SCHOOL-BASED FISSURE SEALANT PROGRAMME

GUIDELINES

A SCHOOL-BASED FISSURE SEALANT PROGRAM

Second Edition

Oral Health Division
Ministry of Health Malaysia
March 2003
Globally, there is change in caries pattern with caries decline. Caries now principally involves pits and fissures of teeth. This has led to increasing use of fissure sealants for clinical prevention of caries. Over the last 30 years, oral health data on Malaysian school children have shown a similar caries decline. The National Oral Health Survey of Schoolchildren 1997 (NOHSS ’97) officially documented occlusal surfaces as being about four times more caries-susceptible than other surfaces.

On the strength of the 1997 data, guidelines were formulated for an integrated school-based fissure sealant programme implemented in 1999.

This second edition guidelines aim to strengthen the programme, in particular the need to continuously monitor the impact of the large-scale programme on overall caries pattern and decline in Malaysia. The programme incorporates dental nurses to render fissure sealants through an ‘outreach’ strategy. In the Malaysian context, the school-based programme utilises a targeting strategy for children at risk to occlusal caries.

I take this opportunity to extend my warm appreciation to all officers involved in the programme planning and implementation, and who have continued with reviewing the policy for the school-based fissure sealant programme. It is hoped that success of the strategy will translate into further caries decline in Malaysia.

DATIN DR. ROHANI RAMLI
ACKNOWLEDGEMENT

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Members of the Working Group welcome comments and constructive suggestions pertaining to any aspect of these guidelines.
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1. INTRODUCTION

Recent oral health data of school children in Malaysia shows evidence of a decline in dental caries experience between 1970/71 and 1997\(^2\). There was an overall decline in mean caries experience of 56.8% in 12-year-olds and 41.7% in 16-year-olds over the 17-year period. In Peninsular Malaysia, the mean DMFX(T) of 12-year-olds decreased from 3.7 in 1970/71 to 1.6 in 1997; and the mean DMFX(T) of 16-year-olds decreased from 4.8 in 1970/71 to 2.8 in 1997. The recent study also documented occlusal surfaces as constituting the majority of carious surfaces - approximately 44% and 39% of carious occlusal surfaces in the 12- and 16-year-olds respectively, compared to a range of approximately 12% - 17% for mesial and distal surfaces. More than 71% of teeth with carious experience had occlusal surface caries in both the 12- and 16-year-old age groups. The teeth commonly affected by dental caries were observed to be the first and second permanent molars, with the first permanent molars being twice more affected than the second permanent molars. These facts serve to emphasise the need for fissure sealants to overcome the majority of dental caries now observed in Malaysia.

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

In the context of the Malaysian school dental programme, fissure sealant application is considered a preventive procedure and not a restorative procedure. Fissure sealant is thus defined as non-
invasive. However, a preventive resin restoration (PRR), with or without a fissure sealant, is an invasive procedure and is considered a restorative procedure.

The definition of ‘No Treatment Required (NTR)’ as used in the Health Management Information System (HMIS) applies, that is, cases that do not require invasive procedures. As fissure sealants are considered prophylactic and non-invasive, cases requiring only fissure sealants are thus considered as NTR cases.

2. BACKGROUND OF THE FISSURE SEALANT PROGRAMME IN MALAYSIA

The fissure sealant programme was started as a pilot programme in the Federal Territory Kuala Lumpur in 1987-1988 and subsequently expanded ad-hoc in many states. In 1993, a special allocation was granted for the purchase of equipment for the programme. Portable cutting instruments purchased since then, have specified oil-free compressors. In 1998, standardised guidelines were formulated for the conduct of a national school-based programme, and the programme was subsequently launched in 1999. However, collection of fissure sealant data has pertained only to performance indicators - the number of children involved, the number of teeth rendered fissure sealants and the number of sealant re-applied.

Based on feedback received from two workshops conducted in Malacca and Johore Bahru in 2000 and 2002 respectively, a decision was made to review the 1999 guidelines, in particular the need to continuously monitor the impact of the programme on caries. Current aspects of fissure sealants were reviewed, including clinical techniques, criteria for patient selection, cost-effectiveness and current practice and programmes. Discussions centred on longitudinal evaluation of cohort groups starting at age 8 years upwards.

