



# The acceptability of fluoride varnish and fissure sealant treatments in children aged 6-9 delivered in a school setting

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**Objective:** To assess the acceptability of fluoride varnish and fissure sealant treatments for children. To investigate the acceptability of delivering this treatment in a school setting for children, parents, clinicians and school staff. **Basic research design:** Semi-structured interviews (with children, parents, clinicians and school staff) and a questionnaire (for school staff) as part of a two-arm, randomised clinical trial. **Participants:** Children aged 6-9, their parents, clinical staff and school staff. **Interventions:** Fluoride varnish or fissure sealant was delivered to children from the ages of 6 to 9 years for 36 months, by a community dental service in a school setting. Fluoride varnish was re-applied every 6 months; fissure sealant was applied once to first permanent molars and re-applied as required. **Results:** Interviews with children a few days after treatment indicated little difference in preference; acceptability at this point was driven by factors such as finding it fun to visit 'the van' (i.e. mobile dental unit) and receiving a "sticker" rather than specific treatment received. Interviews with parents, clinicians and school staff indicated high acceptability of delivering this type of intervention in a school setting; this may have been partly due to the service being delivered by a well-established, child-oriented community dental service which delivered the clinical trial. **Conclusions:** Preventive fluoride varnish and fissure sealant treatments in a school setting has high overall acceptability.

**Keywords:** Preventive treatment; dental caries; qualitative study; fissure sealants; fluoride varnish; children; health inequality; school based prevention

## Introduction

The 'Seal or Varnish' trial was a two-arm randomised controlled trial to compare the effectiveness, cost-effectiveness and acceptability of fluoride varnish and fissure sealant treatments among children aged 6-9 years (Chestnutt *et al.*, 2017a, Chestnutt *et al.*, 2012). Preventive treatments for children such as fluoride varnish (FV) and fissure sealant (FS) are both known to be effective in reducing the risk of future caries (Ahovuo-Saloranta *et al.*, 2013, Marinho *et al.*, 2013). However, there is insufficient evidence to determine which of these preventive measures is the more effective (Ahovuo-Saloranta *et al.*, 2016). In order to effectively deliver preventive treatments, the acceptability of the treatment for children, their families, and services delivering treatment, also needs to be established in order to inform viable future prevention programmes. Although the amount of research on children's perspectives of dental treatment has increased since 2000, it is still largely focused on clinical outcomes (Marshman *et al.*, 2015). Furthermore, the use of proxies (such as parents) in research to represent children's views has increased (Marshman *et al.*, 2015). There is also little literature on the acceptability of fluoride varnish or fissure sealant: one previous study employed observation and a face-to-face multiple choice questionnaire

to compare the acceptability of fluoride foam and varnish for children aged 3-15 years, where varnish was found to be more acceptable than foam (Hawkins *et al.*, 2004). The acceptability of fluoride varnish has also been established for children aged 2-5 years, including the acceptability of delivery in nursery school settings (Kolb *et al.*, 2013, Zhou *et al.*, 2012). A further study, using a Likert-scale questionnaire, found that fissure sealants had overall acceptability for children aged 3-16 (Morgan *et al.*, 2014). This article reports on qualitative findings of a study of the acceptability of the two treatments for children, collecting data directly from children and also parents, clinicians and school staff involved in the 'Seal or Varnish' trial.

The trial was delivered from 2011 to 2015 in primary schools located in designated Community First areas in south east Wales, recognised by Welsh Government as having high levels of socioeconomic disadvantage. Children resident in such areas are at high risk of dental caries and fissure sealants are therefore recommended (Scottish Intercollegiate Guidelines Network (SIGN), 2014). The 'Seal or Varnish' trial was delivered as an extension to the well-established Welsh Government National Oral Health Improvement Programme 'Designed to Smile' which includes the delivery of fissure sealant treatments by the Community Dental Service (CDS) on school sites, using the same staff and

mobile dental clinics (MDCs). Schools can be good routes to accessing services for children who would not otherwise receive or present themselves for services, a factor linked to socioeconomic disadvantage (Morris *et al.*, 2006). Participants were invited to take part in the study through an information leaflet and consent forms sent home from schools to parents, when children were six or seven years old. All assessment and treatment visits were conducted in an MDC which visited the school; children were removed from the classroom in groups of two or three for their visits. For further details about the trial methods and treatment, see Chestnutt *et al.* (2012). The clinical results of the trial, reporting the relative effectiveness of the two treatments, have been published (Chestnutt *et al.*, 2017b). This article reports on the acceptability of treatments and treatment setting in order to complement the effectiveness study and to explore the feasibility of delivering FV and FS treatments in a community setting where the need for preventive treatment is high. The study examined the acceptability of the treatments from the perspectives of children, parents and CDS staff, as well as the acceptability of the intervention for the schools which hosted the MDCs. Acceptability was explored in terms of attitudes, experiences and responses to receiving FV or FS as a topical dental treatment in a school setting. Acceptability of the treatments was also investigated with respect to change over time, as children aged from 6-7 to 8-9 years old over during the trial.

