

425: Pit and Fissure Sealants



Home Study Courses
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STOP

BEFORE READING THIS COURSE

PRETEST YOUR KNOWLEDGE OF THIS SUBJECT.

**PLACE YOUR ANSWERS IN THE *PRETEST* COLUMN OF
THE SEPARATE ANSWER SHEET INCLUDED WITH
THIS COURSE BOOKLET.**

**THE TEST QUESTIONS ARE THE SAME FOR BOTH THE
PRETEST AND THE POST-TEST. THE TEST QUESTIONS
ARE FOUND AT THE BACK OF THIS COURSE
BOOKLET.**

**AFTER COMPLETING THE PRETEST
THEN
READ THE COURSE
THEN**

**TAKE THE POST-TEST FOR CREDIT AND SEE HOW
MUCH YOU HAVE LEARNED.**

**TO GET THE MOST OUT OF THIS GSC HOME STUDY
COURSE USE THE PSQ4R LEARNING SKILLS
TECHNIQUE DESCRIBED ON THE FOLLOWING PAGES.
GOOD LUCK.**

How to get the most out of your GSC Home Study Course using the PSQ4R technique!

Continuing education should provide the licensee with timely information that can be recalled for day to day use. Each GSC Home Study CE Course was planned and produced in accordance with the PSQ4R method described in the following paragraphs. GSC Home Study has found the PSQ4R method useful for retention of new or updated information.

PSQ4R, a method for improving reading comprehension, has been used by dozens of colleges and universities.

P = Purpose

S = Survey

Q = Question

4Rs = Read Selectively, Recite, Reflect, and Review.

1. Determine your **purpose** for reading this course. For many of you it may be merely to obtain continuing education credit to maintain your license. But, take a moment and look beyond this reason, what is it about this particular course topic that interests you? How does it relate to your current practice? (Est. Time- 5 minutes)
2. Test your knowledge of the course subject matter prior to reading the course by answering the course examination questions at the back of the booklet. Use the pretest column of the answer sheet to write your answers. (Est. Time-20 minutes)
3. **Preview** the course by surveying or skimming the course objectives, subject headings, illustrations, graphics and test questions. Pay attention to the first sentences, introductions, conclusions or summaries in the course. Write down any words that are unfamiliar to you. (Est. Time-15 minutes)
4. Make up **questions** using the section headings as a guide. Write the questions on a blank sheet of paper and leave space for your answers (2-3 inches). For example, if the section heading states "Diagnosis of Alzheimer's Disease", write the question "What are the current criteria used to diagnose Alzheimer's disease?" leaving space for the answer later on. (Est. Time-15 minutes)
5. **Read selectively** to find the answers to your "section-heading" questions. Write your answers in the space you provided. Be sure to write down and/or look up any words that are or were unfamiliar to you. Also, as you continue to read don't forget to look for ideas and information that are in alignment with your purpose for taking the course. (Est. Time- 80 minutes)
6. **Recite** the answers to your questions, by reading the question aloud with the answer covered up. Use your own words as much as possible. If you don't recall the answers, look over that section again. (Est. Time-5 minutes)

7. **Reflect** on the information in the section you've just read. Try to make a simple outline, table, flow diagram or "doodle". (Est. Time-5 minutes)
8. **Review** "section-heading" questions and answers, diagrams and outlines. (Est. Time- 20 minutes)
9. Take the Course Examination. Place your answers on the detached answer sheet posttest column inserted with your course packet. (Est. Time-30 minutes)

Normal Estimated Time to Complete this GSC Home Study CE Course Activity

Taking pretest	20	minutes
Reading course	90	minutes
Taking posttest	30	minutes
Re-reading course to locate answers	40	minutes
<u>TOTAL time</u>	<u>180</u>	<u>minutes</u>

Estimated Time to Complete this GSC Home Study CE Course Activity Using the PSQ4R Method for Improving Your Reading Comprehension

Determine the Purpose for taking the course	5	minutes
Take the pretest	20	minutes
Preview the course	15	minutes
Make up Questions	15	minutes
Read Selectively	80	minutes
Recite the answers to your questions	5	minutes
Reflect the information you just read in the course	5	minutes
Review questions, diagrams, and outlines	20	minutes
Take the posttest	30	minutes
<u>TOTAL time using the PSQ4R method</u>	<u>195</u>	<u>minutes</u>

Use the method you think will be the better use of your time.

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COURSE OBJECTIVES

At the completion of this course the dental provider should be able to do the following:

1. Demonstrate knowledge of the purpose of pit and fissure sealants.
2. Identify the clinical indications and contraindications for sealant suitability.
3. Identify the three generations of dental sealants and demonstrate knowledge of their differences.
4. Identify the steps required in proper sealant application technique.
5. Demonstrate understanding of the implications and advantages of fluoride use in conjunction with dental sealants.
6. Demonstrate familiarity with the success rates reported with each type of sealant.
7. Identify the most common reasons for sealant failure, as well as recommendations for preventing and correcting them.
8. Demonstrate knowledge of the retention rate and effectiveness of sealants.
9. Demonstrate an understanding of the miscellaneous indications for sealants.
10. Demonstrate knowledge of the cost effectiveness of sealants.

INTRODUCTION

Americans spend billions of dollars for oral health each year, but the cost of treatment is only part of the story. The burden of dental-related diseases is significant. In 1989, the American Fund for Dental Health reported that Americans lost 28.7 million work or school days to dental problems—despite the fact that oral health preventive services are some of the most effective and least costly health services available.

Dental sealants that are placed using appropriate techniques and are retained are virtually one hundred percent effective at preventing some types of dental caries. Their demonstrated effectiveness notwithstanding, sealants continue to be underutilized as a method of disease prevention.

No three-hour course can adequately cover all of the published literature available over the past thirty years that has addressed the preventive implications and efficacy, as well as retention rates associated with pit and fissure sealants. As early as 1965, Buonocore's clinical trials reported sealants effective in preventing decay in specific areas of the mouth.

In 1972, the American Dental Association granted provisional acceptance for the use of sealants in private practice. Moreover, in 1983, the National Institutes of Health Consensus Development Conference declared sealants to be a "safe and highly effective means of preventing pit and fissure caries.

Although this documented information is readily available to the dental community at large, it is estimated that only thirty percent of the United States

population that could benefit from the application of pit and fissure sealants is actually receiving treatment. Although there are a number of theories, the most common factors include: staff delegation, lack of education of patients and their parents, insufficient training to perform this relatively simple procedure with a high degree of confidence.

Many of the state dental practice acts now permit the application of sealants by properly trained, qualified dental auxiliary personnel.

By the end of this course, it is anticipated that a greater understanding of the indications, rationale, ease of technique and high retention rate, as well as the benefit of staff delegation will elevate the practitioner's awareness of the overall benefits of sealants, as well as their role in the prevention of incipient caries.

BACKGROUND

It has long been established that prevention is the cornerstone to containing dental disease. The introduction of topical fluorides as early as the 1940s demonstrated a significant break-through in the prevention of tooth loss directly caused by decay.

The second greatest step was the introduction of pit and fissure sealants as a barrier to shield enamel structures from cariogenic bacteria contained in saliva. Application of sealant material to the developmental pit and fissure

areas inhibits decay in noncarious teeth. It has also been proved to curtail early incipient caries in developing teeth.

The utilization of sealants has many positive long-term ramifications.

More specifically, sealants:

1. Act as a preventive measure that may benefit a significant share of the U.S. population (especially children) in the reduction of tooth decay
2. Aid significantly in preventing the destruction of vital tooth structure due to caries, especially in the occlusal pit area, which is microscopically too small to be cleaned by a single toothbrush bristle
3. Are financially economical
4. Are proven safe and effective in cooperative children
5. May be delegated to qualified auxiliary staff in states that permit indirect supervision and expanded duties

THE NEED FOR SEALANTS

Statistically, the percentage of occlusal and buccolingual decay has risen in children. Caries involving the lingual and buccal surfaces in children most often occurs in the pits and fissures. Eighty-three percent of all caries or restorations in U.S. school children occur on the buccal, lingual or occlusal surfaces. In essence, caries in children has become a disease affecting pits and fissures of posterior teeth.

Additionally, as caries on all tooth surfaces is lower in communities with optimally fluoridated water supplies compared to those that are fluoride deficient, an equally high proportion of pit and fissure caries prevails in both types of communities. In essence, the need for sealants is unaffected by the community fluoridation status. **(See Tables 1 and 2)**

-Table 1-
Percentage Distribution of Caries In Specific Tooth Surfaces
In U.S. School Children

Surface	NCHSNIDR	
	Survey 1971-74	Survey 1979-80
Proximal	24	17
Buccolingual	27	29
Occlusal	<u>49</u>	<u>54</u>
Total	100%	100%

Source: Brunelle, J A and Carlos, J P/J Dent Res, 1982

-Table 2-
Percentage Distribution of Caries in Specific Tooth Surfaces
Of U.S. School Children from Optimally Fluoridated and
Fluoride-Deficient Communities

Surface	Fluoridated Communities	Fluoride- Deficient Communities
Proximal	6	11
Buccolingual	40	35
Occlusal	54	54

Source: Bohannon, H M/ Journal Public Health Dent, 1983

According to a report published in the Journal of the American Dental Association (JADA) and co-authored by two ADA councils—Scientific Affairs and Access, Prevention and Interprofessional Relations—children and adults who have one or more of the following characteristics are good candidates to receive dental sealants:

1. If a patient is at moderate or high risk for tooth caries.
2. If the patient has caries limited to the enamel of the pits and fissures of teeth.
3. If the patient has existing pits and fissures that are susceptible to caries.
4. If the patient has sufficiently erupted permanent teeth with susceptible pits and fissures.

Further, it has been demonstrated and documented in the literature that individual teeth are not equally susceptible to caries. Specifically, newly erupted permanent molars develop decay at a far faster rate than newly erupted incisors, cuspids or premolars. Sealing newly erupted molars not only reduces the incidence of decay in most caries-susceptible teeth, but also contributes to an increase in the number of American teenagers graduating from high school with intact dentition.