2.1 PRE-REQUISITES FOR A SCHOOL-BASED FISSURE SEALANT PROGRAMME

The necessary prerequisites for a school-based fissure sealant programme rest on the availability of dental officers and
nurses trained in the use and application of fissure sealants, and on the procurement of oil-free portable equipment (vacuolyser, 3-way syringe and oil-free compressor) and materials. These factors will determine the expansiveness and sustainability of the school-based programme. The following suggestions are made.

i) The fissure sealant programme may have to start on a small scale initially, based on the availability of trained personnel and equipment, and later expand as and when procurement of the necessary equipment and materials is made.

ii) Continuing education on the rationale for an outreach school-based fissure sealant programme and the techniques involved must be a team approach involving both dental officers and nurses.

iii) There must be emphasis on meticulous procedures in the field conditions of the school incremental dental care programme.

iv) The application of fissure sealants as an integral part of the school-based programme, and not merely as a clinical prevention procedure, should be incorporated into the training programme for dental nurses at the Dental Training College, Penang.

v) The rationale for a fissure sealant programme as part of the school incremental dental care must be emphasised to all new dental officers.

vi) Planning at state and district levels must be towards realistically sustaining the programme; the factors for priority setting undertaken for incremental dental care should also be utilised in setting priorities for the school-based fissure sealant programme.

vii) Priority setting must veer towards prevention of dental caries in the younger age groups.
3. OBJECTIVES OF GUIDELINES

3.1 General Objective
The general objective of these guidelines is to establish a standardised, comprehensive and systematic fissure sealant programme as an integral part of the Malaysian incremental dental care programme for schoolchildren.

3.2 Specific Objectives
- To implement a school-based fissure sealant programme starting at Year 1 primary school children upwards as part of the Incremental Dental Care.
- To monitor performance in terms of need for fissure sealant and fissure sealant rendered.
- To assess trends of occlusal caries occurrence in relation to total tooth decay for 12 year-olds.

4. METHODOLOGY

4.1 Target Population
The programme shall cover all schoolchildren under the incremental dental care programme starting at Year 1 upwards. Selection of schoolchildren shall be based on the selection criteria. Nevertheless, children with special needs, for example, the handicapped, the medically compromised or those from an obvious disadvantaged social background shall be given priority.
4.2 Implementation

The programme shall be undertaken by teams of dental officers and nurses as part of the “outreach” incremental dental care programme, and shall be co-ordinated by the District Senior Dental Officers, with the assistance of the local Dental-Officers-in-Charge.

4.2.1 Criteria

I. Criteria for School Selection
Selection of schools shall be at the discretion of district/state management. Following priority-setting between schools, there shall be priority-setting for selection of children considered “at-risk” to occlusal caries (Figure 1).

II. Criteria for Patient Selection
The use of the probe is to be limited to removing debris. There must be no excessive probing of pits and fissures.

A consideration of the following factors will help towards making a decision on patient selection (Figure 1). The initial application of these criteria, individually or in combination, must be supported by a consideration of the tooth/teeth of the children.

- Children who have had caries experience in one or more of their first and second permanent molars.
- Children who have had caries experience in their first permanent molars shall be
considered for fissure sealing of their second permanent molars.

- Children with $\text{dft} \geq 3$ in the mixed dentition stage of Year 1, 2 and 3.
- Children with special need e.g. the handicapped, the medically compromised and the socially disadvantaged.

To select potential candidates for fissure sealants, look at the general oral condition of the child. Is the oral hygiene good, moderate or poor? Is the child co-operative? Go on to assess the morphology and depth of the fissures of the permanent molars. Are they deep and complex-patterned? Are there chalky occlusal appearances, occlusal restorations or fissure sealants? How many teeth have had caries experience? Are contra-lateral first and permanent molars involved?

Once a child is selected for fissure sealant application, the procedure can be undertaken immediately, or recall for fissure sealant application may be on a separate occasion in the same year.

III Criteria for Tooth Selection

If recall for fissure sealant application is on a separate occasion, reassess tooth/teeth. A general examination should look for stains, signs of decalcification (chalky white enamel) or frank caries (Figure 2). Where caries is suspected to be in dentine or approximal areas, the light should be shone at various angles to help determine the presence and depth of caries.
Consideration of a combination of the following factors will help towards tooth/teeth selection for fissure sealant application.

- Caries-free first and second permanent molars exhibiting deep and/or complex fissure patterns.
- First and second permanent molars exhibiting incipient enamel lesions e.g. chalky white lesions.