## Methods

Data were collected through interviews with different stakeholder groups and a questionnaire for school head teachers (described below). All interviews were conducted by SMT, an experienced qualitative researcher and Research Associate at Cardiff University at the time of the study. She was employed as a methodologist, with no prior relationship with study participants or the CDS staff delivering the intervention and no previous involvement in dental research or assumptions about the study findings. The researcher introduced herself to participants as a university researcher, without a clinical background in dentistry, conducting a study to find out what children, parents and school and CDS staff thought about the treatment and its delivery within the school setting. The interview schedule was determined by the main study research questions concerning the comparative acceptability of the two treatments and the acceptability of the delivery of preventive dental treatments in schools. These topics were refined through a discussion with two CDS staff, before the interviews, about how the intervention was delivered and any differences between the two treatments (such as the length of time each took). Additional questions about the experience of the trial aimed to identify and distinguish between issues that may have arisen from research processes rather than the intervention. No fieldnotes were made. All interviews took place in separate rooms, or in locations such as the edge of a school hall, where participants could not be overheard. All telephone interviews took place in a private office at Cardiff University where the conversation could not be overheard. Interview schedules are available from Chestnutt *et al.* (2017a). All interviews were digitally recorded and fully transcribed. Transcripts and findings were not presented to study participants for comment.

### *Child interviews*

Data were collected from a sub-sample of children through face-to-face, semi-structured interviews held in schools. Schools where children were interviewed were sampled from the highest and lowest quartiles of socioeconomic disadvantage within the Communities First areas, in order to consider any effects of socioeconomic disadvantage on acceptability (schools were all located within Communities First areas but levels of socioeconomic disadvantage varied within this sample). Socioeconomic disadvantage was measured by the percentage of pupils receiving free school meals (FSM). Larger schools within these areas were sampled to enable paired interviewing (see below) within each trial arm to be conducted where possible. Participants were evenly split between trial arms. Consent for child and parent interviews was sought within the main trial consent procedure, gained through an information pack and consent forms sent to parents from schools (Chestnutt *et al.*, 2012). Additional telephone calls were made to parents ahead of child interviews to confirm consent; no parents refused consent at this stage. Assent was checked verbally at the beginning of each interview; no child refused. Children were interviewed twice: a few days after the first treatment of the trial in 2011 (50 children) and after the final treatment in 2014 (32 children). Children were interviewed in pairs according to trial arm and their preferences, where possible, to make them more comfortable (Highet, 2003). Interview topics included the experience and acceptability of the treatment, acceptability of the school setting and contextual factors such as prior experience of dental treatment.

### *Parent interviews*

After the child interviews, one of their parents was interviewed by telephone within six weeks of treatment. These interviews were semi-structured, with schedules piloted with parents attending a South Wales community centre outside the non-trial area. Forty-nine parents were interviewed in the first year of the trial and 30 in year three. The fewer child and parent interviews in the final year were due to the child not being present in school on the days when interviews were conducted or difficulties in contacting parents to confirm consent for interviews (due in part to some parents changing their mobile phone numbers). Parents were asked about perceptions of their child's experience of treatment, acceptability of the treatment, acceptability of the school setting and contextual factors such as prior experience of dental treatment.

### *CDS staff interviews*

Face-to-face semi-structured interviews were conducted with CDS hygienists, dental nurses and staff who collected children from the classrooms at the end of years one (9 staff), two (12) and three (12) of the trial. All CDS staff involved in the trial who were available on the interview days were sampled. Staff were informed about the interviews by liaison CDS staff who were members of the trial management group. Interviews took place in the CDS central offices in Cardiff, in a separate room where they could not be overheard. These interviews explored the acceptability of the sealant and varnish treatments for children from clinician perspectives, and the feasibility and acceptability of delivery in a school setting.

### *School staff interviews and questionnaires*

Data on the acceptability of the intervention for schools were collected through a questionnaire and semi-structured telephone interviews. A questionnaire was sent to heads of all trial schools at the end of the first year of treatment; this included closed and open questions about their experience of hosting the Seal or Varnish trial and intervention in their school. Twenty four questionnaires were returned. At the end of the third year, schools that had returned a questionnaire were contacted to take part in a semi-structured telephone interview. Three head teachers and one class teacher were interviewed; topics included the impact of the trial and treatment delivery in the school, contextual factors affecting the feasibility and acceptability of delivering preventive treatment in a school setting, the acceptability of treatments and recruitment of hard-to-reach parents for interventions.

### *Analysis*

Data analysis was underpinned by a post-positivist approach because of the evaluative nature of the study, which was assessing the acceptability of the intervention to inform future implementation. Qualitative data were analysed by SMT using framework analysis, in NVivo 9 (Ritchie *et al.*, 2013), for three reasons. First, due to the very focused questions asked and the often brief and direct answers given, the interviews generated a large quantity of ‘thin’ data for which in-depth approaches such as thematic analysis were not suitable. Children were aged six or seven in the first year of the trial and were limited in what they were able to report due to their relatively early developmental stage. Child interviews lasted 15-20 minutes. Parents often had other young children and were busy; interviews with parents usually lasted 10-15 minutes. The analysis therefore drew on the explicit content of the data using deductively-derived themes based on interview questions. Second, framework analysis organises and displays themes, which facilitates an overview of initial findings and allows the researcher to observe any patterns. This concise display is especially useful with large samples. Third, one aim of the analysis was to compare findings between participant types (children, parents, clinicians and school staff), trial arm, level of socioeconomic disadvantage and between the first and last years of the trial. The framework method assisted data comparisons between many participants by using separate frameworks for each group of participants.

Transcripts were first read through for familiarisation, after which an index of themes was created. This index contained one level of deductively-derived themes, based on interview questions (Gale *et al.*, 2013). Frameworks were created using this index with separate frameworks for each participant group (children, parents, CDS staff, school staff), trial arm, level of socioeconomic disadvantage (high/low), and time-point (first, second and third year of trial), to allow comparison. The main themes included: attitudes towards and perceptions of the research; school setting; overall acceptability of the treatment; taste; and length of treatment. Additional themes were included for groups where additional questions had been asked: what teachers and headteachers thought motivated parents to participate (or not) in dental programmes; teacher and clinical staff views about how the intervention was de-

livered, and how the dental service and schools worked together; children and parents’ perceptions of changes in teeth (including discolouration); participants’ current dental arrangements; families’ previous experience of dental care; and any changes in children’s oral hygiene practices and diets. Data were directly charted into the framework grids in Nvivo 9. Each framework was then exported to Excel so that a summary could be added to the end of each column, and each framework could be printed and reviewed. The summaries of each theme noted patterns in responses, but also contained sufficient detail about variance between responses to avoid bias in the reporting of findings. In the second stage, the framework summaries were compared between participant groups, trial arms, levels of socioeconomic disadvantage, and to examine change over time. The framework analysis was not cross-checked by a second researcher because responses to interview questions tended to be brief and focused in response to each interview question; the analysis produced a relatively straightforward summary of the explicit content of the data rather than requiring interpretation which might be disputed.

The schools questionnaire data were analysed using summary descriptive statistics, in Excel. The quantitative and qualitative findings from data collected from schools were triangulated to build a comprehensive assessment of schools’ experiences of hosting the intervention.

## **Results**

### *Acceptability of FV and FS Treatment*

Acceptability, as reported by children, tended to be driven by their overall experience of the treatment visit. Apart from a small number of exceptions, most children commented that ‘going to the van<sup>1</sup>’ was ‘fun’, ‘good’ or ‘brilliant’. Getting a “sticker”<sup>2</sup> was a very popular feature of visits to the MDC, and children also frequently mentioned generic aspects of the treatment they liked, particularly the moving dental chair and protective (often coloured) glasses. Children also reported positively on being with their friends when attending treatment. Cotton wool rolls were the least popular aspect of treatment, and a few children expressed a dislike of having their teeth ‘scraped’/‘poked’. Feelings about the three-in-one syringe were mixed, since some children found it unpleasant but others liked it because it was ‘ticklish’. There were no differences in acceptability between the FV and FS trial arms, or by level of socioeconomic disadvantage, and there was no change over time except that children were more relaxed about having treatment and were more likely to mention that they liked having their teeth looked after or protected for the future in year three of the trial.