RETENTION AND EFFECTIVENESS

The primary factor associated with the efficacy of sealants is their ability to remain bonded to the occlusal surface. A report published in JADA to coincide with National Children's Dental Health Month concluded that dental sealants are highly effective in the prevention of tooth decay on the occlusal surfaces of teeth. The report found that ninety-two to ninety-six percent of all dental sealants placed on occlusal surfaces of teeth remain intact one year later, and up to eighty-two percent are retained after five years.

The literature reports attest that the success of caries prevention with sealants is judged by the degree of caries inhibition achieved by their use. Because sealants prevent the decay process by their physical presence rather than by a chemical reaction with the teeth (the exception being the sealants with fluoride added), caries protection may also be determined by the sealant's

ability to remain adhered to the tooth. So long as sealants remain intact, caries will not develop.

The highest rate of sealant loss occurs within the first year, which is when improperly placed sealants fail. Seven years after application one study reported a forty-nine percent success rate, with sealed teeth still completely covered.

First-generation ultra-violet light sealed teeth produced good results and were a benchmark improving sealant efficacy against decay. The autopolymerized sealants further established the efficacy of sealants in decay prevention. Visible light initiated systems are new and producing results reported to be comparable to second-generation sealants. Further tracking of sealant success will undoubtedly confirm what researchers are finding in preliminary tracking studies.

Regardless of the type of sealant system used, findings indicate that the clinical skill of the operator is key to determining sealant retention. The two principal factors affecting the operator's ability to maintain a dry field are the position of a tooth in the oral cavity and the tooth's degree of eruption. This is why sealant retention is reportedly better on premolars than on more difficult to isolate molars.

Christensen suggests that the use of air-slurry polishers has been effective in thoroughly removing plaque from the surfaces of teeth that have grooves. He contends that plaque remains in grooves after acid-etching and claims a thirty percent failure rate as a result. Because air polishers can remove plaque

much more effectively than rubber cup slurry pumicing, he recommends the air-polisher as an alternative prior to acid-etching.

CLINICAL INDICATIONS FOR PIT AND FISSURE SEALANTS

Indications

Sealant resin may be indicated in any of the following clinical areas:

- The occlusal surfaces of permanent teeth having well-defined pits and fissures and/or deep fossae. Occasionally, primary molars with significantly deep grooves or pits may be sealed.
- Stained or slightly white pits and fissures, especially in patients with high caries incidence
- Buccal and lingual grooves when only the appropriate teeth have erupted sufficiently to be free of gingival and operculum contact
- Incisors with lingual pits

Miscellaneous Indications

Dental sealants have proved to be effective at not only preventing dental caries, but also halting the progress of caries in its earliest stages. In the mid-1980s, a consensus panel convened by the National Institute of Dental Research (NIDR) endorsed the use of sealants on incipient carious lesions. Sealants stop the development of caries by substantially reducing oxygen and

nutrients required by caries-causing bacteria. As long as the sealant's margin is intact, bacteria decrease and caries should not progress.

Early research in the 1940s showed that caries did not progress after being sealed by a restoration. In 1972, research proved that progression of caries within tooth structure could be inhibited if the occlusal surface were covered with a sealant. After one month, the sealed tooth had approximately fifty times fewer caries-causing bacteria than the unsealed teeth.

The durability of sealants began to emerge in long-term studies in the late '70s. Bacteria counts of both sealed and unsealed teeth at one, two, four, six and twelve months demonstrated a major reduction in viable micro-organisms within the first two weeks after sealant placement, and a gradual reduction in bacteria count followed during the next two years. Researchers found that the bacteria count decreased 1,000-fold after one year and 2,000-fold after two years. The clinical significance of these reductions was demonstrated in an evaluation of sealant effect on incipient lesions in a public health program. After five years, the initially incipient surfaces that were sealed had an eleven percent caries rate while the unsealed surfaces reached fifty-two percent.

Orthodontic Care and Sealants

Banding of molars is still the attachment mode of choice for the majority of clinical orthodontists. One of the acknowledged hazards of orthodontic treatment continues to be the presence of clinically detectable areas of enamel demineralization following the removal of orthodontic appliances.

Use of sealants with orthodontic care may reduce enamel demineralization at the margins of the bands. A technique has been introduced whereby fissure sealant is extended to cover the entire occlusal perimeter, effectively sealing the band-tooth circumferential interface. This technique represents an additional method of prophylaxis against the demineralization that can accompany orthodontic intervention.

Contraindications

Sealants should not be applied to teeth presenting with any of the following clinical indications:

- Synthetic porcelain restorations
- Veneers
- Amalgam restorations. (*Note: Evidence suggests that some buccal pit amalgam restorations may require sealants for exceptionally large occlusal pits and fissures.*)
- Gold foil restorations, inlays, onlays or crowns
- Evidence of caries on occlusal or interproximal surfaces
- Teeth that cannot be sufficiently isolated

- Sealing margins of existing non-resin restorations
- Vital dentin, which is more sensitive than enamel, and has a much poorer retention rate
- In children who are too young to cooperate during the procedure

Sealants may be applied to clinically indicated teeth in children's, as well as adults' teeth. They are most commonly applied to the occlusal surfaces of permanent first and second molars and premolars. Occasionally they may be applied to deciduous molars if the child is able to cooperate during the procedure.

