

**ARTICLE TITLE AND
BIBLIOGRAPHIC
INFORMATION**

Cost-effectiveness of an experimental caries control regimen in a 3.4-yr randomized clinical trial among 11-12-yr-old Finnish schoolchildren.

Hietasalo P, Seppä L, Laine S, Niinistö A, Kallio J, Aronen P et al.
Eur J Oral Sci 2009;117:728-33

REVIEWER

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PURPOSE/QUESTION

To determine if an experimental patient-centered prevention regimen was more cost-effective than standard dental care.

SOURCE OF FUNDING

Foundation support from a number of Finnish organizations.

TYPE OF STUDY/DESIGN

Randomized controlled trial

LEVEL OF EVIDENCE

Level 2: Limited-quality, patient-oriented evidence

**STRENGTH OF
RECOMMENDATION GRADE**

Not applicable

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Patient-Centered Caries Prevention in Children may be More Cost-Effective in the Long Term than Traditional Dental Care

SUMMARY**Subjects**

The sample size consisted of 497 children ages 11 to 12 years from Pori, Finland. The study period was between 2001 and 2005. Individuals recruited for the study had to have at least one active initial carious lesion. The follow-up period was 3.4 years.

Key Exposure/Study Factor

Children were randomly assigned to either the experimental group ($n = 250$) or the control group ($n = 247$). Children in the experimental group were provided toothbrushes and fluoride toothpaste (1500 ppm of fluoride and containing 10% xylitol), as well as fluoride and xylitol lozenges. Children in the experimental group were also given nutrition and oral hygiene counseling. Additionally, surfaces of active lesions were professionally cleaned, and fluoride and chlorhexidine varnish were applied in intervals of every 1 to 2 weeks. This was repeated until the lesion appeared to be reversed.

In the control group, children received standard dental care. Both groups were exposed to continuous community-based oral health promotion.

Main Outcome Measure

The main outcome measure was the incremental cost-effectiveness ratio (ICER), which expresses the cost of each extra unit of outcome. Outcome is defined here as being the averted decayed, missing, or filled surfaces (DMFS) score for each child.

Main Results

The main results were that the mean cost per child in the experimental group was €496.45 and for the control group was €426.95. The mean incremental cost was €69.50 (95% confidence interval: 28.25, 110.75). The mean number of decayed, missing, or filled (DMF) increment surfaces was 2.56 in the experimental group and 4.6 in the control group. The ICER was €34.07 per averted DMF surface.

Conclusions

Although the overall cost for the experimental group was higher than for the control group, the experimental group had more decayed surfaces averted, and costs in years 2004 and 2005 were higher for the control group. This study suggests that in the long term, an experimental patient-centered prevention program may be more cost-effective than traditional dental services.

COMMENTARY AND ANALYSIS

The cost-effectiveness of frequent preventive dental visits for children has been previously questioned, yet no definitive recommendations have been made owing to lack of evidence to support increasing or decreasing the frequency of dental preventive visits.¹ The study by Hietasalo et al raises important public health opportunities for children with identified carious lesions. Specifically of benefit is the reduced future risk of disease if clinicians are able to reverse early carious lesions, which is of critical value, as the strongest measure of future caries risk is a history of caries. Reducing the caries experience of children ultimately will benefit society when children age into adulthood.

The Pori study may have elicited more positive cost-effectiveness if the program had not been entirely school-based. In a previous report of the Pori study, researchers stated that they had no measureable impact on nutritional habits or frequency of toothbrushing among the experimental group, despite intense counseling of the children. Counseling on either nutrition or hygiene practices did not include parents, which would reduce the likelihood that these behaviors would be modified in the home environment.² Previous research on school-based counseling, specifically nutritional counseling, has also resulted in poor outcomes of observed energy-intake reductions even after intense counseling.³ Incorporating family changes, which would result in parental modeling of appropriate behaviors, may have resulted in more positive changes in terms of nutrition and hygiene practices at home, and made the program even more cost-effective.^{4,5}

The cost-effectiveness of these interventions were likely diminished because of the use of dental hygienists for the application of fluoride and chlorhexidine varnishes on such a frequent basis. As well, the experimental group received a professional cleaning before fluoride and chlorhexidine varnish application, which is of little clinical value.⁶ Utilization of less costly staff, such as dental assistants or training school nurses to apply varnish on initial lesions may have been a more cost-effective use of staff and resulted in an earlier cost benefit within the experimental group. Other studies in Scandinavia have attributed personnel costs to account for roughly half of the cost of providing preventive services in a school-based environment. Therefore, reducing the cost of administering effective components of the experimental preventive model should be explored further.⁷ Reducing the costs of delivering basic preventive services that require minimal training would have likely resulted in the experimental group becoming cost-effective earlier in the study period. It would also make expansion of such a preventive regimen more logical to the general population with limited available resources.

A weakness of this study was that it only measured the real economic costs for reducing disease levels. The study did not consider the value of good oral health, which results in less pain and fewer missed school days, as well as reduced future disease risk. Additionally, the study did not consider the costs of recurrent maintenance of restored teeth throughout life, which cannot be measured by direct costs. There are also specific indirect costs to individuals who require dental care beyond preventive care, which include transportation costs and missed work days for parents.⁸

The results of the study appear to suggest that an experimental preventive program for children with identified early carious lesions, which includes the frequent application of fluoride and chlorhexidine varnish, fluoride toothpaste with xylitol, and lozenges with fluoride and xylitol may be cost-effective within a few years of implementation. The study did not identify a specific benefit of any single component of this experimental regimen that would result in reduced caries.

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