Community-based Fluoride Varnish Intervention Program for Schoolchildren in Perak, Malaysia

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Introduction

Topical fluorides have been available for decades and have shown positive results as anti-caries treatments. They are available in different forms such as fluoride-containing toothpaste, topical fluoride gels and foams, mouthwash and high concentration varnish. Topical fluoride varnish is intended to prolong the period of contact with the enamel surface where the amount of fluoride permanently retained in the enamel is increased to enhance the formation of fluoridated hydroxyapatite and reduce the solubility of enamel in acid. The first commercial fluoride varnish product was introduced in 1964 by Schmidt, under the trade name Duraphat which contained 5% sodium fluoride or 2.26% by weight or 22,600ppm fluoride.

As dental caries still remains a global epidemic, the use of fluoride varnish to prevent and control dental caries is expanding in public health and private dental practice settings that incorporate health risk assessments and counseling.

Numerous clinical trials have been conducted on children to create a body of evidence on the effectiveness of fluoride varnish in preventing and managing dental caries. In the 2013 Cochrane Database Review on effectiveness of fluoride varnish, 22 randomized trials comparing varnish to placebo treatment were reviewed using a sample of 12,455 children; 13 trials contributed data for the permanent tooth surfaces meta-analysis. The pooled D(M)FS prevented fraction estimate comparing fluoride varnish with a placebo or no treatment was 43%. The pooled d(e/m)FS prevented fraction estimate was 37% for the 10 trials that contributed data for the primary tooth surfaces. The authors also reported that there was little or no information about adverse effects of fluoride varnish.

The scientific evidence for community-based use of fluoride varnish is based on studies conducted in children. The current recommendations suggest that 5% NaF varnish should be used every six months or 2-4 times per year. If only one topical fluoride agent is being used (in addition to fluoride dentifrice), and professional personnel are available, varnish is preferred to APF gel and may be preferable to 0.2% NaF mouth rinse.

The Community Oral Health Promotion Program detailed below was a collaboration between the Faculty of Dentistry University Malaya, Colgate-Palmolive and Kampung Lembah Tempurung community leaders.

Community Oral Health Promotion Program

The program aims to improve the caries status of preschool and primary schoolchildren in Sekolah Kebangsaan Gunung Panjang, a rural area of Lembah Tempurung, Gopeng, in the Perak area of Malaysia.

Despite improvement in the overall oral health of schoolchildren in Malaysia, caries prevalence among pre-school and schoolchildren remains high. A survey in 2007 showed caries prevalence amongst 6-year-olds, 12-year-olds and 16-years-olds were 74.5%, 41.5% and 59.6%, respectively. Among 5-year-olds, caries prevalence was 76.2% with a mean decayed, missing, and filled teeth (dmft) score of 5.6. About 55.8% of 5-year-olds had three or more deciduous teeth affected by caries whilst 25.3% had dmft ≥10.

Caries prevalence among schoolchildren in rural areas still remains high despite comprehensive dental care by the school dental service, and early intervention is needed to prevent the relatively high caries prevalence among children in high risk population.
Children living under poor economic circumstances often belong to ethnic and racial minorities. They often have parents with low education and low income levels. These children experience a high prevalence of dental caries, and this situation is higher among children from rural communities compared to their urban counterparts. Taking these factors into consideration and the need to improve the oral health of economically disadvantaged pre-school and primary school children in rural areas, Gopeng district in Perak was chosen by the University Malaya Dental Faculty for a community oral health project by Year 4 students supervised by the Department of Community Oral Health & Clinical Prevention.

A rural preschool and primary school in Gopeng, Perak was identified by the Department of Community Oral Health and Clinical Prevention, Faculty of Dentistry, University of Malaya as a community laboratory to conduct their annual community field project for Year 4 students. The program included four main components, beginning with a dental screening (oral examination) of children aged 5-12 years, followed by the application of Duraphat® varnish (high concentration fluoride) on children’s teeth with high risk of caries (i.e. dft > 3 or D 3 or dft + D > 3).

