

# APPLICATIONS OF FLUORIDE FOR CARIES PREVENTION IN CHILDREN: AN OVERVIEW

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**Abstract:** Fluoride has known as an odd arch-criminal who revolves around mouth cleanliness and prevention. Although dental fluorosis is a well-known developmental enamel defect caused by excessive fluoride ingestion during enamel formation and is typically caused by chronic, long-term exposure to elevated levels of fluoride as a result, its role in the prevention of dental caries is deeply ingrained. Since tooth development is reflected in dental fluorosis, high fluoride intake during early maturation and the secretory stage of enamel creation changes protein metabolism, resulting in an unorganised crystal structure and hypo-mineralization. When compared to fluorosis in the permanent dentition, fluorosis in the primary dentition is "rare" or "less severe". This is explained by the fact that the placental tissue regulates the amount of fluoride in the foetal blood and the consumption of breast milk, which has a fluoride concentration of about 0.02 parts per million. Due to the primary dentition's transitory nature, fluorosis is regarded as being of little concern. This best practice informs professionals about the use of fluoride as a tool for preventing and managing dental caries in young patients. The recommended level of fluoride in community water (0.7 parts per million) helps balance the danger of dental fluorosis from excessive fluoride intake during the early years of tooth growth with the risk of dental caries. Based on fluoride levels in the drinking water, other dietary sources of fluoride, use of a fluoridated toothpaste, and caries risk, specific recommendations for dietary supplementation of fluoride are made for children between the ages of six months and sixteen years. Whether administered in a formal clinical environment or at home, the needs of each patient dictate the proper use of systemic and topical fluoride treatments. Fluoride has been shown to be a successful treatment for lowering the incidence of dental caries in infants, kids, teenagers, and people with special needs.

**Key Words:** Fluoride, Dental caries, Fluoride Varnish, Demineralization, Remineralization, Fluoride Supplements, Fluoride toothpaste, Slow-release Fluoride Beads

## INTRODUCTION:

Natural fluoride strengthens teeth and stops them from deteriorating. The usage of fluoride from various sources is seen to be the greatest strategy to prevent cavities, according to experts. Small levels of fluoride are present in naturally occurring water sources and in foods such as meat, fish, eggs, and tea.<sup>[1]</sup> In some places, fluorine is added to the water supply. Fluoride is a mineral that is found in many toothpastes, mouthwashes, and dental products. Children who do not use fluoridated water are given prescriptions for fluoride tablets. Over a century ago, studies on fluoride's effects on oral health started. The ratio of fluoride in water to dental cavities was the initial focus of investigation. Exogenous fluorine administration was a topic of research in the second half of the 20th century all over the world. It is easy to employ fluoride in mass preventive programmes to prevent tooth decay. Fluoride is widely used in preventative dentistry, but this has resulted in very aggressive, divisive, and frequently unjustified opposition. The anti-cariogenic fluoride action is the end product of a variety of distinct processes working together. They can have an effect on the teeth's exterior or have an immediate impact on the mineral phase of enamel<sup>[2,3]</sup>. Fluoride, in its compounds represent a normal component of tooth enamel and bone, while it even can be found in some plants. It is the most negative charged element, and therefore the most reactive with the strongest oxidizing action which binds to almost all other chemical elements. The use of fluoride in improving oral health has long been known and documented in many scientific papers. Every study has shown at least a small positive effects of fluoride. So its extraordinary effect on tooth structure cannot be hidden<sup>[4]</sup>. Fluoride prevents tooth decay by making the enamel more resistant to the action of acids. They and accelerate the buildup of healthy minerals in the enamel, further slowing the occurrence of decay. Studies even show that in some cases, fluoride can stop already started teeth decay. In children younger than 6 years, fluoride is incorporated into the enamel of permanent teeth, making the teeth more resistant to the action of bacterial and acids from foods<sup>[5]</sup>.