It is to be noted that the enamel of primary molars is not as conducive to acid etching as permanent teeth thus, sealant retention is compromised in deciduous teeth. While some practitioners apply sealants to primary teeth, others prefer to wait until the permanent posterior teeth have erupted.

UTILIZATION OF SEALANTS

While the effectiveness of dental sealants is unquestionable, the percentage of school-age children who have them has historically been low. About nineteen percent of children age five to seventeen years had sealants on their permanent or primary teeth, according to a study published in JADA. Some dentists use sealants proportionately more than others do. Dentists who use sealants more frequently tend to be less recent graduates, those who

practice in the Northeast and those dentists who are oriented toward preventive procedures.

The reasons given by some dentists for not using pit and fissure sealants are surprising. Despite considerable published evidence to the contrary, most dentists are not yet convinced of the effectiveness of the procedure in preventing caries. In addition, many dentists are concerned that the material does not last long in the mouth. Increased use of sealants seems to depend on improving communication regarding their function and value to the dental profession.

Dental Hygienists' Knowledge and Use of Sealants

Most state dental practice acts permit sealant placement by dental hygienists. However, delegation of sealant application is low, despite the fact that research has shown that dental hygienists and dental assistants can apply sealants effectively and that the procedure can be delegated to them. In a 1985 study of sealant use by dental hygienists in Virginia, fifty-three percent reported receiving experience in sealant application during their professional education. This compared with fifty percent of pediatric dentists and twenty-eight percent of general dentists reporting.

Public Knowledge and Acceptance

Data from the National Health Interview Survey (NHIS) indicate that racial and ethnic minorities and groups with low levels of formal education have the least knowledge of prevention of oral disease. Only one-third of adults had heard of sealants and twenty-five percent of those adults could not correctly identify the purpose of sealants. Public awareness of sealants significantly affects whether a child has them applied. Surveys of patients' knowledge of sealants indicate that dentists and dental hygienists are the most frequent source of information about sealants.

COST-EFFECTIVENESS AND REIMBURSEMENT

The cost-effectiveness of the sealant placement has been generally ignored. However, the cost of preventing tooth decay by placing dental sealants is much less than treating oral disease once it has developed. When the sealants are applied by a dentist, the cost appears likely to exceed the potential cost of restorations saved, but this could be altered if the procedure were carried out by auxiliaries.

An analysis of the cost-effectiveness of dental sealants placed under routine, unrestricted practice conditions in a fluoridated community found cost savings or improving cost-effectiveness with time depending on the conditions under which sealants were placed. A strategy of identifying children with prior

restoration and sealing the remaining molars showed cost savings within four to six years.

Dental insurance reimbursement is often thought to be one barrier to widespread acceptance of dental sealants. However, the dental benefit code for sealants was developed by the ADA in 1982 and since 1987, the ADA's policy statement on Preventive Coverage in Dental Benefits Plans has included sealants as one of the procedures that should be a covered benefit. Additionally, a study of state dental Medicaid programs found that thirty-three states offer some form of coverage for sealants.

THREE GENERATIONS OF SEALANT SYSTEMS

Three generations of dental sealants are available to the practitioner: *photopolymerizing* (ultraviolet and near ultraviolet) light-cured; *autopolymerizing* (chemical) or; and *visible* (incandescent) light-cured.

The first-generation, or photopolymerized systems, contained an initiator activated by an intense light of specific wavelength. The first clinical tests used cyanoacrylates, which were biodegradable, and were therefore not suited for prolonged use in the oral cavity. The cyanoacrylates were subsequently replaced with dimethacrylates, which represent the reaction product of bisphenol A and glycidyl methacrylate (BIS-GMA). Most sealants used today are BIS-GMA dimethacrylate- or urethane dimethacrylate-based products.

The photopolymerizing system requires the use of a hand-held near ultraviolet light unit. The advantage of the light-cured system is that the operator has control over the initiation during the setting process. This system can also be integrated with other bonding techniques, such as the repair of fractured anterior teeth, as well as esthetic restoration of developmental defects. *Note:* The eyes of the operator, patient and chairside assistant must be protected from ultraviolet radiation with specially treated glasses or a hand-held shield while the light is turned on. **Failure to protect the eyes may result in corneal burning!** Photopolymerizing light-cured systems are still in use today, but are no longer marketed by U.S. dental companies.

The second-generation sealants are auto-polymerizing, or self-curing. These set upon mixing with a chemical catalyst-accelerator system. No light is required. The advantages of autopolymerized products is the lower capital cost because a light curing unit and protective glasses are not required. Another is less time required to activate and place the sealant. Another benefit is that the second-generation sealants have demonstrated a higher retention rate than first-generation sealants. A disadvantage of this system is that the operator cannot control the setting time once the catalyst has been added.

Third-generation, or visible light sealants, are photoinitiated with a hand-held incandescent light. Published clinical studies on third-generation sealants are preliminary, with only five-year retention studies reported. (The ideal study is fifteen years.) While retention rates are promising, researchers

have found variances required in the setting time. Further published data is required to establish efficacy and retention rates of photoinitiated sealants.

FLUORIDE-CONTAINING SEALANTS

A fluoride-containing sealant system is currently available, and both *in vivo* and *in vitro* studies of fluoride released have been reported. Two types of fluorides are used. One contains a soluble fluoride salt added to unpolymerized resin. After the sealant is applied to a tooth the salt dissolves and fluoride ions are released. The second method uses an organic fluoride compound that is chemically bound to the resin. The fluoride is released by exchange with other ions.

In both studies the fluoride release was rapid. In the *in vitro* study the major fluoride release occurred within the first two days after application. In the *in vivo* study, salivary fluoride levels were obtained on the same side of that mouth where the sealant had been placed, on the opposite side and for the whole mouth. The fluoride concentration of whole saliva increased significantly within thirty minutes after sealant placement, but returned to baseline levels within one to two days.

The same study reported that after one year the clinical retention for the fluoride sealant was eighty-seven percent (completely covered teeth) as compared with eighty percent for an analogous fluoride-free sealant.

Although promising, one year is too short an observation period to determine if the incorporation of fluoride into a sealant affects its retention. Because there is no lasting effect on salivary fluoride concentration, any additional benefit derived from fluoride-releasing sealant would be absorbed into the enamel underlying the sealant.

FILLERS: ADVANTAGES AND DISADVANTAGES

Some manufacturers of sealant systems that contain inert fillers claim a partially filled sealant is more resistant to the abrasive action of the opposing teeth. There is no evidence, however that sealants fail as a direct result of wear or that sealants with filler particles clinically out-perform those without fillers. With normal chewing, unfilled sealant high spots, which are inevitable, are worn away by the patient's mastication pattern. Partially filled sealants, however, may require equilibration when they are too high. Thus, the use of partially filled sealants has no known advantage, but has a disadvantage of increased chairside time.

COLORED SEALANTS

The polymerized sealant may be clear, white or tinted. White sealants contain small amounts of opaquing agent, such as *titanium dioxide*. Tinted sealants can be seen more easily, in contrast to clear sealants. This visibility factor may be beneficial in obtaining more accurate placement at the application visit, as well as better visualization at subsequent recalls.

PIT AND FISSURE SEALANT APPLICATION TECHNIQUE

Success with dental sealants is dependent upon the formation of strong bonds between the sealant material and the enamel surface, which enables the sealant to remain firmly bonded to the tooth. Sealants contain no active therapeutic agents (with the exception of fluoride-added sealants). Caries prevention is attained by physically shielding out bacteria-causing microorganisms and food particles from the pit and fissure surfaces of posterior teeth. Because attachment and retention of the sealant material depend upon the careful technique during application, the technique of the operator is extremely important, and the principal variable responsible for the retention success.

Whichever type of sealant system is used, the following steps are necessary:

Step 1: Tooth Selection

As previously stated, the occlusal surfaces of first and second primary molars, first and second premolars and first and second and third permanent molars are most benefited by sealant application. While sealants are generally used on children, there are some clinical indications for applying them on adults.

The two most important considerations when selecting teeth for sealant application are: the morphology of the pits and fissures should be deep; and the teeth must be sufficiently erupted to obtain and maintain a dry working field.

Step 2: Prophylaxis

Use a mounted prophyl brush or cup to clean the pits and fissures with a slurry pumice mixture. Flour of pumice is recommended rather than hydrogen peroxide or commercial pastes that contain coloring or flavoring agents, glycerine or fluoride. *Note:* Topical fluoride, if indicated, should be applied at a separate appointment or after sealant placement, but not immediately prior. It is believed that fluoride applied directly before sealant placement may interfere with the bonding and retention process.

After the prophylaxis, thoroughly rinse the residual pumice particles from the pit and fissure areas to be sealed. Use an explorer to mechanically remove any remaining particles. Thoroughly dry the teeth.

Step 3: Isolation and Drying

The indicated teeth must be isolated and kept dry throughout the procedure. This is to prevent contamination and to ensure retention of the material once placed.

Isolation may be achieved with cotton rolls or a dental dam. The patient's head should be tilted so that saliva cannot pool around the teeth receiving the sealant. A saliva ejector must also be placed. Saliva absorbers may also be temporarily placed over the parotid duct openings in conjunction with cotton roll isolation.

After isolating the area, the teeth must be thoroughly dried with clean, oil-free compressed air. The air line can be checked for moisture or oil droplets by expressing several short blasts of air onto a cotton roll or gauze square.

Step 4: Acid Etch Conditioning

The cleaned, dry tooth surface must be etched for sixty seconds. Use a small cotton pellet, minisponge or brush to apply the acid. A locking pliers is especially useful in applying the acid with a pellet or sponge. The surface to be sealed must be kept moist with the acid and not allowed to dry out.

If a liquid acid etch solution is used, use a gently dabbing motion to keep the solution agitated on the tooth surface. Do not rub or burnish the enamel surface with the applicator, however.

Note: Exercise caution with using acid etch liquid or gel, as these solutions may cause accidental burning of oral mucosa or stain clothing.

