

Topical fluoride guidance

American Dental Association *Professionally applied topical fluoride: evidence-based clinical recommendations. J Am Dent Assoc 2006; 137:1151–1159*

Scope and purpose To review the scientific evidence and develop clinical recommendations on professionally applied topical fluoride.

Methodology Medline and the Cochrane Database of Systematic Reviews were searched for systematic reviews published in the English language that dealt with professionally applied topical fluoride, including gel, foam or varnish, at any time up to October 2005. Seventeen systematic reviews were identified. Clinical studies published after January 2004 and thus not included in the systematic reviews were also identified through Medline. The American Dental Association (ADA) Council on Scientific Affairs formed a panel of experts to evaluate the identified systematic reviews and clinical trials. The panellists were provided with the identified publications and asked to identify any additional systematic reviews or other relevant published trials. One additional publication was included that had been accepted for publication. The individual studies were assessed at a workshop and a draft document was submitted for review to scientists with expertise in fluoride and caries, relevant ADA agencies and the external reviewers. The comments received were considered by the expert panel and the clinical recommendations were approved by the ADA Council on Scientific Affairs. The evidence (Table 1) and strength of recommendations (Table 2) were graded as shown.

Table 1. System used for grading evidence

Grade	Category of evidence
Ia	Evidence from systematic reviews of RCT
Ib	Evidence from at least one RCT
IIa	Evidence from at least one controlled study without randomisation
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

RCT, Randomised controlled trial.

Table 2. System used for classifying strength of recommendations

Classification	Strength of recommendations
A	Directly based on category I evidence
B	Directly based on category II evidence or extrapolated recommendation from category I evidence
C	Directly based on category III evidence or extrapolated recommendation from category I or II evidence
D	Directly based on category IV evidence or extrapolated recommendation from category I, II or III evidence

Review and Updating A date for the review of the recommendation is not provided.

Recommendations The panel produced a number of evidence statements (Table 3) and recommend planning topical fluoride applications based on an assessment of a patient's clinical risk (Table 4): a summary of the main clinical recommendations is shown in Table 5. The full document and an executive summary can be downloaded (www.ada.org/prof/resources/topics/evidencebased.asp).

Table 3. Evidence statements and levels

Evidence statement	Evidence level
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 ≥ 4 min.	Ia
In contrast, there is laboratory, but no clinical equivalency, data on the effectiveness of 1-min fluoride gel applications	IV
Fluoride varnish applied every 6 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 6 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

NaF(sodium fluoride); APF(acidulated phosphate fluoride)

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Table 4. Clinical risk criteria

	Age (years)	
	<6	>6
Low caries risk	No incipient or cavitated primary or secondary carious lesions during the last 3 years and no factors that may increase caries risk*	No incipient or cavitated primary or secondary carious lesions during the last 3 years and no factors that may increase caries risk*
Moderate caries risk	No incipient or cavitated primary or secondary carious lesions during the last 3 years but presence of at least one factor that may increase caries risk*	<p><i>Any of the following:</i></p> <p>One or two incipient or cavitated primary or secondary carious lesions in the last 3 years</p> <p>No incipient or cavitated primary or secondary carious lesions in the last 3 years but presence of at least one factor that may increase caries risk</p>
High caries risk	<p><i>Any of the following:</i></p> <p>Any incipient or cavitated primary or secondary carious lesion during the last 3 years</p> <p>Presence of multiple factors that may increase caries risk*</p> <p>Low socioeconomic status[†]</p> <p>Suboptimal fluoride exposure</p> <p>Xerostomia[‡]</p>	<p><i>Any of the following:</i></p> <p>Three or more incipient or cavitated primary or secondary carious lesions in the last 3 years</p> <p>Presence of multiple factors that may increase caries risk*</p> <p>Suboptimal fluoride exposure</p> <p>Xerostomia[‡]</p>

*Factors increasing risk of developing caries also may include, but are not limited to, high titres of cariogenic bacteria, poor oral hygiene, prolonged nursing (bottle or breast), poor family dental health, developmental or acquired enamel defects, genetic abnormality of teeth, many multisurface restorations, chemotherapy or radiation therapy, eating disorders, drug or alcohol abuse, irregular dental care, cariogenic diet, active orthodontic treatment, presence of exposed root surfaces, restoration overhangs and open margins, and physical or mental disability with inability or unavailability of performing proper oral health care.

[†]On the basis of findings from population studies, groups with low socio-economic status have been found to have an increased risk of developing caries. In children too young for their risk to be based on caries history, low socio-economic status should be considered as a caries risk factor.

[‡]Medication-, radiation- or disease-induced xerostomia.