When children commented on the treatment itself, taste was the most frequently mentioned aspect. Children very rarely commented other aspects of treatment such as duration. Discolouration was rarely noticed and did not cause concern. Very small numbers of children said that they had felt sick. Some children liked the taste while others found it unpleasant, and there were varying strengths of reactions. In year one, most FS children who made clear statements about the taste of treatment made negative comments, whereas FV children’s comments were more evenly spread across a range of reactions.

However, many children said their experience was ‘ok’ or ‘fine’, even if they did not like the taste:

Interviewer: So can you tell me what you thought about going to the dentist when you went?

Child 1: It was quite fun

Child 2: It was quite fun and it tasted disgusting

Interviewer: Ok [to Child 2] you thought it was disgusting and [to Child 1] you thought it was quite fun

Child 1: I thought it was fun

Child 2: It was fine but it tasted horrible

(Paired child interview, Sealant arm, Year One)

Some children in year one mentioned feeling nervous about the treatment; of these most said that attending the MDCs with friends made them less nervous or feel safer. In year three, fewer children mentioned feeling nervous or unhappy about having further treatment; most were tolerant overall by this stage and generally felt more relaxed and confident about a visit to the MDC. Children in year three tended to report that they were ‘fine’ or happy/excited to go for treatment, even if they did not like all aspects of it. Some children also mentioned that they liked having their teeth looked after or protected.

Parent accounts of child acceptability corroborated child reports. They said that children found it novel and exciting to visit the MDC, and that they liked aspects of treatment such as being with their friends and receiving stickers. A small number of children had reported to their parents that they did not like the taste or another aspect of treatment (that it was ‘gluey’ for example) but, again, acceptability was often based on more than one factor:

Parent: She said that it tasted horrible

Interviewer: Ok

Parent: That was it really, just it didn’t taste very nice but she was delighted because she had stickers (laughs). I was like “What was it like, what did they do?” and she said “They put something in my mouth and it didn’t taste very nice.”

(Parent Interview, Sealant Arm, Year One)

Many parents said their children did not say much about the treatment but would have complained if they had found it objectionable. There were no differences between trial arm or level of socioeconomic disadvantage.

CDS staff reported similar aspects of acceptability. For example, several thought taste was a significant feature of treatment for children, and commented that children were less nervous usually if they were accompanied by friends. They also noted the novelty and excitement of being on the MDCs for children:

*Oh, they love coming on the van. They love it. They always ask who drives it and where do people, some think that they sleep there overnight and it turns into a caravan. But they love it, they love coming on. “What’s this drawer for?” you know, yeah, they love coming on.*

(CDS staff interview, Year Two)

In year one, more CDS staff thought the varnish was better liked by children because it was quicker, did not involve cotton wool rolls, and because some children did not like the taste of the sealant. In year two they commented in more detail about the pros and cons of both treatments: varnish was quicker and easier to apply but was also sticky, could cause nausea and the taste lingered, whereas children could rinse after sealant treatment. If children gagged easily applying sealant could be difficult and children sometimes found keeping their mouth open for a long time difficult. However sealants usually only required check-ups rather than re-application. CDS staff in years two and three also said that children were very accepting of treatment, and that refusals were rare, but did note that acceptability still varied and that some individuals liked the treatment and/or taste of a treatment while others did not. CDS staff reported that children were generally tolerant and well behaved, whether they liked the treatment or not. After the first year, they thought some children remembered not liking the treatment and could react negatively when attending again, which could then affect the other children they were with.

#### *Acceptability of Treatment Setting*

The delivery of preventive treatment in a school setting during the school day had high acceptability for children, parents, CDS staff, and school staff. In year one of the study, most children either did not express a clear preference or were indifferent to whether they were in class or the MDC. In the final year of the study, children were more aware of having to catch up on schoolwork if they missed part of a class, though this was a minor issue. There were no differences in attitudes to missing classes between the FV and FS trial arms. Three children said if the lesson was maths, their preference would be for going to the dentist.

Parents were happy for children to receive dental treatment through schools, in part because they tended to have high levels of trust in schools. They also appreciated not having to escort children to appointments and commented that this was very convenient for them. Parents were unconcerned about missed class time, due to the young age of the children and because they missed less time compared to a community dentist visit. Several parents thought that their children behaved better or were less nervous about seeing a dentist or dental hygienist in a school environment.

Data from the school questionnaires and interviews with school staff highlighted various benefits of the MDC visits. School staff were positive about the CDS because it contributed to their ‘promoting health’ agenda and helped them engage with families, which they viewed as part of their remit. Most indicated that the service ran smoothly with minimal disruption to the school. Several thought it made children more aware of the importance of looking after their teeth, though there were various dental programmes operating in schools, such as oral hygiene education. One

<sup>1</sup> Colloquial term used by the children for the mobile dental clinic

<sup>2</sup> An adhesive badge usually featuring a cartoon character, given to the children by the treating clinician as a reward for attending

participant commented that it could benefit schools in the longer term by reducing future absences for treatment. It should be noted that the treatments were delivered by a well-established child-friendly CDS, which is likely to have had an impact on acceptability for schools.

CDS staff found the treatment setting unproblematic on the whole, largely because the Seal or Varnish trial was integrated with existing MDC services in schools, which typically ran very smoothly. Both school and CDS staff reported a good working relationship. For example, schools sometimes helped to recruit children and CDS staff made efforts to fit around school timetables. A few CDS staff thought schools in the more deprived areas were particularly welcoming. Treating children in a school was easier for CDS staff because there were fewer missed appointments and they could treat more children more quickly.

## Discussion

Whilst FV and FS have been established preventive dental agents for several decades, limited research has considered their acceptability to children (Hawkins *et al.*, 2004, Morgan *et al.*, 2014, Kolb *et al.*, 2013). To our knowledge, no previous research has been conducted on their comparative acceptability, or on the wider acceptability of delivering this type of preventive treatment in schools. The application of FS, with the attendant need for enamel etching, aspiration and maintenance of a dry field is inherently more invasive than painting on FV. Despite this, the comments from participating children did not markedly differentiate between the technologies under investigation. Taste has been reported as an important determinant of the acceptability of preventive interventions (Kolb *et al.*, 2013). While the taste of the treatments featured highly in children's reports, it was clear that taste was not the predominant factor in the overall acceptability of either treatment. The novelty of dental treatment in the MDC, being with friends, receiving reward stickers, a moving chair and coloured glasses being 'fun' were also important factors. Acceptability for older children also appears to have been influenced by their appreciation of the preventive nature of the treatment. Parents also reported acceptability in broader terms, such as the convenience of the setting. This means that acceptability needs to be understood as a broad measure since contextual factors, of both the treatment and setting, can influence the acceptability for families. The high trial completion rate and lack of children lost to follow-up or withdrawal further evidences the acceptability of the treatments (of 1016 children enrolled, 835 completed the final assessment, most of those lost being due to moving away) (Chestnutt *et al.*, 2017a). A limitation of this study was the brief nature of the interviews conducted with children and parents, due to the children's age (6 to 9 years), the limited time most parents had available for interviews and the limited comments parents made about the intervention.

The acceptability of providing FV and FS treatments in schools was generally high for both schools and the CDS, due to a positive and efficient working relationship and the contribution of preventive services to wider school aims of holistic education and care. The CDS was a child-friendly service with an established relationship with schools. This relationship is likely a key component in the delivery of the interventions and is an important consideration in any future school based preventive programme.

## Conclusion

Both FV and FS are acceptable preventive dental treatments for children. This confirms previous research that demonstrated the acceptability of such treatments (Hawkins *et al.*, 2004, Kolb *et al.*, 2013, Morgan *et al.*, 2014). Taste of treatment was the predominant aspect remembered and commented on by children. Further, a few days after treatment, children's perception of treatment appears to be driven by wider features of a dental visit such as visiting a 'fun' van with friends, getting a sticker or sitting in a moving chair.

In deprived areas where caries rates are high, schools can be an effective delivery setting for preventive dental services. Delivery through a child-friendly MDC in a school setting has high acceptability for children. This mode of delivery also has high acceptability for parents (for convenience), clinicians, (for efficiency), and schools (the service contributes to health promotion agendas). The trial was conducted in an area which had an established mobile dental service for children which had a good working relationship with schools; acceptability is likely to depend on the quality and embeddedness of such a service.

## Acknowledgements

This report presents independent research funded by the National Institute for Health Research (grant 08/104/04). The views expressed are those of the authors and not necessarily those of the National Health Service, the National Institute for Health Research, or the Department of Health. The authors declare no potential conflicts of interest with respect to the authorship and/or publication of this article.

The authors gratefully acknowledge the contribution of the Seal or Varnish study team and members of the Community Dental Service, Cardiff and Vale University Health Board to the study. The cooperation of the children and parents whose views were sought, and of the participating schools, is also acknowledged gratefully.

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