Stage three included oral health education, followed by supervised daily tooth brushing with fluoridated toothpaste over a 12-month period. 184 school children were included in the program with parental consent.

Duraphat® high fluoride varnish with 5% NaF was used as treatment. It was applied by two post graduate clinicians as part of a preventive program for children with high caries risk. As community based preventive treatment is often more challenging than private clinical practice, the aim of this report was to showcase user experience of applying Duraphat® varnish in a community setting.

**Duraphat® Varnish Application in a Community Setting**

**Before application**
- The procedure was explained to parents and children.
- Children were allowed to eat normally prior to their appointment.
- Clinicians asked questions about any allergies.
- Clinicians explained the purpose of the procedure - to reduce decay and the risk of decay.
- Children were advised not to eat, drink or brush teeth for 30 minutes after application.
- Children were advised not to eat hard food for 4 hours after application.

**Pre-application assessment**
The aim of the assessment was to ensure children with any abnormality of the lips, face or soft tissues of the mouth was excluded.

Children with signs of systemic illness (e.g. colds, flu, chicken pox etc were also excluded).

Children with contra-indicating soft or hard tissue oral conditions should be seen by the referring dentist for further assessment and/or care. (Fig.1)

**Equipment**
- Mouth mirror
- Cotton wool rolls
- Duraphat® varnish containing 22,600 ppm Fluoride
- Microbrush
- Dosage pad
- Protective items for patient: bib
- Protective items for clinician: gloves, mouth mask, gown
- Torch

![Fig 1: Oral examination](image-url)
Application procedure

Two post graduate students examined 121 primary school children between 7-12 years of age and applied Duraphat® varnish to 30 school children with high risk of caries, using the following procedure:

- Children brushed their teeth before the application of the varnish.
- 0.25 ml of varnish dispensed (dosage guide).
- Varnish recapped.
- Child’s left cheek gently retracted, using a finger. Lower left canine and molars dried using cotton rolls.
- A cotton wool roll was placed in the lower left buccal sulcus.
- Holding the roll in place, a small amount of fluoride varnish was applied to the contact points or interproximal surfaces between the canine and molars. A small amount of varnish was also applied to the pits and fissures of the molars (Fig.2).
- Cotton wool roll removed.
- Procedure repeated for lower right quadrant with a fresh cotton wool roll.
- Left cheek gently retracted, using a finger. Upper left canine and molars dried using cotton rolls.
- Cotton wool roll placed in the upper left buccal sulcus.
- Holding the roll in place, a small amount of fluoride varnish was applied to the contact points or interproximal surfaces between the canine and molars. A small amount of varnish was also applied to the pits and fissures of the molars.
- Cotton wool roll removed.
- This procedure was repeated for the upper right quadrant.

User Experience

Each post graduate student gave feedback about the handling, application and patient compliance experienced during the Duraphat® varnish application procedure completed during the one day community oral health program in Perak.

All 184 children in this community program received dental screening, oral health education and correct brushing instruction. In addition, they were instructed to brush their teeth twice daily for 12 months.
Findings
Both clinicians confirmed the application and handling of Duraphat® varnish was excellent, in respect of consistency of the material, ease of application and quick setting. Full mouth application of Duraphat® varnish took only three minutes and was quick and painless for each child. This user experience supports using high fluoride varnish for caries prevention in high risk children. In community setting, moisture control is more challenging as suction units are not available. However, by using cotton wool rolls, the varnish was applied easily and set rapidly on tooth surfaces, minimizing gagging and accidental swallowing.

Conclusion
Both clinicians recommended the use of Duraphat® varnish for community based programs for caries control and prevention among school children with high risk of caries as the method of application is both easy to implement by the dental professional and quick and painless for the child.
As a next step, the oral health community program will be repeated after 12 months and the impact of the community-based caries prevention program on the children’s oral health will be evaluated.

References: