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# British Society of Paediatric Dentistry: a policy document on fissure sealants in paediatric dentistry

*This policy document was prepared by J. H. Nunn, J. J. Murray and J. Smallridge on behalf of the BSPD. Policy documents produced by the BSPD represent a majority view, based on a consideration of currently available evidence. They are produced to provide guidance with the clear intention that the policy be regularly reviewed and updated to take account of changing views and developments.*

*This policy document updates the original document, British Society of Paediatric Dentistry: a policy document on fissure sealants published in 1993 [1].*

## Definition

A fissure sealant is a material that is placed in the pits and fissures of teeth in order to prevent the development of dental caries.

Whilst this Policy Document may be used to inform decision making about the use of sealants as part of a preventive programme, the rationale for doing so needs to be considered for each individual. Likewise, it has to be borne in mind that it may well be inappropriate to use individually focused guidelines to inform collectively orientated decisions, designed for public health programmes [2].

## Rationale for use – the need to be evidence-based

Sealants are highly effective in preventing dental caries in pits and fissures of teeth when applied by trained operators in clinical trials and community health programmes [3,4]. However, their effectiveness when applied in other primary and secondary care settings is still not known. When used appropriately, sealants result in improvements in oral health but their use on all occlusal tooth surfaces for preventive reasons will result in wastage of scarce resources [5]. There is evidence that initially sound surfaces in a fluoridated area do not necessarily become decayed, even after 5 years. Clear efficiencies have been identified in the sealing of *incipient* caries (caries confined to enamel) and there has been a recommendation for the targeting of these in sealant programmes, in fluoridated areas [6]. There is evidence that sealing may well arrest caries on an affected surface [7,8]. In areas of high caries prevalence it has been shown that treatment costs can actually be reduced by sealing susceptible surfaces, usually the occlusal surfaces of first permanent molars [9]. Even where sealant retention is incomplete, the caries inhibition is sufficient to endorse their use as a public health measure [4].

There would be a reduction in opportunity costs, that is, of other health services foregone, if there were more widespread delegation of the application of sealants to appropriately trained dental auxiliaries [10].

Whilst cost-effectiveness is an important consideration, from an ethical standpoint the protection of oral health should not be viewed purely in economic terms [5,11].

## Prevalence of the use of fissure sealants

Evidence is emerging in the UK, Germany and the United States that the use of fissure sealants is increasing, although this may not be the case in Canada [9,12–14].

Despite the welcome upturn in the provision of dental sealants there remain significant numbers of children and adolescents for whom this preventive approach is not routine. In the United States, the majority of dental caries is distributed amongst 25% of the population [15], with pits and fissures of newly erupted molar teeth continuing to be the vulnerable sites [16–18]. In Canada, 95% of caries or restorations in first permanent molar teeth of 8-year-old children are found in pits and fissures [9]. Similar data are available for the United States [19].

Whilst there is good evidence to support the inclusion of fissure sealants as part of a preventive programme from the dental team, a number of related issues need to be considered.

## Prediction of success

A number of authors have attempted to predict the need for sealants based on previous caries experi-

ence. They have failed to identify the rationale used by dental personnel for the purpose [20,21]. What has emerged is that the child's caries risk may be a factor in sealant loss such that the higher the dft, the higher the risk of sealant failure in permanent teeth [22]. There would appear to be a continuing need for education of providers on issues like the need for professional prophylaxis, cost-effectiveness of sealants and the speed of progression of caries in enamel [20,23].

The window of susceptibility to caries of 1 year after eruption for first molar teeth no longer seems to be the case [24].

**Need for re-treatment**

Monitoring and re-treatment, where indicated, remain a feature regarded as good practice in the maintenance of a sealant if longevity and thus caries protection is to be ensured [6,25,26]. Early placement of sealants is still to be advocated since it may help in the acclimatization to dentistry of small children. However, evidence has emerged that early placement (first permanent molars in 6-, 7- and 8-year-olds, second molars in 12-year-olds) required resealing more often than did sealants placed in these teeth in children aged 13 years and older [27]. A balance needs to be struck between sealing early, when a tooth is only partially erupted, partly sealed and thus a source for marginal leakage and caries development, and delaying the placement of pit and fissure sealants to allow for full eruption but also, potentially, the development of caries [28].

**A preventive strategy**

An over-arching principle must be that sealants should not be placed in isolation from other preventive measures. There is good evidence that a comprehensive approach with diet control, professional fluoride applications and intensive oral hygiene measures, as well as residence in a fluoridated area, confer substantial benefits to oral health [12,16]. Indeed, the study by Arrow [16] showed that a programme of professional tooth cleaning accompanied by an oral health education programme was as successful in reducing caries as was a parallel programme of selective fissure sealing and application of topical fluorides.

