Cost-analysis of school-based fluoride varnish and fluoride rinsing programs

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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.

CRD summary
The objective was to examine the clinical and economic impact of two caries prevention programmes among schoolchildren; fluoride varnish treatment and fluoride mouth-rinsing. The authors concluded that prevention of approximal caries using the varnish was a cost-effective alternative to rinsing and could result in cost savings compared with no prevention. The study had some methodological weaknesses, but the authors’ conclusions appear to be valid and robust.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to examine the clinical and economic impact of two dental caries prevention programmes among schoolchildren; fluoride varnish treatment and fluoride mouth-rinsing.

Interventions
The two fluoride interventions (varnish and rinsing) were compared against no preventive intervention.

Location/setting
Sweden/community (school).

Methods
Analytical approach:
The study was based on a decision tree model with an eight-year time horizon, which was three years of school-based prevention programme plus five years of follow-up. The authors stated that the perspective of the dental care service was taken.

Effectiveness data:
The clinical data came from a selection of known, relevant studies, in the Swedish setting. The effectiveness of varnish in caries prevention was based on a randomised controlled trial (RCT) and that for rinsing was taken from a cohort study. Both these studies used the same control group. Caries progression was taken from a 12-year longitudinal study. It was assumed that the natural course of progression would occur after the three years of prevention. The main clinical endpoints were caries incidence and caries progression after three years of prevention.

Monetary benefit and utility valuations:
Not included.

Measure of benefit:
The number of avoided fillings was the summary benefit measure.

Cost data:
The economic analysis included the costs of the prevention programmes (materials and nursing time, transportation, payroll taxes, and overheads) and the costs of filling damage from approximal caries. The costs and resource quantities for the two programmes were taken from the two sources for their effectiveness data. The cost of filling was based on official prices in a Swedish regional dental service. An annual discount rate of 3% was applied. The price year was 2006 and all costs were in Swedish kronor (SEK).
Analysis of uncertainty:
A deterministic analysis was undertaken to investigate the impact of variations in the clinical outcomes (using their 95% confidence intervals), the cost of the prevention programmes (varied by ± 20% of the base-case figures), the discount rate (0 and 5%), and assumptions about the progression of lesions to fillings.

Results
In a hypothetical cohort of 100 pupils, the number of avoided fillings with fluoride varnish over no intervention was 16.8 from enamel, 8.3 from dentine, and 2.2 from avoided re-fillings. Those with fluoride rinsing over no intervention were 14.9 from enamel, 7.3 from dentine, and 1.9 from avoided re-fillings. Thus, the varnish produced better outcomes than rinsing.

The expected cost per pupil per year was SEK 35.80 with fluoride varnish and SEK 63.00 with rinsing.

When considering the cost of avoided fillings, in a cohort of 100 pupils after eight years, the varnish led to a cost-saving of SEK 8,521, and rinsing increased costs by SEK 1,527 or SEK 63 per avoided filling. The varnish was dominant, which means it was cheaper and more effective than no intervention.

The sensitivity analysis showed that these base-case results were generally stable and that the varnish treatment remained dominant except in the worst-case scenario.

Authors’ conclusions
The authors concluded that prevention of approximal caries by fluoride varnish treatment was a cost-effective alternative to fluoride mouth-rinsing in schoolchildren and could result in cost savings compared with no prevention.

CRD commentary
Interventions:
The selection of the comparators was appropriate as two available preventive strategies in schoolchildren were compared. A background comparator of no intervention was also considered. A description of these preventive strategies was provided.

Effectiveness/benefits:
Country-specific sources of data were used to derive the clinical inputs to the model. This should have ensured the inclusion of data that represented the setting, but a systematic search would have been a more appropriate method to identify the best evidence. The varnish effectiveness was taken from a RCT and this should have ensured high internal validity, even though the sample size was small. Data on the progression of caries was appropriately taken from a longitudinal Swedish analysis. The benefit measure was disease-specific, which limits the external validity of the clinical analysis.

Costs:
The economic viewpoint included only the direct medical costs. Extensive information on the patterns of resource consumption and unit costs for both prevention programmes was provided. Other details of the analysis such as the price year and the use of discounting were reported. The cost estimates were treated deterministically and potential ranges of values were tested in the sensitivity analysis.

Analysis and results:
The clinical and economic results were clearly presented and an incremental analysis compared the two programmes with no intervention. The issue of uncertainty was investigated using a partial approach, although a more comprehensive analysis would have been more appropriate. The study findings were robust. The authors compared their results with those of several other analyses, highlighting similarities and differences.

Concluding remarks:
Although the study was subject to some methodological weaknesses, the authors’ conclusions appear to be valid and robust.
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