*However first and second permanent molars exhibiting caries with entry into dentine can be considered for a preventive resin restoration.*

The selected tooth/teeth shall

- have all fissures visible to enhance ease of moisture control by limiting moisture from crevices;
- exhibit presence of deep and/or complex pattern(s) of pits and fissures;
- have no existing restoration; and
- exhibit(s) no signs of approximal caries.

Teeth to be excluded

- Deciduous teeth
- Teeth with shallow and coalescent fissures
- Teeth with frank caries (caries which has entered dentine layer)
- Teeth exhibiting signs of approximal caries
- First and second permanent molars, which are not fully-erupted (keep in view / KIV).
4.2.2 Fissure Sealant Application

The difficulty of frequent recall in a school-based programme might necessitate the following - children who exhibit excessive materia alba and plaque must be made to brush their teeth prior to prophylaxis for sealant application. The general principles of fissure sealant application must be applied at all times (Figures 3 and 4).

The tooth/teeth (and working field)

- must not be contaminated with oil at any time (oil-free field)
- if using resin based sealants, must be adequately etched according to manufacturer’s instructions
- must be irrigated and dried after acid-etching for resin based sealants
- must be dry, clean and without contamination prior to placement of sealant material.

Appendix 1 lists equipments and materials for the programme.

4.2.3 Criteria for Fissure Sealant Re-application

A tooth shall be considered for a fissure sealant re-application when there is total or partial loss of sealant with an obvious catch when probed. The criteria for tooth selection (4.2.III) shall be applied.
4.3 Monitoring and Evaluation

A State Co-ordinator shall be appointed by the respective State Deputy Director of Health (Dental) to monitor and evaluate the outcomes of the programme at state and district levels.

*Note

Evaluation of the outcomes of the school-based fissure sealant programme: A longitudinal study

A longitudinal study on a cohort group of 8-year-olds shall be undertaken concurrent with the school-based programme to capture data for identified indicators. The study shall be co-ordinated by dental public health officers identified by the State Deputy Directors of Health (Dental).

All personnel involved in the school dental programme are required to attach and complete format FS 1/2003 for 8 year-olds (Year 2 schoolchildren only) in year 2003 (or in subsequent years when instructed by the Oral Health Division) in readiness for the longitudinal study.

4.4 Data Collection

Data shall be collected through

- the manual/computerised HMIS format (PG 307 and PG 201)
- specific dummy tables built for this programme (Appendix 2 and 3)
- FS 1/2003 (Appendix 4) for 8 year-olds (the cohort group for the longitudinal study). This form is to be attached to LP8.
The link between the school-based programme and the longitudinal study is illustrated in Appendix 5.

4.5 Data Flow
The compiled district and state data shall be channelled to national level by the end of February of the following year. Each district/state must be responsible for the monitoring and evaluation of its individual school-based fissure sealant programme.
Figure 1
Stage 1: FLOW CHART FOR SELECTION OF SCHOOLS/PATIENT/TOOTH

Prioritisation of schools
High dental caries experience

Assessment of the patient
- caries experience
- oral hygiene
- dental attendance history
- medical history e.g. handicapped, medically-compromised

Risk Assessment of Teeth
- pit and fissure morphology
- level of caries activity
- caries pattern

Do not seal if:
- patient uncooperative;
- deciduous teeth;
- the tooth cannot be isolated;
- frank occlusal caries or caries into dentine;
- tooth exhibits signs of proximal caries
- proximal restoration involves pit and fissure surfaces.

Evaluate Pit and Fissures for Fissure Sealant
(Figure 2)
Stage 2: CRITICAL STEPS FOR EVALUATING PITS AND FISSURES

Evaluate Pit and Fissure Surfaces

- No caries
  - Questionable (if in doubt seal)
    - Seal (Figures 3 and 4)
      - SEAL
        - If at-risk to caries based on an evaluation of:
          - pit and fissure morphology
          - caries pattern
          - patient’s perception/desire for sealant
            (Figures 3 and 4)
        - DO NOT SEAL
          - If individual and teeth are not at risk
          - Monitoring still necessary

- Caries
  - Arrested Caries
    - Sealed
      - Seal (Figures 3 and 4)
  - Active Caries
    - Unable to judge depth of caries
      - Explored and removed caries (if any) with small round bur
      - Seal
        - In enamel
          - Shallow in dentine
            - Consider restoring with preventive resin restoration (PRR)
        - Deep in dentine
          - Restore