## DENTAL CARIES AND FLOURIDES:

Dental caries is one of the most prevalent chronic diseases, affecting nearly 60 to 90% of the world's population [6,7]. It results from the interaction of bacteria, fermentable carbohydrates, and host factors over time [8]. Dental caries is a non-communicable disease (NCD); it shares lifestyle factors associated with other diseases such as obesity and diabetes [9]. Fluorides play a central role in the prevention of dental caries and are also used therapeutically for the inactivation of incipient carious lesions. The effect of fluoride is mainly achieved when applied topically, which is further enhanced when accompanied by good oral hygiene [10]. Since the implementation of water fluoridation, there has been a decrease in the prevalence of dental caries. The risk of dental fluorosis is mainly related to the systemic consumption of fluorides during the first six years of age [10]. However, early exposure to fluoride toothpaste has also been linked to dental fluorosis due to unintended swallowing. This risk should be considered when selecting the concentration of fluoride toothpaste for young children [11]. Fluoride-containing products, including toothpaste, rinses solutions, gels, foams, and varnishes, are indicated according to age and risk of caries.

## FUNCTIONS

### HOW DOES FLUORIDE PREVENT DENTAL CARIES?

Fluoride exerts its anti-cariogenic action when administered topically through three mechanisms: 1) It inhibits tooth demineralization, 2) It promotes tooth remineralization and 3) It inhibits plaque bacteria [12]. Fluoride in drinking water and fluoride-containing products like toothpaste, mouthwash, and varnish work through these mechanisms. When fluoride is administered systemically in the form of supplements (drops, tablets, and lozenges), the effect on caries protection is minimal [12].

### FLUORIDE INHIBITS DEMINERALIZATION

As previously mentioned, fluoride incorporated into the enamel crystal structure at the tooth developmental stages does not have a sufficient effect on the acid solubility of enamel [13]. However, the fluoride present in the biofilm due to regular topical exposure and surrounding the carbonated apatite crystals (enamel crystals) effectively inhibits tooth demineralization. At the time of bacterial acid production, the fluoride in the plaque fluid travels down with the acid into the enamel sub-surface, adsorbs into its crystal structure, and protects it against dissolution. Fluorapatite  $\text{Ca}_{10}(\text{PO}_4)_6\text{F}_2$  is an enamel mineral much more resistant to acid dissolution than other tooth minerals (carbonated apatite and hydroxyapatite). Fluorapatite results from replacing the OH ion in hydroxyapatite with a fluoride ion [12].

### FLUORIDE PROMOTES REMINERALIZATION

During the normal process of remineralization the acid produced by bacteria is neutralized by the saliva's buffering action, stopping the dissolution of enamel minerals at the subsurface. Moreover, calcium and phosphate are supersaturated in saliva, forcing the minerals back into the dental structure. The partially demineralized crystals function as nuclei for further remineralization. Fluoride enhances tooth remineralization by accelerating the growth of fluorapatite crystals on the partially demineralized sub-surface crystals in the carious lesion. Fluoride adsorbs into this surface and attracts calcium ions. Consequently, this new surface attracts preferentially more fluoride, resulting in a fluorapatite-like surface [12]. Therefore, it is less soluble in plaque acids.

### FLUORIDE INHIBITS PLAQUE BACTERIA

Fluoride ions (F<sup>-</sup>) cannot cross the bacterial wall, but at low pH values (when bacteria produce acids), the fluoride ions (F<sup>-</sup>) travel through the cariogenic bacterial cell wall in the form of HF. [13,14] Once inside the cell, the HF dissociates again into H<sup>+</sup> and F<sup>-</sup> ions, acidifying the bacterial environment and inhibiting the enzyme, enolase, and activity, respectively [14]. This process is cumulative [12].

