Economic evaluation of a pit and fissure dental sealant and fluoride mouthrinsing program in two nonfluoridated regions of Victoria, Australia

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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 prevention programme (aimed at decreasing dental caries) to provide dental pit and fissure sealant (PFS) and fluoride mouthrinsing (FMR) for low-income adolescents (12-13 years old students) in nonfluoridated regions. The participants in the intervention programme received the pit and fissure dental sealant, a weekly fluoride mouthrinsing, and an annual oral hygiene education session.

Type of intervention
Primary prevention and treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Low-income adolescents (12-13 years old students) in unfluoridated regions.

Setting
Community and dental clinic. The economic study was carried out in Victoria, Australia.

Dates to which data relate
The effectiveness and resource use data were derived from a cohort of subjects studied between 1989 and 1991. The fiscal year was 1994.

Source of effectiveness data
Effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was retrospectively performed on the same patient sample as that used in the effectiveness analysis.

Study sample
Power calculations were not used to determine the sample size. The sample was drawn from 5 schools in an unfluoridated region with known high levels of dental caries. The intervention group consisted of 256 subjects versus 266 in the control group. Both study groups had an average age of 12.5 years. The participation rate was 59.4% in the intervention group and 53.2% in the control groups.
Study design
This was a randomised controlled trial, carried out in five schools in an unfluoridated region. The duration of follow-up was three years. The loss to follow-up was 19.1% in the intervention group versus 10.9% in the control group, (NS). A randomisation was performed, which used a school as a unit of randomisation.

Analysis of effectiveness
The analysis of effectiveness was carried out based on intention to treat and on treatment completers only. Overall three-year mean DMFS increment and DMFS component increments were the main health outcomes measured in the study. The study subjects were found comparable in terms of age, gender, the mean baseline DMFS, and components of DMFS index.

Effectiveness results
When calculated in accordance with the principle of "treatment completers only", the overall three-year mean (SD) DMFS increment was 0.93 (2.50) surfaces in the intervention group versus 2.35 (4.05) in the control group, (p<0.001). When the calculation was performed in accordance with the principle of "intention to treat", the corresponding values were 1.12 and 2.35, respectively. In terms of the components of DMFS index, the intervention group had values of 0.11, 0.21, and 0.80 for DS (decayed), MS (missing), and FS (filled), respectively, versus 0.25, 0.35, and 1.74 for the control group.

Clinical conclusions
The intervention programme was associated with a significant improvement in the dental health of the adolescents compared with the routine care.

Measure of benefits used in the economic analysis
DMFS avoided (the mean discounted DMFS difference in increment) was the main benefit measure adopted in the study.

Direct costs
Costs were discounted. Quantities of resource use were not fully reported separately from the costs. The cost components were reported separately. The cost analysis for the intervention group covered the specific costs of the intervention programme (capital equipment, salaries, and consumables) plus the costs of dental treatment (restorations, extractions, decayed, and examinations). The total cost for the control group consisted of the costs of dental treatment only. The perspective adopted in the cost analysis was that of society. The resource use data for the intervention programme was based on a retrospective estimation using a set of assumptions. The dental treatment costs were estimated based on the health outcomes attained in the effectiveness analysis and using the average charge for each procedure from Victoria state-wide dentist fees. The dental services price index was used to inflate the costs to the fiscal year adopted in the study. 1994 price data were used. The cost analysis did not cover the cost of running an annual oral hygiene instruction session since it was deemed common to both alternatives. Protocol-driven costs incurred solely for the purpose of assessing and analysing trial data were not included in the cost analysis.

Currency
Australian dollars (Aus$).

Sensitivity analysis
A set of one-way sensitivity analyses was performed by varying the key assumptions regarding both costs and outcomes, programme effectiveness, discount rate, the assumptions related to dental checkup rates, outcomes related to loss to follow-ups, and baseline DMFS of students.
Estimated benefits used in the economic analysis
The overall three-year DMFS avoided for the 250 participants in the intervention group due to the intervention programme relative to the usual care was 288. The discount rate was 5%.

Cost results
The discount rate was 5%. The total three-year cost of the intervention programme was Aus$50,150 versus Aus$46,750 in the control group.

Synthesis of costs and benefits
Incremental cost-effectiveness ratio was used as the measure of cost-effectiveness by calculating the additional cost per additional DMFS avoided, which resulted in an overall cost of Aus$11.80 per DMFS avoided. The incremental cost ratios for the three subsequent years of the study were Aus$99.80, Aus$8.80, and -Aus$12.60. The incremental cost-effectiveness ratios for the bottom and top quartiles of baseline DMFS were Aus$39.40 and -Aus$14.50, respectively. The sensitive parameters were programme effectiveness, dental examination rates, and baseline DMFS of students. The incremental cost-effectiveness ratios attained in the sensitivity analyses ranged between a saving of Aus$7 to a cost of Aus$35.60 per DMFS avoided.

Authors' conclusions
The introduction of a preventive programme such as that in this study in unfluoridated regions of Victoria will represent an efficient use of community resources.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator is clear.

Validity of estimate of measure of benefit
As acknowledged by the authors, the internal validity of the estimate of the benefit measure might have been affected by the short-time frame of the study (which might have resulted in underestimation of the benefits of the intervention programme), and the randomisation of schools rather than students.

Validity of estimate of costs
The quantities of resource use were not fully reported separately from the costs. However, adequate details of methods of cost estimation were given. Costs were estimated retrospectively, and, as acknowledged by the authors, a prospective analysis would have been more helpful.

Other issues
Adequate comparisons were made with previous studies. The issue of generalisability to other settings or countries was implicitly addressed by performing a set of sensitivity analyses.

Implications of the study
The authors pointed out that "Policy issues that need consideration include whether to target areas where adolescents have a history of high dental disease experience, and whether dentists or auxiliaries are used as service providers. The need exists for a systematic evaluation (including an economic evaluation component) of dental prevention and treatment program in Australia".

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