the teeth.

The USPSTF concludes that the evidence is insufficient to recommend for or against routine risk assessment of preschool children by primary care clinicians for the prevention of dental disease. **I recommendation.**

The USPSTF found no validated risk-assessment tools or algorithms for assessing dental disease risk by primary care clinicians and little evidence that primary care clinicians are able to systematically assess risk for dental disease among preschool-aged children. The USPSTF further found little evidence that either counseling of parents or referring high-risk children to dental care providers results in fewer caries or reduced dental disease. Thus, the USPSTF concluded there is insufficient evidence to determine the balance between the benefits and harms of routine risk assessment to prevent dental disease among preschool children.

CLINICAL CONSIDERATIONS

- Dental disease is prevalent among young children, particularly those from lower socioeconomic populations; however, few preschool-age children ever visit a dentist. Primary care clinicians are often the first and only health professionals whom children visit. Therefore, they are in a unique position to address dental disease in these children.
- Fluoride varnishes, professionally applied topical fluorides approved to prevent dental caries in young children, are adjuncts to oral supplementation. Their advantages over other topical fluoride agents (mouth-rinse and gel) include ease of use, patient acceptance, and reduced potential for toxicity.
- Dental fluorosis (rather than skeletal fluorosis) is the most common harm of either oral fluoride or fluoride toothpaste use in children younger than 2 years in the

United States. Dental fluorosis is typically very mild and only of aesthetic importance. The recommended dosage of fluoride supplementation was reduced by the American Dental Association in 1994, which is likely to decrease the prevalence and severity of dental fluorosis. The current dosage recommendations are based on the fluoride level of the local community's water supply and are available online at www.ada.org. The primary care clinician's knowledge of the fluoride level of his or her patients' primary water supply ensures appropriate fluoride supplementation and minimizes risk for fluorosis.

DISCUSSION

Dental caries is a common childhood disease: as many as 19% of children aged 2 to 5 years and 52% of children aged 5 to 9 years have experienced dental caries.[4, 5] Minority and economically disadvantaged children have a higher prevalence and severity of caries compared with other groups.[3] Untreated caries in primary teeth may lead to caries in permanent teeth and a possible loss of arch space.[3]

Although a first dental visit is recommended when a child is approximately 1 year old, [6] only 36% of 2- to 4-year-olds have had a dental visit in the past year; thus, primary care clinicians have a role in providing access to preventive dental services, particularly for very young and disadvantaged children.[5] The USPSTF reviewed the evidence for the prevention and management of dental caries in children up to 5 years of age. The review did not cover the evidence for water fluoridation, application of dental sealants, or prenatal counseling. However, based on strong evidence, the Centers for Disease Control and Prevention Task Force on Community Preventive Services has recommended that local water fluoridation be a part of a population-based strategy for the prevention of tooth decay in communities. The recommendation can be accessed at www.thecommunityguide.org/oral/.

Clinical trials that assess the effectiveness of oral fluoride supplementation started before the age of 5 in preventing dental caries have consistently found that fluoride supplementation prevents 32% to 81% of caries lesions in primary teeth or tooth surfaces.[3] The smallest proportional reductions occurred in studies with the highest background water fluoride level, which is a level that is not currently considered appropriate for supplementation.[7] Since these trials have several limitations, the overall strength of evidence is considered fair by the USPSTF, and these results should be generalized with caution.[3] Although only 2 studies with mixed results have examined the effectiveness of fluoride supplementation on preventing caries in permanent teeth in preschool children, a larger body of evidence supports the effectiveness of fluoride supplementation in school-aged children to prevent caries in permanent teeth.[3]

Dental fluorosis is a potential harm of oral fluoride supplementation. A systematic review concluded that the use of fluoride supplements increases the risk for dental fluorosis, although the fluorosis is very mild (as classified by Dean's Fluorosis Index) in the large majority of children[8]. A national survey in the United States found that the prevalence of fluorosis in the permanent teeth of children aged 5 to 17 years was nearly 24%; almost all

cases were mild.[9] About 13% and 28% of children who were continuous residents of nonfluoridated and fluoridated communities, respectively, had very mild fluorosis.[9] The prevalence of dental fluorosis considered to be of some aesthetic consequence in children varies from 3% to 7%.[10] One study estimated that nearly two-thirds of cases of dental fluorosis observed in communities in Massachusetts and Connecticut were attributable to supplementation using pre-1994 dosage schedules; the remaining cases were attributed to early use of fluoride toothpaste.[11]

Although the studies assessing the appropriateness of primary care clinicians' prescription of fluoride supplements have problems that compromise external and internal validity, they indicate that the majority of physicians, especially pediatricians, prescribe oral fluoride supplements to at least some of their patients.[3] Since not all physicians report that they know the fluoride status of their patients or the fluoridation level of their patients' water supplies, there is the possibility of inappropriate prescription of fluoride supplements that may lead to excessive fluoride intake.