## CLINICAL SIGNIFICANCE

### COMMUNITY WATER FLUORIDATION

Community water fluoridation has been used for over half a century, and results show that the greatest effect of fluoridated water on tooth protection is in deciduous and mixed dentition [15,16]. Water fluoridation is a simple, cost-effective method to prevent caries, and it is less than the cost of one dental restoration per person in their lifetime [17]. The United States Public Health Service recommends a fluoride concentration of 0.7 mg/L of water to prevent caries while reducing the risk of dental fluorosis [18]. Recently there has been a rise in the consumption of bottled water that usually contains an insufficient concentration of fluoride [19]. In that case, alternative sources of fluoride supplementation should be considered. Also, over the decades, the protective benefits of water fluoridation have declined as other forms of fluoride delivery spread. For example, fluoride supplements are prescribed for children whose primary source of drinking water is deficient in fluoride [15,20].

### DIETARY FLOURIDE SUPPLEMENTS

Dietary fluoride supplements may be tablets, lozenges, or liquids such as fluoride-vitamin preparations [19]. Tablets and lozenges contain 1.0, 0.5, or 0.25 mg fluoride concentrations, and sodium fluoride is usually the active ingredient [20]. For infants, liquid fluoride supplements are used with a dropper. For children and adults, tablets are prescribed by dentists and PCPs, with instructions to chew or suck for 1 to 2 minutes before they are swallowed. This is to maximize the topical effect of fluoride [21]. One study showed an 80% reduction of caries in children who dissolved fluoride in the mouth by sucking or chewing than those who swallowed the fluoride tablets. Fluoride supplements have been prescribed to compensate for fluoride-deficient water intake. Therefore, careful consideration must be given to the percentage of fluoride content in drinking water in the patient's region and any additional sources of fluoride the patient is receiving, such as toothpaste and mouth rinse [20].

For children at high risk of caries living in areas where the drinking water contains less than 0.3 ppm F, daily supplementation of fluoride may be recommended as follows:

- From six months to three years of age: 0.25 mg of fluoride per day.
- From three to six years of age: 0.5 mg of fluoride per day.
- More than six years of age: 1.0 mg of fluoride per day.

### Fluoride Toothpaste

Fluoride toothpaste delivers fluoride to dental surfaces, and it presents mainly as sodium fluoride (NaF). It has been effective in caries prevention of both primary and permanent teeth for decades [22,23]. Brushing with fluoride toothpaste increases the fluoride concentration in saliva by 100- to 1,000-fold. After one to two hours following using fluoride toothpaste, the saliva concentration returns to the baseline level [24]. Tooth brushing must start when the first tooth erupts, usually as early as six months [25]. Brushing twice a day with fluoride toothpaste lowers the risk of dental caries by 14% [26]. Efficient plaque removal is attainable only while tooth brushing is supervised in children under four [27]. Fluoride toothpaste containing 1,000 ppm of fluoride prevents dental caries in the permanent and primary dentition. In the United States, the standard concentration of fluoride in toothpaste is 1,000 to 1,100 ppm [20]. Doses of 1,350 ppm to 1,500 ppm are advised for children at high risk of developing caries and seven years of age upwards. In the early years of childhood, the swallowing reflex of children is not well controlled. For this reason, toothpaste containing 1,500 ppm fluoride is contraindicated in children under six to minimize the risk of fluorosis due to swallowing [19]. The recommended amount of toothpaste for toothbrushing according to age is only a smear of toothpaste in children less than three years and from three to six years of age a pea-sized amount [26]. The maximum dose of fluoride toothpaste available over the counter in most countries is 1,500 ppm. Higher amounts (2,800 ppm and 5,000 ppm) are available on prescription. However, the indication of higher doses should be implemented as a short-term intervention to reduce risk in vulnerable young people and adults while other measures are being taken, like changing a cariogenic diet. On the other hand, patients at high chronic risk of dental caries could benefit from using such high doses for the long term, e.g., those with xerostomia or physical or learning disabilities. Sodium fluoride 2,800 ppm toothpaste can be indicated from 10 years of age and 5,000 ppm from 16 years of age.

