

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
A school-based dental sealant programme for low socioeconomic status (low-SES) children was considered. This clinical preventive programme included oral hygiene instructions, weekly sodium fluoride rinses, dental sealants (either for repairing lost sealants, or for sealing newly erupted teeth), and referrals to the students family dentists or the Peekskill Area Health Center (PAHC) for comprehensive dental care.

Type of intervention
Primary prevention and treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised low-SES children aged 6 to 14 (i.e. first to sixth graders) in two Peekskill schools.

Setting
The setting was community care. The economic study was carried out in Peekskill (NJ), USA.

Dates to which data relate
The effectiveness and resource use data were collected from 1987 to 1992. The price year was 1992.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was undertaken on the same patient sample as that used for the effectiveness study. It appears to have been conducted prospectively for the intervention group and retrospectively for the control group.

Study sample
No power calculations to determine the sample size were reported. A total of 780 children were screened during the first year of the programme (1987) in two schools. Children in the school where the sealant programme was implemented were included in the intervention group, and first and sixth graders received the sealant intervention. In total, 54 children were treated in the intervention group, although after 5 years only 30 children were available for follow-up in this group. Thirty children from the other school were selected as the control group at the end of the study period, in order to match children in the intervention group. Therefore, after excluding the 24 lost to follow-up in the
intervention group, the final study sample comprised 60 patients (30 in each of the two groups).

**Study design**
Although the effectiveness data appear to have been collected prospectively, this study seems to have been a retrospective cohort study with matched controls, which was based on two schools. The duration of follow-up was 5 years. The authors reported that the controls were chosen to match as closely as possible those children in the intervention group, but the method of matching them was not reported.

**Analysis of effectiveness**
The primary outcome was the incidence of caries, as measured by the number of decayed, missing or filled surfaces (i.e. DFMS scores). The secondary outcomes were missing teeth and filled or decayed surfaces, and the number of sealants that children in each group received during the study period. The authors reported that the percentages of minorities, in terms of race, were lower in the control group. However, similarities between the two study groups at baseline were found in terms of age, gender, and DMFS scores. A multiple logistic regression analysis was performed to examine the impact of sealants on the change in DFMS scores from baseline to follow-up, controlling for age.

**Effectiveness results**
Students in the control group had a mean increase in DMFS of 6.8 (standard deviation, SD=7.0) with a median increase of 7 points. Students in the intervention group had a mean increase of 2.2 (SD=6.0) and a median increase of 0.

After controlling for age, the impact of sealants on the change in DFMS scores showed an odds ratio equal to 10.8, (p=0.0001).

In the control group, six permanent teeth were lost, and the number of decayed and filled surfaces increased by 108 and 51, respectively.

In the sealant group, one permanent tooth was lost, and the number of decayed and filled surfaces increased by 47 and 15, respectively.

Children in the intervention group received a total of 120 sealants, whereas children in the control group received 0 sealants.

**Clinical conclusions**
The study showed that clinical outcomes (in terms of a lower incidence of caries) were more favourable in the sealant group than in the control group.

**Measure of benefits used in the economic analysis**
The authors used the number of healthy tooth surfaces as the measure of benefits for the economic analysis. A healthy tooth surface was defined in two different ways. More specifically, tooth present, without decay and without filling; or, tooth present and without decay (independent of whether they were filled or not). These measures of benefit were obtained from the effectiveness analysis, by assuming that each child could have a maximum number of 140 tooth surfaces at the end of the study period. The time horizon considered for the estimation of health benefits was 5 years. A discount rate of 3% was applied.

**Direct costs**
The cost/quantity boundary adopted for the costing appears to have been that of the health care system. The broad expenditure areas included were personnel, equipment and supplies. However, the type of costs considered for the control group in the baseline analysis were unclear. The resources used were derived from data recorded throughout the clinical study and several authors’ assumptions. The price data were collected from a telephone survey of 15 private
practices and from PAHC fees. The costs were appropriately discounted at an annual rate of 3% since a time horizon of 5 years was considered for the cost estimation. Some, but not all, of the resource quantities were reported separately from the unit costs. The price year was 1992. The authors reported the total costs associated with each of the study groups during the 5-year period.