Reinforce preventive messages

Where applicable evaluate sealed teeth for sealant integrity, retention and caries progression

For Preventive Resin Restoration techniques, refer to the following monograph: Zamzuri AT, Wan Othman WMN. Preventive Resin Restoration: Monograph No.2. Children’s Dental Centre and Dental Training School, Penang, Malaysia 1995.
CRITICAL STEPS FOR FISSURE SEALANT APPLICATION

(RESIN-BASED SEALANTS)

1. Determine tooth/teeth to be sealed

2. Prophylaxis
   - Pumice powder and water (no pre-mix paste)
   - Irrigate with water from 3 way syringe from oil-free compressor

3. Isolate tooth and dry (two-finger technique)

4. Etch enamel
   (Follow manufacturer’s instruction)

5. Rinse tooth, isolate and dry.
   Do not allow child to rinse
   (two-finger technique)

6. Check surfaces – chalky or frosty?
   - No
   - Yes
     - Apply sealant

7. Light cure
   - Apply sealant over pit or fissures
   - Avoid air traps
   - Polymerise with UV/halogen light

8. Chemical cure
   - Mix resin types until homogeneous
     (follow manufacturer’s instructions)
   - Apply over pits and fissures
   - Avoid marginal ridges
   - Work within the time limit set by manufacturers

9. Remove ‘wet’ layer with cotton wool when cured.
   Check margins and occlusion.

10. Marginal deficiencies
    - Re-etch
    - Re-apply sealant

11. Occlusal interference
    - Trim premature contacts
Figure 4
STEP-BY STEP GUIDE TO THE PLACEMENT OF GLASS IONOMER SEALANTS

Determine tooth/teeth to be sealed

Isolate the tooth with cotton wool rolls. Keep treatment area free from saliva.

Gently remove plaque and food debris from the deepest parts of the pits and fissures with an explorer.

Apply conditioner or glass ionomer liquid into the pits and fissures according to the manufacturer’s instructions. Condition for the specified time.

Immediately wash the pits and fissures using wet cotton wool pellets to clean off the conditioner. Wash 2-3 times.

Dry the pits and fissures with cotton wool pellets.

Mix the glass-ionomer and apply it in all pits and fissures with the round end of the applier/carver. Overfill slightly but take care not to cover the cusps of the tooth.

Rub a small amount of petroleum jelly on the gloved index finger.
Press the glass-ionomer mixture into the pits and fissures using the index fingers (press-finger technique). Then remove finger sideways after a few seconds.

Remove visible excess of mixture with the carver or a large excavator

Check the bite using the articulation paper and adjust comfortably.

Apply a new layer of petroleum jelly or varnish

Remove the cotton wool rolls

Advice patient not to eat for at least one hour
APPENDICES
LIST OF EQUIPMENT AND MATERIAL

Basic requirements for a school-based fissure sealant programme:

Equipment
- Portable cutting unit with oil-less compressor
- Oil-free 3-way syringe
- Vacuolyser and suction tips
- Light cure equipment (if using light cure resin)
- Portable chair
- Portable light
- Basic dental instruments

Materials
- Self-cure or light cure composite resin kit (Opaque/tinted) or Glass Ionomer Cements
- Cotton rolls
- White stones for occlusal adjustment of sealant
- Articulating paper
- Petroleum Jelly / Vaseline (if using glass ionomer cement)
- Dentine conditioner (if using glass ionomer cement)
Appendix 2

(*Information to be extracted from HMIS PG 201*)

**Table 1: Fissure Sealant Treatment Need and Treatment Rendered by Year of School Children**

School/Clinic/District/State: __________________________

<table>
<thead>
<tr>
<th>Calender Year</th>
<th>Class (Standard)</th>
<th>No. examined</th>
<th>FS Treatment Need</th>
<th>FS rendered</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td>No. of subjects</td>
<td>No. of teeth</td>
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<tr>
<td>Total</td>
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### Table 2: Trend data of decayed teeth with occlusal caries in Year 6 children over 5 years

**School/Clinic/District/State:**

<table>
<thead>
<tr>
<th></th>
<th>No. of teeth carious experience (D + F)</th>
<th>No. of teeth with occlusal caries experience (D + F)</th>
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<tbody>
<tr>
<td></td>
<td>(include all teeth)</td>
<td>All types (Class I and II)</td>
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<td>Class I only</td>
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*PG 307 (for Year 6 school children only) can be modified to yield these results*

In this table, decay (D) **does not include** teeth indicated for extraction (X).