### FLUORIDE MOUTHWASH

Fluoride mouthwash helps prevent dental caries by increasing fluoride levels in dental plaque and saliva [19]. It is important that the mouthwash is used at a different time of the day than when tooth brushing to increase its availability in the biofilm and optimize its topical effect [28]. The concentration depends on the frequency of use. Over-the-counter solutions of 230 ppm sodium fluoride are indicated for daily rinsing, and those containing 900 ppm for weekly use [28]. They are not recommended for children under six years due to the risk of swallowing – the risk/benefit ratio favors risk [6]. Parents must supervise the use of fluoride mouth rinses in permanent dentition as this has proven to be more efficacious than unsupervised utilization.

### FLUORIDE CONCENTRATION IN MOUTH RINSES (MARINHO *ET AL.* 2004) [39]

Fluoride concentration in the mouth rinse	PPM F (recommended doses)
0.63% SnF <sub>2</sub> or 0.153% F 0.2% NaF or 0.09% F	1528 (use daily as prescribed) 900 (use as a weekly rinse as directed by the manufacturer)
0.05% NaF or 0.0225% F	225 (use once daily as directed by the manufacturer)
0.44 NaF mg/mL or 0.2 mg F/mL	200 Acidulated to pH 4 (5 mL/day)
0.0221% NaF or 0.001% F	100 (use once daily as directed by the manufacturer)
0.00219% SnF <sub>2</sub> or 0.00531% F	53.1 (use once daily as directed by the manufacturer)

### FLUORIDE VARNISH, GELS, AND FOAMS

The professional application of fluoride varnish (FV) and fluoride gels two or more times per year to children shows successful results in the prevention of caries in high-risk caries children of all ages regardless of the fluoride levels in drinking water. Fluoride varnish application twice a year reduces the incidence of caries by 37% in primary teeth and 43% in permanent teeth [29]. Fluoride varnish, typically 22,600 ppm, is the only high-concentration fluoride formulation that can be used in children under six. It may be

applied between twice or four times per year, according to caries risk. The United States Preventive Services Task Force (USPSTF) highly recommends that primary care clinicians apply fluoride varnish to the primary teeth of all infants and children starting at the age of primary tooth eruption<sup>[17]</sup>. In the UK, fluoride varnish is advocated for children over the age of 3 at risk of caries. The varnish must be placed as a thin layer on areas more at risk of caries, incipient lesions, and tooth defects.

On the other hand, applying fluoride gels or foam twice a year (maximum application time is 4 minutes, and minimum application time is 1 minute) reduces caries incidence by 26% in permanent teeth of children who live in non-fluoridated areas. Fluoride gels are usually applied to teeth in the dental office in disposable trays to prevent dental caries and remineralize incipient lesions. They are available in 5,000 to 12,300 ppm. They are not recommended in children under six years of age due to the risk of swallowing the gel – the risk/benefit ratio favors risk<sup>[6]</sup>. They can be applied to children over six years twice to four times per year according to caries risk. The American Dental Association (ADA) recommends 2.26% sodium fluoride varnish (22,600 ppm fluoride) for children under six years and 1.23% acidulated phosphate fluoride gel (12,300 ppm fluoride) for children over six years<sup>[27]</sup>. For home-use prescriptions, the ADA recommends a concentration of only 0.05% sodium fluoride gel (5,000 ppm fluoride) for children over six years or 0.15% stannous fluoride gel (1,000 ppm fluoride)<sup>[18]</sup>.