Step 5: Washing and Redrying

After sixty seconds, use the air-water syringe for ten to fifteen seconds to wash away the etching material. Do not allow the patient to rinse. Rapid evacuation should be used when washing the teeth. Replace cotton rolls and saliva absorbers when saturated. Change them quickly and without contaminating the etched tooth surfaces.

Thoroughly dry the tooth surfaces with uncontaminated compressed air. Avoid blowing saliva onto the etched surfaces. After drying, the etched surfaces will display a noticeable dull matte or frosty appearance. At this time take special care not to contaminate the area with saliva, as it will produce an adherent coating that reduces bond strength. Should salivary contamination occur, wash, dry and re-etch the surfaces for an additional ten seconds. Then wash and dry again before proceeding with the sealant application step.

Step 6: Sealant Placement

Be sure to follow the manufacturer's steps, as sealant application steps and timing may vary. If using an autopolymerizing system, mix the liquid catalyst and base in a one-to-one ratio. A mix of two drops of each can be used for one molar and one premolar in the same quadrant. Should more than two teeth require sealing in the same quadrant, used separate mixes.

Using the brush supplied by the manufacturer, flow the mixed sealant material over the etched surface from cusp to cusp, but do not allowed it to

extend to cover the marginal ridges. If using the photoinitiated system, use the applicator provided; some brands may be directly applied from the bottle to the prepared surface with a cannula.

After placing the material, initiate it with the appropriate light source. Hold the tip of the light source approximately two millimeters from the sealant surface for the first few seconds of polymerization. If the tooth surface is larger than the light tip, slowly move the light back forth near, but not touching, the sealant. Be sure to cure each section of the sealant before moving on to another area of the tooth.

Step 7: Post-application Inspection

Maintain isolation of the teeth until inspection of the sealant reveals no deficiencies. Use an explorer to visually inspect the sealants following polymerization. With some autopolymerized sealants, the leftover sealant retained in the mixing well may be an indicator that polymerization has taken place.

If coverage is found to be incomplete or if there is a surface air bubble is present, additional sealant can be applied if the tooth has remained uncontaminated. Otherwise, the tooth must be re-etched for ten seconds, washed and dried before adding more sealant.

Note that a thin film of sealant usually remains unpolymerized due to contact with the air. This film has an unpleasant taste and should be carefully

wiped off with a wet cotton roll. Remove the isolation materials and allow the patient to rinse.

If an unfilled sealant is used, inform the patient that the material will feel high for a few days, but that this will subside. If a sealant containing filler particles is used, check the occlusion with articulating paper and remove occlusal interferences with a finishing bur.

THE IMPORTANCE OF FOLLOW-UP CARE

As with all preventive and restorative procedures, adequate monitoring through recall appointments is essential. Because, as previously stated, the greater rate of sealant loss occurs within the first twelve months after application, sealed teeth should be evaluated by the practitioner within the first twelve months.

Sealed teeth should be adequately dried and examined both visually and tactilely, using a mirror and explorer. The recall status of a sealed tooth fits one of the following categories. If reapplication is required, the tooth should be treated as outlined.

-Table 3-
Status and Treatment of Sealed Surfaces at Recall

Recall Status of Tooth	Recommended Treatment
* All pits and fissured covered	* No treatment required
* Sealants missing from some or all of the pits and fissures; exposed surface sound	* Reseal the exposed pits and fissures
* Sealant missing from some or all of the pits and fissures; frank caries present	* Restore carious pits and fissures

SEALANTS AND SAFETY

In a time of increased patient litigiousness and OSHA concern for the safety of employees, it is imperative to discuss safety concerns associated with sealant application. Safety concerns include: systemic toxicity, eye safety and local hard and soft tissue effects.

* **Systemic Toxicity**—Sealants are within the voluntary control of the ADA’s Acceptance Program. A requirement for acceptance is that the product be safe. The components of sealants are similar to the resin portion of composite restorations, which have received certification by the ADA’s programs that include standards for toxicity. It has been stated by researchers

that “systemic effects off a general nature from pits and fissure sealants are improbable, and that no further test results can cast doubts regarding the safety of available sealant resin formulations.”

*** Eye Safety**—To reduce long-term risks to the eyes associated with photocuring light units, operators and all other chairside personnel must protect their eyes when the light is on. Protective lenses are available in clip-on and frame styles. These special lenses protect the eyes against both blue light and ultraviolet light radiation.

*** Phosphoric Acid Effects**—The acid conditioning agent removes about five to ten microns of surface enamel. This is equivalent to the amount abraded away during a routine prophylaxis using prophy paste. Other than this minimal loss of surface enamel, which is of no clinical significance, there is no deleterious effect to the enamel, dentin or pulp. No gingival reactions from orthophosphoric acid have been reported. Caution is advised, however, not to spill the acid etch solution onto exposed gingival, oral mucosa, exposed skin or clothing, as this may result in mild burning. If these areas are inadvertently exposed, they should be flushed or rinsed thoroughly with cool water for sixty seconds.

*** Effect on Occlusion**—No occlusal or TMJ dysfunction have been reported due to sealant application. Jensen and co-workers found that fifty percent of a sealant’s volume is lost one month after placement, whether the product used contained filled or unfilled resin. The excess is simply worn away during mastication, usually within a few days.