**Statistical analysis of costs**
The costs were treated deterministically.

**Indirect Costs**
No indirect costs were included.

**Currency**
US dollars ($).

**Sensitivity analysis**
The authors investigated uncertainty related to variability in the data. A different scenario was considered in which the unit costs used at analysis (considering private practice charges instead of PAHC fees), the assumptions formulated by the authors in the cost estimation, and the discount rate (5%) for both the estimated costs and health benefits were modified. A further analysis was performed by estimating the costs under two alternative scenarios. More specifically, decayed teeth were filled but missed teeth were left without replacement; or, decayed teeth were filled and missed teeth were replaced.

**Estimated benefits used in the economic analysis**
The number of discounted healthy tooth surfaces (not missing, no decay, no fillings) was 3,460 for the control group and 3,565 for the sealant group.

The number of discounted healthy tooth surfaces (not missing, no decay) was 3,504 for the control group and 3,578 for the sealant group.

**Cost results**
The total discounted costs were $1,720 for the sealant group and $2,100 for the control group.

**Synthesis of costs and benefits**
The cost of producing a healthy tooth surface (where healthy was defined as surfaced neither filled nor decayed) was $27.

The cost of producing a healthy tooth surface (defined as that without any current decay) was $39.

The results of the sensitivity analyses showed a net saving for the sealant group of $2,890 when decayed teeth were filled and missing teeth were left untreated, and of $11,120 when decayed teeth were filled and missing teeth were replaced.

If the costs of administering sealants were raised to private rates, sealants would no longer be net cost-saving relative to ordinary practice ($4,010 versus $1,400, respectively), but would still lead to substantially better outcomes (i.e. 95 further healthy tooth surfaces, not missing, not decayed, not filled; or 67 further not missing, nor decayed healthy surfaces) at a minimally increased cost (i.e. $2,610).
Authors' conclusions
The Peekskill School-Based Sealant Program of administering sealants to low socioeconomic status (low-SES) children was cost-effective, as it saved money relative to ordinary dental care.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparator was clear. It represented standard practice in New York State schools. You should decide whether this represents current practice in your own setting.

Validity of estimate of measure of effectiveness
This was a cohort study with matched controls in which the sample was selected retrospectively. Although all of the patients included in the final study sample were considered for the effectiveness analysis, selection bias might have been present since the sample selection was based on whether or not the patients were followed up. As the authors reported, the fact that the intervention group had a higher percentage of minorities (in terms of race) means that the effectiveness results might have been biased against the sealant intervention since caries prevalence is higher among minorities. There was no adjustment for potential confounding factors. It is unclear from the study whether the effectiveness analysis was handled credibly and, in particular, whether the sample size was large enough to obtain robust results.

Validity of estimate of measure of benefit
The summary measure of benefit used in the economic analysis appears to have been appropriate in comparison with those used in similar studies. However, given that it was an intervention-specific health benefit measure, it would not allow comparisons with different health care interventions.

Validity of estimate of costs
The study perspective appears to have been that of the health service. Relevant cost categories were included for this perspective, but the authors limited their analysis to some direct costs. The costs associated with the use of space were excluded, and this was justified because the programme was available rent-free from the schools. Moreover, some further costs, such as those associated with endodontic treatment, fabrication of posts and cores, and possible orthodontic treatment because of the early loss of permanent first molars, were not included in the study. This could have biased the results in favour of the control group. Some, but not all, of the resource quantities were reported separately from the unit costs. This may hinder reflation exercises in other settings and limit the generalisability of the results. Further, the cost estimates are likely to be specific to the Peekskill area, although this might have been overcome to some degree by the sensitivity analysis performed.

Other issues
The authors did not make appropriate comparisons of the study findings with those from other studies. In terms of the generalisability of the results, the authors commented that the results of this study make it more likely that disadvantaged children all over the USA will benefit from the caries-preventive effects of dental sealants.

Implications of the study
The authors suggested that the findings of this study are significant since they show an opportunity to provide preventive care for all disadvantaged children in the school system. The authors also indicated that the use of school-based sealants for high-risk children offers an opportunity to reduce disparities in oral health status among poor and minority patients. The results of this study seem to favour sealant programmes for low-SES. However, given the caveats to the study (as discussed already), both the resulting health benefits and the magnitude of the savings should be viewed with caution.

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**Other publications of related interest**


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