### SILVER DIAMINE FLUORIDE

Silver diamine fluoride (SDF), a colorless alkaline liquid, is regarded as the most cost-effective approach to dental caries prevention in low-socioeconomic settings and high-risk populations, including children and the elderly with special needs<sup>[31,32]</sup>. SDF works on two levels to arrest and prevent dental caries. The silver component has an antibacterial effect arresting carious lesions, and the fluoride component has a remineralizing action. However, the main drawback of using SDF is that it leaves a dark stain on the treated area, so it is used as a preventive measure where aesthetics is not the main concern<sup>[33]</sup>. The use of silver diamine fluoride is a good solution to overcome barriers in dental treatment, such as dental fear, transportation, access to clinic facilities, insurance, and cost<sup>[32]</sup>. Comparisons of the annual application of SDF versus topical fluoride treatments, such as varnish and gels, placed two to four times per year show that SDF is more efficient<sup>[34]</sup>.

### SLOW-RELEASE FLUORIDE BEADS

Slow-release fluoride beads are bonded to teeth to release low levels of fluoride in the oral cavity over a period of time, usually several years. Therefore, preventing dental caries and remineralizing incipient lesions. The two main types of slow-release fluoride devices are copolymer membrane type and glass beads. Studies have shown that these devices raise intraoral fluoride concentrations enough to prevent enamel dissolution; however, further clinical trials are required to validate their use in clinical practice since the majority of research was done in vitro and in situ<sup>[35]</sup>. Also, although they may be a cost-effective solution in reducing dental caries in people at high risk of caries, their retention rates are the main drawback<sup>[36]</sup>.

### FLUORIDE VARNISH

Fluoride varnish is 5% sodium or 22,600 PPM fluoride resin that is applied to the tooth surface as a thin coating to protect it from decay. According to the FDA, fluoride varnish falls under the category of “drugs and devices” that presents minimal risk and is subject to the lowest level of regulation.

### PURPOSE

The purpose of applying fluoride varnish is to retard, arrest, and reverse the process of cavity formation.

### INDICATIONS/RISK FACTORS

Fluoride varnish application is indicated for infants and children with a moderate or high risk of developing cavities. A child is considered at risk if he/she:

1. Has had cavities in the past or has white spot lesions and stained fissures
2. Continues to use the bottle past 1 year of age or sleeps with a bottle containing liquids other than water
3. Breastfeeds on demand at night, after teeth have developed
4. Has a developmental disability
5. Chronically uses high sugar oral medications
6. Has frequent cariogenic snacks/drinks
7. Has visible plaque on the teeth
8. Has parents/caregivers who neglect brushing the child's teeth
9. Does not drink water with an optimal amount of fluoride or does not get proper fluoride supplementation
10. Has family members with a history of caries or untreated decay
11. Engages in prolonged or ad lib use throughout the day of a bottle or sippy cup containing liquids other than water

### CONTRAINDICATIONS

Low risk children who consume optimally fluoridated water or receive routine fluoride treatments through a dental office.

### ADVANTAGES OF FLUORIDE VARNISH

1. Fluoride is the single most effective tool we have to prevent dental cavities.
2. Does not require special dental equipment.
3. It is an inexpensive preventive measure.

4. Does not require a professional dental cleaning prior to application.
5. Is easy to apply.
6. Sets immediately upon contact with saliva.
7. Minimal ingestion during and after treatment.
8. It enhances remineralization of the tooth surface.
9. Is safe and the taste is well tolerated by infants, young children, and individuals with special needs.
10. Placement requires minimal training.

#### **HOW DOES FLUORIDE VARNISH WORK?**

Fluoride in varnish enters the tooth enamel and makes the tooth hard. It prevents new cavities and slows down or stops decay from getting worse. If tooth decay is just starting, it repairs the tooth.

#### **WHY DO WE RECOMMEND PUTTING FLUORIDE VARNISH ON CHILDREN'S TEETH?**

Tooth decay is one of the most common preventable diseases seen in children.

Children as young as 12 months can get cavities. Cavities in children's teeth can cause pain and can prevent children from being able to eat, speak, sleep and learn properly. Most children do not lose all their baby teeth until they are about 11 or 12 years old.