**Materials**

Since the 1970s the conventional materials employed as fissure sealants have been the BIS-GMA resins. Alternative materials, such as the glass polyalkenoate cements (GIC) enjoyed a vogue but were shown to be not as efficacious. That is, although caries prevention was acceptable, paradoxically, retention was poor. This may in part have been due to the better penetration and retention of GIC in the depth of the fissure, relative to resin-based materials, which was not apparent macroscopically [29]. The benefit conferred by the presence of fluoride in GIC materials may have been advantageous as far as caries prevention was concerned.

Further trials with GIC materials as an alternative to composite resins have not changed this view, with the result that glass polyalkenoate cements can probably be recommended as a 'fluoride depot' rather than as a conventional mechanical barrier occluding a susceptible fissure [30]. However, where co-operation is insufficient to place a conventional resin sealant, glass ionomer cement in this role may be a temporary expedient until patient compliance improves. The use of a fluoride varnish in pits and fissures confers some protection against the development of caries but not to the same extent as conventional resin sealants [25].

The incorporation of fluoride into a resin and its subsequent release after clinical application may compromise the integrity of the sealant and as yet there is no justification for advocating the use of materials modified in this way [31].

**Recommendations for use**

It would appear that the application of sealants to all fissured surfaces is no longer to be advocated in the absence of consideration of risk factors for both children and adults. Indeed, one of the Healthy People 2000 Objectives, to increase sealant use in children in the United States by 50%, is thought now to be too broad to be meaningful [19].

The decision to apply a fissure sealant should be made on clinical grounds based on a thorough clinical examination, supported by radiographs where appropriate [32] and taking into account risk factors like the medical and social history and past caries experience.

*Patient selection*

**1** Children and young people with impairments. The application of sealants to all susceptible sites of teeth should be considered, along with other risk factors, in such individuals. This is particularly the case for young people who have an impairment and in whom their general health would be jeopardized by either the development of oral disease or the need for dental treatment.

In this situation it may be prudent to place pit and fissure sealants on the primary teeth also.
**2** Children and young people with caries in their primary teeth (dmfs = 2 or more) should have all susceptible sites on permanent teeth sealed [33].
**3** Children and young people with caries-free primary dentitions do not need to have permanent teeth sealed routinely; rather they should be regularly monitored for any change in risk factors and/or clinical or radiographic evidence of a change in their caries status.

*Tooth selection*

**1** Where there are indications, as in 1–3 above, to place sealants, these should be applied to all susceptible sites of permanent teeth. Primary teeth are not *normally* considered for sealants.
**2** Consideration should be given to applying sealants to surfaces that are deeply fissured and thus potentially susceptible to caries [34].
**3** In circumstances where there is an indication to place pit and fissure sealants, these should be placed as soon as the selected teeth have erupted sufficiently for adequate moisture control during placement, remembering that failure rates are higher when sealants are placed on newly erupted teeth [27].
**4** There would no longer appear to be a scientific basis for the rationale of sealing teeth within a year or two of eruption, rather the potential risk factors should be regularly re-assessed before making such a decision [24].
**5** Where occlusal caries affects one permanent molar, the occlusal surfaces of the remaining sound molars should be sealed because there is evidence that this is cost-effective [9].

*Clinical circumstances*

**1** Where there is real doubt about the caries status of a susceptible site on clinical examination, for example a stained fissure, a bitewing radiograph should be obtained. If there is unequivocal evidence that the lesion is confined to enamel the surface may be sealed and monitored clinically and radiographically. Where the evidence is equivocal, an enamel biopsy should be carried out, although the sealing of *incipient* lesions (caries confined to enamel) does not appear necessarily to lead to dentine involvement [6,8].
**2** If, after carrying out an enamel biopsy, the lesion extends into dentine, a sealant restoration may be placed [26] provided the final restoration would not occupy more than a third of the occlusal surface. A more extensive cavity will require a conventional restoration.

*Follow-up*

**1** All sealed surfaces should be regularly monitored clinically and radiographically. Bitewing radiographs should be taken at a frequency consistent with the patient's risk status [31], especially where there has been doubt as to the caries status of the surface prior to sealant placement. The exact intervals between radiographic review will depend not only on the risk factors, which may change with time, but also on the monitoring of other susceptible sites, for example approximal surfaces [35].
**2** Defective sealants and/or preventive resin restorations should be investigated and the sealant replenished in order to maintain the marginal integrity, provided the surface is caries-free [26,36].

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