

Fluoride varnish as a public health measure to reduce caries

Is fluoride varnish an effective public health measure for reducing dental caries in children?

Hardman MC, Davies GM, Duxbury JT, Davies RM.

A cluster randomised controlled trial to evaluate the effectiveness of fluoride varnish as a public health measure to reduce caries in children. Caries Res 2007; 41:371–376

Design A cluster randomised controlled trial (RCT) was carried out.

Intervention Twice-yearly applications of fluoride varnish were made in a test group of children from relatively deprived areas, with a similar no-intervention control group. The test and control children were from two school years (aged 6–8 years) from 24 state primary schools in the Manchester area. Fluoride varnish was applied five times at school over a period of 26 months by dental hygienists.

Outcome measure Caries increment indicated by decayed, missing or filled teeth in the primary (dmft) or permanent dentition (DMFT) was measured.

Results A total of 2091 children in 24 schools were eligible for inclusion in the study. No response was received from 1023 children, 154 did not consent and 914 gave positive consent. Of those giving positive consent, 457 were randomly allocated to the test group and 457 to the control group. During the study, 263 children in the test group received five varnish applications and 319 received four or more applications. At baseline there were no important differences in caries levels of participants in the test and control groups. At the final examination there was only one statistically significant difference in the caries increment, for small enamel lesions only in the primary dentition, with the test children having fewer lesions. This was not, however, apparent for the other levels of caries diagnosis, nor for all three levels of caries diagnosis in the permanent dentition.

Conclusions The results of this study suggest that the use of this type of fluoride varnish intervention cannot be recommended as a public health measure for reducing caries in this population.

Commentary

Reducing oral health inequalities is a national priority in many countries and dental caries prevention programmes are among the aims of many public health departments. There are many local and regional caries preventative programmes using toothpastes and brushes and, recently, more intensive fluoride delivery programmes similar to one described in this paper are being introduced.

This paper reported on a cluster RCT to establish the effectiveness of twice-yearly applications of fluoride varnish as a public health measure to reduce dental caries in children living in relatively deprived areas. A population of 914 children aged 6–8 years took part in the study. The principal outcome measures were prevalence of caries in the first molars of both the permanent and primary dentitions at the final examination, compared with at the baseline examination.

The study found one significant difference in the caries increment, for small enamel lesions, only in the primary dentition, with the test children having fewer lesions. This was not seen with other levels of caries diagnosis, nor for all three levels of caries diagnosis in the permanent dentitions. A comparison of caries increment in those children who had caries experience at baseline demonstrated no significant differences between test and control groups. Similarly, a comparison of caries increments at all levels of diagnosis between those children who received the maximum number of varnish applications and those who did not demonstrated no important differences.

The study did not demonstrate that twice-yearly fluoride varnish applications reduced dental caries in children living in these relatively deprived areas. The examiners themselves cite two factors that may have contributed to this finding, however, namely the low positive-consent rate and, secondly, the fact that examination of the caries increments of participants in the control group indicated that they were lower than in the population of children from which the sample was taken.

The age group of children chosen (6–8 year olds) would show a variation in both the eruption in their adult teeth and exfoliation of their deciduous teeth. As the study used primary molars and first permanent molars as their test teeth, the variation in exfoliation and eruption may also have impacted on the difference in caries increment on both these teeth.

The one statistically significant difference found was that of the caries increment for small enamel lesions in the primary dentition, which would be the first surface to be affected by such an intervention. As the intervention period was only 26 months any difference in dental lesions may have needed a longer intervention time to show any difference.

The conclusion of the study was that, “the results of this study suggest that this type of fluoride varnish intervention cannot be recommended”. This is a rather bold statement bearing in mind the

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shortcomings that the authors list themselves regarding the study and the clear evidence for the effectiveness of fluoride varnish: two systematic reviews^{1,2} have shown caries reductions of between 30–46%. With the poor positive consent rate excluding those most likely to benefit it is unsurprising that the varnish had a limited effect — as seen in other studies conducted on children with low-caries rates.³ Consequently, the spotlight should fall on the recruitment element of the trial rather than the therapeutic intervention. It is children from more deprived areas who are most likely to benefit from such an intervention and thus narrow the dental inequalities gap, but it is also these children who are more likely to be poor responders for the positive consent forms required for this intervention. Effort must be put in at the beginning of such an intervention to gain as much consent as is possible. Schools may be able to assist in this, since their teachers are known and trusted by the parent population. The British Association for the Study of Community Dentistry annual surveys (www.bascd.org/annual_survey_results.php) epidemiology reports from England and Wales and

the National Dental Inspection Programme in Scotland (www.scottishdental.org/dentalinspection.htm) also find that in areas of high caries, established disease is apparent from the age of 5 years if not much younger. Therefore, it would seem sensible to start prevention programmes much earlier than the 6–8-year old age group chosen here — from as young as 3 years old or perhaps even birth.

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