#### **IS FLUORIDE VARNISH SAFE?**

Yes, fluoride varnish is safe. It can be used on babies from the time they have their first teeth. Only a very small amount of fluoride varnish is painted onto the teeth with a small brush. The varnish sets as soon as it comes in contact with saliva.

#### **HOW IS FLUORIDE VARNISH APPLIED?**

A small piece of gauze is used to clean and dry the teeth. The varnish is painted onto the front, back, top, and bottom of the teeth, in a thin layer, with a tiny brush. It forms a sticky covering over the tooth and becomes hard as soon as saliva in the mouth touches it. It takes 2 minutes to varnish the teeth.

#### **WILL FLUORIDE VARNISH MAKE THE TEETH LOOK DIFFERENT?**

Some brands of fluoride varnish coat the teeth with a yellow film. Other brands are white and may make the teeth look dull. This is normal and does not hurt the teeth. When the varnish comes off the next morning when the teeth are brushed, the teeth will be white and shiny.

#### **HOW OFTEN SHOULD FLUORIDE VARNISH BE APPLIED?**

Fluoride varnish can be applied up to 4 times per year or every 3 months. Studies show that children who get fluoride varnish every 3 months have fewer cavities than those who get it less often or not at all. Make sure to check if the child receives fluoride varnish applications from another provider.

#### **FLUORIDE VARNISH CAUTIONS**

##### **CONTRAINDICATIONS:**

1. Ulcerative gingivitis and stomatitis (trench mouth)
2. Known allergies or reactions to colophony (Rosin)  
Rosin is sap or sticky substance that comes from pine trees.  
Found in cosmetics, adhesives, medicines, and chewing gum
3. Professional fluoride application within the past 3 months

##### **INTERACTIONS:**

When Dental Varnish is applied, other fluoride preparations, such as gels or foams, should not be administered during the same day. The routine use of fluoride tablets and rinses should be interrupted for at least five days after initial treatment.

##### **ADVERSE REACTIONS:**

1. Edematous swellings have been reported only in rare instances, especially after application to extensive surfaces.
2. Dyspnea, although extremely rare, has occurred in asthmatic people.
3. Nausea has been reported when extensive applications have been made to patients with sensitive stomachs.
4. If required, varnish is easily removed with a thorough brushing and rinsing of the teeth.

##### **PRE-APPLICATION INSTRUCTIONS**

1. Advise the parent that the child's teeth may become discolored temporarily, if the fluoride varnish has a slight tinge.
2. Tell the parent that the varnish can be brushed off the following day.

##### **MATERIALS**

1. Disposable gloves
2. Gauze sponges (2 x 2)
3. Fluoride varnish – single use application with disposable brush

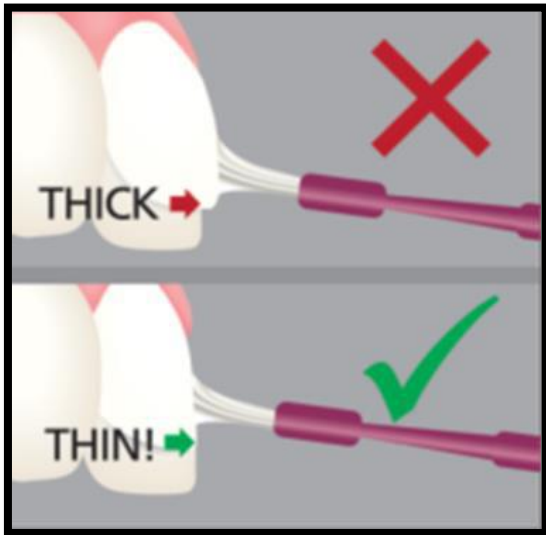


**POSITION THE CHILD FOR AN INFANT**

1. Place the child on the caregiver’s lap, facing the caregiver and the child’s legs around the caregiver’s waist. Position yourself knee-to-knee with the caregiver and gently lower the child’s head onto your lap, treating the child from behind the head.
2. Or, place the infant on an exam table and work from behind the head.