Table 5. Summary of main clinical recommendations

Risk	Age (years)								
	<6			6–18			>18		
	Recommendation	Grade	Strength of recommendation	Recommendation	Grade	Strength of recommendation	Recommendation	Grade	Strength of recommendation
Low	May not receive additional benefit from professional topical fluoride	Ia	B	May not receive additional benefit from professional topical fluoride	Ia	B	May not receive additional benefit from professional topical fluoride	IV	D
Moderate	Varnish at 6-month intervals	Ia	A	Varnish at 6-month intervals OR	Ia	A	Varnish at 6-month intervals OR	IV	D
				Fluoride gel at 6-month intervals	Ia	A	Fluoride gel at 6-month intervals	IV	D
High	Varnish at 6-month intervals OR	Ia	A	Varnish at 6-month intervals OR	Ia	A	Varnish at 6-month intervals OR	IV	D
	Varnish at 3-month intervals	Ia	D	Varnish at 3-month intervals OR	Ia	A	Varnish at 3-month intervals OR	IV	D
				Fluoride gel at 6-month intervals OR	Ia	A	Fluoride gel at 6-month intervals	IV	D
				Fluoride gel at 3-month intervals	IV	D	OR Fluoride gel at 3-month intervals	IV	D

Research recommendations A number of areas were identified as requiring additional research:

- A systematic review on the effectiveness of fluoride varnish and gel in high-risk people and/ or groups and the effects of varied frequency
- The effects of frequency and mode of application (varnish, gel and foam) of fluoride products in adults and especially in populations with special needs
- The use of fluoride varnish and gel for the prevention of root caries and recurrent caries
- Strategies, especially for appropriate intervals of fluoride varnish and gel in high-risk groups, including consideration of multiple applications over short time intervals
- The best fluoride regimen to assist in the remineralisation of early carious lesions
- Clinical trial on the effects of fluoride foam versus gel in various target populations
- Clinical trial on the effectiveness of 1-min versus 4-min gels in various target populations
- Development of slow-release fluoride systems that are responsive to changing pH levels in plaque fluid and/ or saliva
- Methods of assessing caries risk
- The safety and effectiveness of chewable topical fluoride supplements or troches for adults
- Evaluation of whether the caries-prevention effect of topical fluoride treatments is influenced by fluoridated water and toothpastes

Commentary

The ADA have been increasingly active in supporting evidence-based dentistry since developing a definition and policy for this approach to practice. This, their first evidence-based clinical recommendation, is another welcome development.

This evidence-based clinical recommendation conforms to the definition of clinical practice guidelines, as outlined by Field and Lohr, as “systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances.”¹ As with most other guidelines that have been produced, there is a clear statement that these recommendations are not a standard of care, requirements or regulations, and that they must be balanced with the practitioner’s professional judgment and the individual patient’s preferences. This balancing of the evidence (in this case the guideline), professional judgement and the patients’ preferences are at the heart of the evidence-based approach.

The scope and purpose of the guideline are clear and there has been widespread consultation with professional groups in both the US and UK, although there is no indication of patient involvement in the development of this recommendation. Patient involvement in guideline development is recommended in the AGREE (Appraisal of

Guidelines Research and Evaluation) methodology (www.agreecollaboration.org) and is being used in guidelines under development with bodies such as the Scottish Intercollegiate Guidelines Network (SIGN) and NICE (National Institute for Health and Clinical Excellence) in the UK.

The AGREE appraisal instrument has a number of questions about the rigour of the guideline development and, although it is clear that the approach to the development of this guideline has been systematic, some of the fine detail is missing regarding the search methodology, selection criteria and methods of formulating the recommendation. I am aware that more of this detail was available in the consultation document but it is not in this published version.

The links between the supporting evidence and the recommendations are clearly presented and external review has been undertaken. There is, however, no indication as to whether the guidance will be reviewed and or updated in the future. The availability of an executive summary is helpful, particularly the Table summarising the recommendations.

The article touches briefly on a lack of definition in payment systems for the use of fluoride products to prevent early carious lesions from progressing, but it does not indicate how these or other barriers to adopting the recommendation should be addressed. SIGN and NICE guidelines provide suggestions for auditing and monitoring compliance and perhaps these could be considered in future guidance.

The clinical recommendations are well supported by the evidence and accord well with the two existing evidence-based guidelines on caries prevention available from SIGN.^{2,3} A useful extension to these is that this guidance includes the evidence relating to people over 18 years of age. It is worth noting, however, that these recommendations are based on weaker evidence, largely extrapolated from the data available for the effectiveness of topical fluoride in the younger age groups.

In practice, although the use of both gels and varnishes is effective, ease of use and better patient acceptance of varnish means that my personal preference would be the use of the varnish.

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1. Field MJ, Lohr KN (Eds). Institute of Medicine Committee to Advise the Public Health Service on Clinical Practice Guidelines. *Clinical Practice Guidelines: Directions for a New Program*. Washington, DC: National Academy Press; 1990.
2. Preventing Dental Caries in Children at High Caries Risk. Targeted Prevention of Dental Caries in the Permanent Teeth of 6–16 Year Olds Presenting for Dental Care. Edinburgh: Scottish Intercollegiate Guideline Network; 2000. SIGN No. 47
3. Prevention and Management of Dental Decay in the Pre-School Child. Edinburgh: Scottish Intercollegiate Guideline Network; 2005. SIGN No. 83.

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