* **Sealing Bacteria** - Trapping bacteria under sealants is almost inevitable. Likewise, inadvertent sealing of initial caries lesions may occur. Neither of these incidences, however, enhances the chance of caries developing or progressing beneath the sealant.



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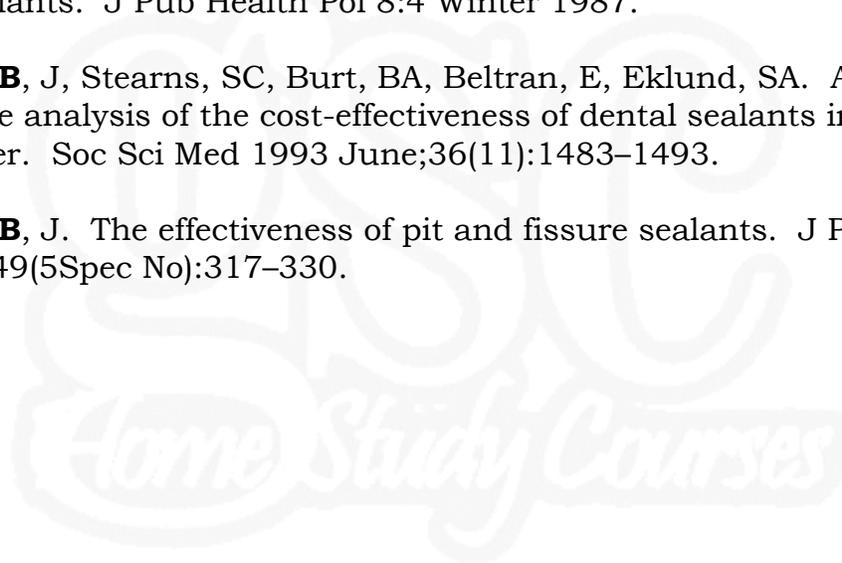
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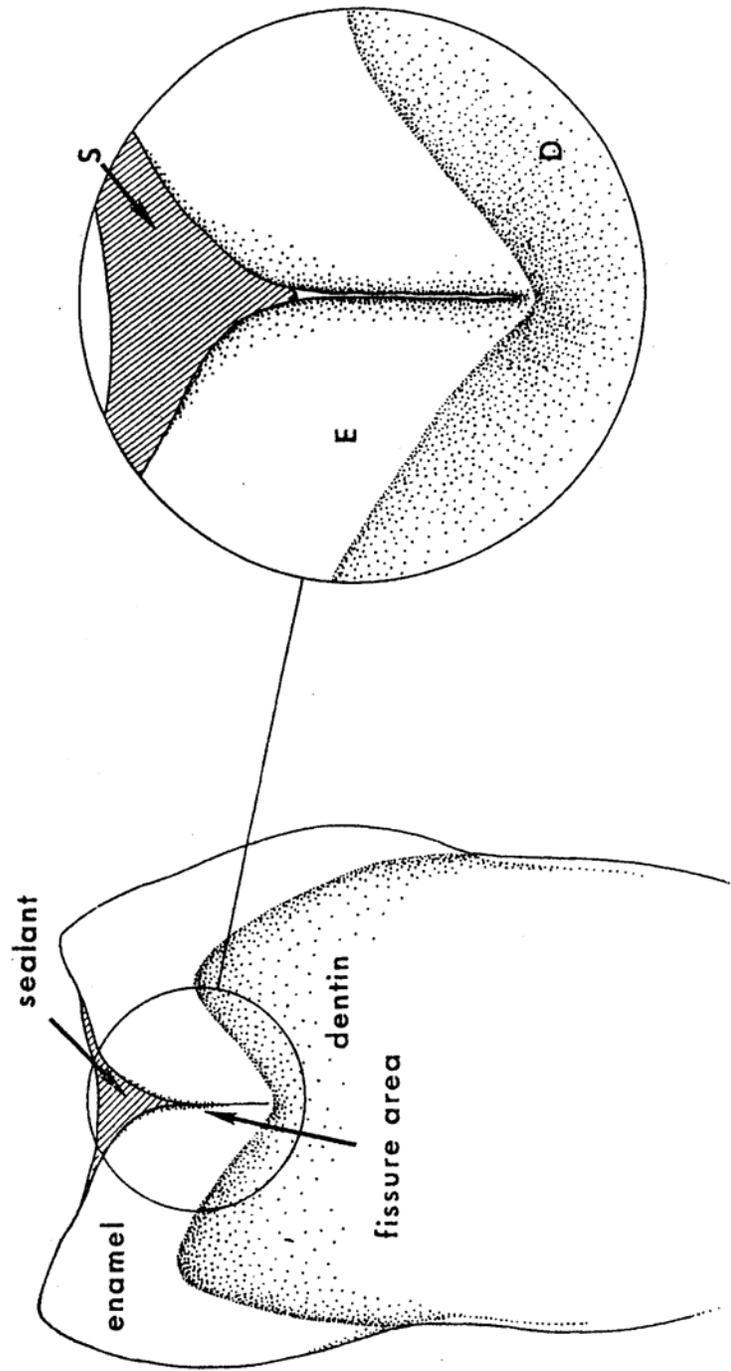
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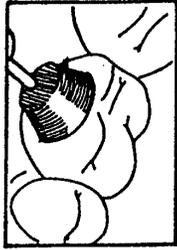
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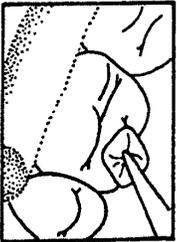
Sealant material in place



1) Pumice tooth to receive sealant.