**FOR A YOUNG CHILD**

1. Place the child in a prone or sitting position and work from above the head as with an infant.
2. Or, adapt a method that works best for you.



**APPLICATIONS**

1. Using gentle finger pressure, open the child’s mouth.
  2. Gently remove excess saliva or plaque with a gauze sponge.
  3. Use your fingers and sponges to isolate the dry teeth and keep them dry.
  4. You will usually be able to isolate a quadrant of teeth at a time, but may have to work with fewer teeth in some children.
- Infants are easiest because, they have only anterior teeth.
5. Apply a thin layer of the varnish to all surfaces of the teeth.
  6. Once the varnish is applied, you need not worry about moisture (saliva) contamination. The varnish sets quickly.

**POST-APPLICATION INSTRUCTIONS**

1. Patient can leave immediately after application
2. Do not brush or floss the child's teeth for at least 4 hours, preferably 24 hours
3. Avoid hot drinks and products containing alcohol (beverages, oral rinses) for 4 hours

**REMEMBER**

1. Even though the child may fuss, the varnish application is not unpleasant.
2. Tell the parent that the teeth will return to normal after the varnish is removed.

**FLUORIDE VARNISH PROTOCOL**

1. Low Risk Children – repeat application once every six months
2. High Risk Children – that do not have a dental home, does not receive optimally fluoridated water, and show signs of visible decay-- repeat the application once every three months

**BABY TEETH ARE IMPORTANT! DON’T DELAY – PREVENT DECAY**

Remember, do not clean your child’s teeth for at least 4 hours, preferably wait until tomorrow to brush your child’s teeth. Start cleaning your child’s teeth tomorrow morning.

**RECOMMENDED USE OF FLUORIDE TOOTHPASTES IN CHILDREN**

Age (years)	(ppm F)	Frequency	Amount (g)	Size

First tooth— up to 2 years	1000	1000 Twice daily	0.125	Grain of rice
2–6 years	1000*	Twice daily	0.25	Pea
Over 6 years	1450	Twice daily	0.5–1.0	Up to full length of

For children 2–6 years, 1000 + fluoride concentrations may be considered based on the individual caries risk

### GOOD PRACTICE POINTS ON BRUSHING BEHAVIOUR

There are common recommendations on brushing behavior that are based on expert opinions and consensus rather than on firm evidence:

- Tooth brushing should be conducted so each tooth surface is reached and brushing should exceed 1 min, also in preschool children.
- Children should avoid rinsing with a lot of water afterwards.
- Children's teeth should be brushed using either a soft manual or power toothbrush.

### CONCLUSION:

#### THE AAPD RECOMMENDS:

1. The use of fluoride for the prevention and control of caries as it is both safe and highly effective in reducing dental caries prevalence.
2. Consumption of optimally-fluoridated community water as a cost-effective method to prevent and control caries at the population level.
3. Tooth brushing at least twice daily with an age-appropriate amount of over-the-counter fluoride-containing toothpaste to prevent caries as first line for caries prevention.
4. Professionally-applied topical fluoride treatments such as five percent NaFV or 1.23 percent F gel preparations at least twice per year to reduce incidence of dental caries.
5. 38 percent SDF be used to arrest cavitated caries lesions in primary teeth and permanent teeth as part of a comprehensive caries management program.
6. Prescription-strength home-use 0.5 percent F gels and pastes and 0.02-0.09 percent F mouth rinses to reduce dental caries in high-risk patients over six years of age.
7. Decisions concerning the administration of fluoride be based on the unique needs of each patient, including the risks and benefits (e.g., risk of mild or moderate fluorosis versus the benefits of decreasing caries increment and, in some cases, preventing devastating dental disease).
8. Fluoride dietary supplements be cautiously considered for children at caries risk who drink less than optimally-fluoridated water as supplementation, in the face of all other sources of fluoride, could exceed the recommended amount of daily fluoride intake.

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