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REVIEW ANALYSIS AND EVALUATION

Clinical practice guidelines were proposed for the use of pit and fissure sealants to prevent and arrest non-cavitated carious lesions.

Evidence-based clinical practice guideline for the use of pit-and-fissure sealants: A report of the American Dental Association and the American Academy of Pediatric Dentistry.

Wright JT, Crall JJ, Fontana M, Gillette EJ, Nový BB, Dhar V, Donly K, Hewlett ER, Quinonez RB, Chaffin J, Crespin M, Iafolla T, Siegal MD, Tampi MP, Graham L, Estrich C, Carrasco-Labra A.

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Purpose/Question

The authors produced a clinical practice guideline based on a systematic review of clinical studies on the effectiveness of pit and fissure sealants (sealants) to prevent caries and stop the progression of non-cavitated caries in the occlusal surface of primary and permanent molars. They also examined

the evidence comparing the ability of sealants or fluoride varnish to prevent caries and stop the progression of non-cavitated caries in the occlusal surface of primary and permanent molars. In addition, they examined the superiority of one sealant material over another.

Source of Funding

American Dental Association and the American Academy of Pediatric Dentistry

Type of study/design

Systematic review with meta-analysis of data

Level of Evidence

Level 2: Limited quality, patient oriented evidence

Strength of recommendation

Grade B: Consistent good quality patient orientated evidence

Summary

This paper summarizes the systematic review that the practice guidelines are based on; details are published elsewhere Wright et al.¹ The systematic review included parallel and split-mouth randomized controlled trials with at least 2 years of follow-up, reporting the effectiveness of pit and fissure sealants on the occlusal surface of primary and permanent teeth. Trials were identified using MEDLINE (via PubMed), Embase, LILACS, the Cochrane Central Register of Controlled Trials, and registers of ongoing trials. Teams of two reviewers independently screened the titles and abstracts of the initial 2869 papers identified. Following this, two reviewers again screened 426 full-length papers, of which 24 met the inclusion criteria (23 trials).

Key Study Factor

The key study factor was the effectiveness of sealants at preventing caries initiation or progression in the occlusal surface of molars. Types of sealants were classified as resin-based, glass ionomer cements, polyacid-modified resin sealants, and resin-modified glass ionomer sealants.

The authors used the AGREE reporting checklist to guide the reporting of the guideline development.²

The GRADE methodology (Halshem et al) was used to classify the certainty of the evidence available.³

Main Outcome Measures

Four questions were addressed:

Should sealants be used to prevent caries initiation or progression on the occlusal surface of primary or permanent teeth?

Should sealants be used to prevent caries initiation or progression on the occlusal surface of primary or permanent teeth, when compared to the application of fluoride varnish?

Which type of sealant material is the most effective?

Are there any adverse effects related to the use of sealants?

Main Results

Nine trials addressed the question regarding the effectiveness of sealants preventing caries initiation or progression. The placement of a sealant compared to no sealant on apparently sound surfaces will reduce caries by 75% at 2 to 3 years' follow-up. In a population with a caries prevalence of 30% this would be 207 (95% confidence interval [CI] 186-225) lesions prevented for 1000 sealant applications. A similar reduction in caries would be expected in a population with sound and initial carious lesions present.

The development panel assessed this evidence to be of moderate strength. Therefore the use of sealants was recommended.

Three trials addressed the second question regarding the effectiveness of sealants compared to fluoride varnish application. After 2 to 3 years' follow-up caries reduction of 73% in sealants placed

on sound teeth would be expected. Again, in a population with a caries prevalence of 30% for 1000 sealant applications, 196 (95% CI 72-255) lesions would be prevented.

However, in a population with sound and initial caries the comparison was not statistically different. The development panel assessed the evidence to be low and made a conditional recommendation that sealants are more effective than fluoride varnish at preventing the initiation or progression of non-cavitated lesions in permanent and primary teeth.

The development panel was unable to determine the superiority of one type of sealant over another. This was because of very low quality evidence. The conditional recommendation is that any of the four sealant materials examined can be used to prevent the initiation or progression of non-cavitated lesions in primary and permanent teeth.

Two trials reported adverse events but found none.

All of the foregoing trials involved patients who were children or adolescents; there were no data on the effectiveness of sealants in adults.

Conclusions

Sealants are effective at reducing the incidence of caries in the primary and permanent molar teeth of children and adolescents compared with no use of sealants or the application of fluoride varnish. This is true whether the sealants are applied to sound surfaces or surfaces with non-cavitated carious lesions.

Commentary and Analysis

This guideline is based on a well-conducted systematic review.¹ This systematic review's conclusions are in general agreement with the previous Cochrane review on the effectiveness of sealants,⁴ the very recent Cochrane review comparing the effectiveness of sealants versus fluoride varnish,⁵ and the review by Mickenautsch and Yengopal⁶ looking at glass ionomer versus resin sealants, to name three of a number of reviews in this area. This raises the question, why do we have to repeat this work? Is

this not a waste of scarce resources? One cannot but wonder whether these authors, without their own systematic review, wouldn't have drawn the same conclusions.

Returning to the methodology, the use of the AGREE and the GRADE methodologies gives a clear, structured, and open approach that makes the conclusions and recommendations robust.

The authors conclude that sealants are effective at caries prevention whether applied to sound surfaces or surfaces with non-cavitated carious lesions based on the results of only 9 studies. The second part of this recommendation is of real significance. Isolating the carious lesion from the biofilm on the surface (or its removal) leads to the arrest of the caries. This biological approach to caries management is increasingly accepted, especially among cariologists.⁷ However, many practitioners have been reluctant to adopt this approach.

The reporting of the results as the number of lesions prevented or arrested per 1000 sealants applied in a population with 30% caries prevalence is a particularly useful method of presenting the results.

The second question asked whether sealants were more effective than fluoride varnish. Again, sealants provided more effective caries prevention. The analysis looking at whether sealants were more effective at arresting non-cavitated caries than fluoride varnish was not statistically significant. Despite this weaker evidence the panel recommended sealants on both sound and non-cavitated carious lesion in preference to fluoride varnish. In practice, because fluoride varnish is effective at preventing smooth surface caries, the clinician should both seal the occlusal surface and regularly apply fluoride varnish.⁸

The largest trial comparing sealants with fluoride varnish has just finished and the results will be available in the near future. It will be interesting to see what effect, if any, these findings will have on this recommendation.⁹

It was believed that resin sealants are superior to glass ionomer materials. This guideline group concluded, as have other reviewers, that despite the inferior retention of glass ionomer materials, all materials evaluated are equally effective.⁶ It must be noted, however, that the strength of evidence was weak, with only a small number of studies available.

The final question examined the adverse effects. Only two trials reported this, with none being reported.

This leads to the large number of areas where the evidence is weak or not available. These do not all need repeated. There is no evidence on the effectiveness of sealants in adults, there needs to be more evidence on the effectiveness of sealants in the primary dentition, and there needs to be more studies comparing types of materials. All of these endeavors should use high-quality designs to avoid bias.

Clinical Applicability

The recommendations are clear that both resin and glass ionomer sealants are effective at preventing caries and arresting the progression of caries in the occlusal surface of molars of permanent and primary teeth.

Sealants are superior to fluoride varnish at preventing pit and fissure caries.

In their discussion the authors make the point that sealant usage is not optimal and this should be addressed. Linked to this is the point they make that effective sealant usage should be associated with a risk assessment. Currently no such tool exists that can efficiently identify those patients and sites that would benefit from sealing.

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