- Class I – involving occlusal surface only
- Class II – involving occlusal surface + other surfaces
Appendix 4

RECORDING CRITERIA FOR FS 1/2003

CHILD STATUS REPORT OF FISSURE SEALANT APPLICATION

School
Enter the name of the school

Name of patient
Enter child’s name

Clinic
Enter the clinic responsible for the management of the school

District/State
Enter the district and state responsible for the management of the school and clinic

Year / Class
Enter the year and name of the child’s class for that year e.g.

<table>
<thead>
<tr>
<th>Year</th>
<th>2003</th>
<th>2004</th>
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<tbody>
<tr>
<td>Class</td>
<td>Std. 2 A</td>
<td>Std. 3 C</td>
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Initial Application/
Material Used
Record the date of first application. Tick (√) whether resin or GIC used.

Columns 1st to 5th Year
Review
Enter the date of subsequent review. Enter the status of the fissure sealant

Year(s) of review
Enter the date of review e.g. if the initial application is in the the year 2003 then
the 1st Year Review is in the year 2004, the 2nd Year Review is in the year 2005
and so on. Indicate the status of the fissure sealant and tooth for each year of
review.

Status of fissure sealant
Use one of the following codes

I  =  Intact Sealant
NI = Not Intact, do not require redo
R  =  Redo/Replace Sealant (see definition below)
F  =  Failed fissure sealed tooth (see definition below)

Failed fissure-sealed
tooth
Prevention of caries is considered to have failed when the tooth develops caries
on any surface (please indicate the carious surface). This definition includes the
following:

- The sealant has failed leading to caries.
- Prevention of caries has failed when decision to render fissure sealant has
  not accounted for possible caries occurrence on other surfaces.

Redo/Replace Sealant
The sealant is deemed to have been totally lost or there is partial loss of sealant
with an obvious catch when probed, and requires redo.
## CHILD STATUS REPORT ON FISSURE SEALANT APPLICATION

### School

### Clinic

### Name of Patient

### District/State

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### 1st Perm. Molar

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FLOW CHART FOR DATA COLLECTION

SCHOOL-BASED FISSURE SEALANT PROGRAMME

Dental Officer / Dental Nurse

Selection of student

Selection of tooth

Record in LP 8

Record in FS1/2003 (Year 2 children only)

Attach FS1/2003 to LP 8

Record in PG 307

Record in PG 201

COHORT STUDY

DPH / Identified dental officers

Randomly select x% children with sealed teeth (from cards with FS1/2003)

Enter into database (Epi Info)

Monitor review of a selected sample for 5 consecutive years

Enter into database each year

Generate report

Submit report to state co-ordinator
GLOSSARY OF TERMS

1. Sound tooth/caries free tooth
   No evidence of treated or untreated caries on any of its surfaces

2. Incipient / questionable caries
   A tooth is deemed to have incipient or questionable caries if it exhibits the following:
   - chalky white appearance on its surfaces;
   - discoloured or rough spots;
   - stained pits and fissures in the enamel which catch on light probing but do not have detectable softened floor, undermined enamel or softened walls;
   - dark, shiny, hard, pitted areas showing signs of enamel defect.

3. Caries
   A tooth is deemed to be carious if
   - there is a lesion in a pit or fissure, or a smooth tooth surface, which has a detectable softened floor, softened wall or undermined enamel; or
   - there is a discoloration due to underlying caries (clinical judgement); or
   - it has a temporary filling or a dressing; or
   - it has a partially or fully dislodged filling with signs of secondary caries.

4. Failed fissure sealed tooth
   A tooth that has developed caries on any surface after placement of fissure sealant. Check for softened areas, discoloration and undermined enamel.

5. Intact fissure sealant
   No discontinuity can be detected with a probe (Probe 9) between the margins of the fissure sealant and the occlusal surface of the tooth.

6. Not intact fissure sealant
   Sealant not in place but does not require a redo according to operator's clinical judgement

7. Redo/replace fissure sealant
   A tooth with a sealant not intact/partially lost and according to operator’s clinical judgement is at risk to caries.
   Any child with a redo sealant will be a new case for the year

8. Wet layer
   Refers to the remnant unpolymerised layer after sealant polymerisation.
REFERENCES


BIBLIOGRAPHY


44. Selangor Dental Services. The Dental Specialist Preventive Clinic, State of Selangor.