Professional topical fluoride application is an adjunct to oral fluoride supplementation used for the prevention of dental caries. It offers the advantages of ease of use, patient acceptance, and reduced potential for toxicity.[3] Adoption of fluoride varnish by primary care clinicians is in the early stages in the United States, although it is commonly used in dentistry in Europe. One study reported that only 22% of pediatricians were familiar with fluoride varnish,[12] Four of 6 trials, including 3 randomized controlled trials, found statistically significant reductions in the number of tooth surfaces with cavitated lesions in children younger than 5 years who had fluoride varnish applied to their primary teeth, compared with untreated controls.[3, 13] These trials tested 2 fluoride varnishes: 2.3% F (Duraphat®) and 0.1% F (Fluor Protector®). Since only a small amount of varnish is applied, the total amount of active agent administered to the patient is markedly reduced compared with other fluoride applications, potentially decreasing the risk for dental fluorosis.

The number of risk indicators for dental caries is large,[14, 15] and subsets of these have been suggested for use in dental practice. Risk indicators most accessible for primary care clinicians' screening of preschool children are the presence of caries lesions, plaque retention, and the presence of white spots or other evidence of demineralization, such as discolored pits and fissures of teeth.[3] Only 2 case studies assess the accuracy of oral examinations conducted by primary care clinicians to screen children for dental caries.[3] Although the sensitivity and specificity of oral examinations in these studies were high – 92% and 100% and 87% and 99%, respectively – there are substantial concerns about the external validity of these studies. The risk indicators or combinations of indicators currently advocated for use have not been validated individually. Only 1 study (of poor quality) has examined the effectiveness of early counseling on caries prevention by primary care clinicians. The study showed that counseling parents with infants 6-12 months of age is essentially ineffective with respect to use of the bottle and minimally effective with respect to tooth brushing.[16] Four systematic reviews show that improved knowledge does not translate into long-term changes in oral health behaviors.[17-20] Although oral health behaviors, principally oral hygiene, can be changed by a variety of

interventions, the most effective strategy appears to be personal one-on-one attention with active involvement.[3] The interventions targeting oral health behaviors tended to be effective in the short term, but with little or no long-term effects. Almost all behavioral change interventions associated with any dental caries prevention included the adoption and increase of fluoride use.[3]

There are several gaps in evidence on the prevention of dental disease in young children. No relevant studies have examined the effectiveness of primary care clinicians in securing parental adherence to daily fluoride supplementation. No studies have been published on the risk for dental fluorosis resulting from the use of fluoride varnish. No relevant studies have assessed the accuracy of screening by primary care clinicians to identify children at elevated risk for dental caries. Little research (only 1 case study with substantial methodological problems) examines the effectiveness of primary care clinicians in referring children to a dentist. Limited evidence supports the effectiveness of oral health education or interventions designed to improve oral hygiene in the prevention of dental caries. No research assesses the effectiveness of a primary care clinician-supplied parental counseling intervention in preventing dental caries.

Recommendations of Others

Guidelines of the American Academy of Pediatrics can be accessed at: http://www.aap.org/policy/fluoride.html.

Guidelines of the Centers for Disease Control and Prevention can be accessed at: http://www.cdc.gov/mmwr/PDF/RR/RR5014.pdf.

Guidelines of the American Dental Association can be accessed at: http://www.ada.org/prof/prac/issues/statements/index.html.

Guidelines of the Canadian Task Force on Preventive Health Care can be accessed at: http://www.ctfphc.org.

Guidelines of the American Academy of Family Physicians can be accessed at: http://www.aafp.org/x6827.xml.

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APPENDIX A

U.S. PREVENTIVE SERVICES TASK FORCE RECOMMENDATIONS AND RATINGS

The Task Force grades its recommendations according to one of 5 classifications (A, B, C, D, I) reflecting the strength of evidence and magnitude of net benefit (benefits minus harms):

A. The USPSTF strongly recommends that clinicians provide [the service] to eligible patients. *The USPSTF found good evidence that [the service] improves important health outcomes and concludes that benefits substantially outweigh harms.*

B. The USPSTF recommends that clinicians provide [this service] to eligible patients. *The USPSTF found at least fair evidence that [the service] improves important health outcomes and concludes that benefits outweigh harms.*

C. The USPSTF makes no recommendation for or against routine provision of [the service]. *The USPSTF found at least fair evidence that [the service] can improve health outcomes but concludes that the balance of benefits and harms is too close to justify a general recommendation.*

D. The USPSTF recommends against routinely providing [the service] to asymptomatic patients. *The USPSTF found at least fair evidence that [the service] is ineffective or that harms outweigh benefits.*

I. The USPSTF concludes that the evidence is insufficient to recommend for or against routinely providing [the service]. *Evidence that the [service] is effective is lacking, of poor quality, or conflicting and the balance of benefits and harms cannot be determined.*

APPENDIX B

U.S. PREVENTIVE SERVICES TASK FORCE
STRENGTH OF OVERALL EVIDENCE

The USPSTF grades the quality of the overall evidence for a service on a 3-point scale (good, fair, poor):

Good: Evidence includes consistent results from well-designed, well-conducted studies in representative populations that directly assess effects on health outcomes.

Fair: Evidence is sufficient to determine effects on health outcomes, but the strength of the evidence is limited by the number, quality, or consistency of the individual studies, generalizability to routine practice, or indirect nature of the evidence on health outcomes.

Poor: Evidence is insufficient to assess the effects on health outcomes because of limited number or power of studies, important flaws in their design or conduct, gaps in the chain of evidence, or lack of information on important health outcomes.