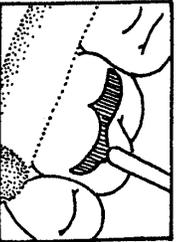
2) Thoroughly wash and dry tooth.



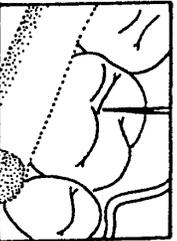
3) Apply tooth conditioner (acid etch solution or gel).



4) Thoroughly wash and redry tooth.



5) Apply sealant material.



6) Check sealant for retention.

Sealant application technique

COURSE EXAMINATION

Pit and Fissure Sealants

Test Completion Date _____
(Always keep a copy of your answer sheet for your records.)

**DO NOT REMOVE THIS EXAMINATION
FROM THIS COURSE BOOKLET.**

Please Read the Following Instructions Before Beginning the Examination.

Fill in your answers on the detached answer sheet inserted with your course packet. Return the completed answer sheet/course evaluation to GSC Home Study Courses at the address listed on the detached answer sheet OR submit your answers on the web at www.gscce.com for instant grading. Receive your certificate of completion immediately. A 75% passing grade is required.

1. Pit and fissure sealant
 - A. is a resin material applied to specific areas of the teeth to prevent caries.
 - B. firmly bonds to the tooth structure to form a physical barrier between the teeth and the oral environment.
 - C. prevents bacteria and dietary carbohydrates from creating the acidic conditions that cause tooth decay.
 - D. All of the above

2. Pit and fissure sealants may be indicated in the following:
 - A. Occlusal surfaces of posterior primary and permanent teeth with well-defined pits and fissures and/or deep fossae
 - B. Synthetic porcelain restorations
 - C. Interproximal surfaces of anterior or posterior teeth
 - D. A & B only
 - E. All of the above

3. Dentists who use sealants proportionately more than other dentists include
 - A. less recent graduates.
 - B. dentists who practice in the Northeast.
 - C. dentists who are oriented generally more toward preventive procedures.
 - D. All of the above

4. Autopolymerizing sealants inhibit decay by a light-cured process.
 - A. True
 - B. False

5. As long as the sealant remains intact and is properly bonded to the tooth, caries will not develop beneath it.
 - A. True
 - B. False

6. What percentage of children age five to seventeen years had sealants on their permanent or primary teeth, according to a study published in JADA?
 - A. Nine percent
 - B. Nineteen percent
 - C. Twenty-nine percent
 - D. Forty-nine percent

7. Pit and fissure sealants may be applied to
 - A. lingual surfaces of maxillary permanent incisors.
 - B. buccal surfaces of mandibular molars.
 - C. lingual surfaces of maxillary molars.
 - D. A & B only
 - E. All of the above

8. If topical fluoride application is recommended for the patient, the two procedures are most often done at the same appointment.
 - A. True
 - B. False

9. Pooling of saliva around the teeth aids in polymerization of sealants.
- A. True
 - B. False
10. The primary factor associated with the efficacy of sealants is their ability to remain bonded to the occlusal surface.
- A. True
 - B. False
11. A properly etched enamel surface will have the following appearance:
- A. Chalky
 - B. Dull
 - C. Frosty
 - D. Glossy
 - E. A, B & C only
 - F. All of the above
12. At the post-application inspection, additional sealant material should be added for which of the following?
- A. when a surface air bubble is present
 - B. if coverage of the pit and fissure areas is incomplete
 - C. if the tooth has remained uncontaminated
 - D. A & B only
 - E. B & C only
 - F. All of the above
13. Second-generation self-polymerizing sealants have the highest documented retention rate.
- A. True
 - B. False
14. The components of sealants are similar to the resin portion of composite restorations which have received certification by the ADA's programs that include standards of toxicity.
- A. True
 - B. False

15. To date, no eye damage has been reported in dental personnel applying sealants, thus no special protective eyewear is necessary.
- A. True
 - B. False
16. Most dental sealants used today are comprised of BIS-GMA dimethacrylate or _____ based products.
- A. initiator
 - B. visible light
 - C. urethane dimethacrylate
 - D. acid etch
17. White sealants contain a small amount of opaquing agent, such as titanium dioxide.
- A. True
 - B. False
18. If salivary contamination occurs the operator should
- A. proceed with the technique
 - B. wash, dry and re-etch the surfaces for ten additional seconds
 - C. apply topical fluoride for extra protection
 - D. All of the above
19. A thin, unpleasant-tasting film of sealant usually remains unpolymerized due to contact with the air.
- A. True
 - B. False
20. Most sealants that are unsuccessful fail within the first year of placement.
- A. True
 - B. False

