Research Update

Clinical Training for School Dental Sealant Programs

Friday August 7, 2020

Dental Sealants Continue to be Underused

- Pits and fissures caries has not kept pace with the decrease of smooth surface caries in children and adolescents.
- “From 1999–2004 to 2011–2016, sealant use increased by about 75% among low-income children and 43% among higher-income children. However, this effective intervention still remains underused. Less than half of children aged 6 to 11 years have dental sealants.”

Barriers to Receiving Sealants

- A California study of third graders showed that their parent's health literacy and English speaking at home were strong predictors of the child receiving dental sealants.
- Institute of Medicine report on dental care access among underserved populations found that low health literacy was a barrier to receiving preventive dental services.
- Children whose parents or guardians have low oral health literacy tend to have more plaque, endodontic treatment and plaque.

Why dentists don't provide sealants

- In general, the resistance of dentists to use sealants stemmed from several sources:
  - Dentists' orientation toward restorations rather than prevention
  - Distrust of the long-term benefits of sealant treatment
  - Perceived economic factors (i.e. reimbursement for restorative tx, not for caries prevention)
  - Lack of confidence in caries risk assessment
  - Concern about inadvertently sealing over caries
  - Schedule does not accommodate

Practice lags behind research

- Researchers have found that:
  - 15% of all clinical practice (medical and dental) is based on sound research.
  - 30-40% of patients do not receive care according to current scientific evidence.
  - 20-25% of medical care provided is not needed or is potentially harmful.

Nothing changes if the systems of care and payments are not aligned with recent research findings.

3 Stages of Prevention

1. **Primary:** Keeps the disease process from becoming established by eliminating causes of disease or increasing resistance to disease.

2. **Secondary:** Interrupts the disease process before it progresses to symptomatic disease.

3. **Tertiary:** Treatment of symptomatic disease to prevent its progression to disability or premature death.

Sealants – Primary & Secondary Prevention

- From a **primary prevention** perspective, anatomic grooves or pits and fissures on occlusal surfaces of permanent molars trap food debris and promote the presence of bacterial biofilm, thereby increasing the risk of developing carious lesions.

- Effectively penetrating and sealing these surfaces with a dental material—for example, pit-and-fissure sealants—can prevent lesions and is part of a comprehensive caries management approach.

Sealants – Primary & Secondary Prevention

- From a **secondary prevention** perspective, there is evidence that sealants also can inhibit the progression of non-cavitated carious lesions.

- The use of sealants to arrest or inhibit the progression of carious lesions is important to the clinician when determining the appropriate intervention for non-cavitated carious lesions.

Regarding Secondary Prevention

To further confirm non-cavitated caries can be sealed:

- Recent research found that caries progression after 12 months, then 2 years, was minimal with use of resin or GI sealants on ICDAS 3 (localized enamel breakdown).
- No statistical difference in caries progression between resin and GI sealant material.

School Dental Sealant Programs

- Are highly effective for delivering sealants to children who might be less likely to receive regular or private dental care.

- For the approximately 6.5 million low-income children who do not have sealants, receiving sealants in a school program could prevent more than 3 million cavities over 4 years and save up to $300 million in future dental treatment costs.

Targeting Elevated Risk Children

- School sealant programs (SSPs) target schools where at least 40% of the students are eligible for the National School Lunch Program.
- Research shows there are a significant number of high-risk students in these schools.
- SSPs are most cost-effective if medium to high-risk students are served. SSPs do not determine individual risk, since school programs are population-based.

Sealants vs. Fluoride Varnish

Are they equally effective?

- Chestnutt, et al. (2017); Results: No significant difference.
- Wright, et al. (2016): Results: The sealant guideline panel recommended sealants over fluoride varnish but with low confidence and encouragement for additional research.

Sealing Buccals and Linguals

- Buccal and lingual pits are the two most frequent surfaces of sealant failures.
- Clinicians tend to avoid sealing these surfaces, which are shallower and difficult to etch.
- However, a national survey found that buccal and lingual surfaces are the second most common caries site for children ages 12–19 (i.e. more common than interproximal mesial/distal).
- Be sure to seal the buccals and linguals and strive to improve retention.

Retention by Surface

3	4	5	12	13	14
79% D / 92% M 83% Ling					94% M / 81% D 78% Ling
89% D / 91% M 79% Bucc					93% M / 87% D 85% Bucc
30	29	28	21	20	19

Oregon Health Authority

Sealing Operculated Molars

- “Sealants should be placed on pits and fissures of children’s and adolescents’ permanent teeth when it is determined that the tooth, or the patient, is at risk of experiencing caries.”
- GI sealants would be a good option for partially erupted, operculated molars.
- If you wait until next year, it may be too late.

Self-Etching Sealant Material

- The bonding of available self-etching sealants is inferior to that achieved with separate etching systems.
- Occlusal sealants applied with self-etch systems show lower retention throughout time than sealants applied in the conventional approach.
- The systematic review concluded that the retention of sealants is higher when applied with the etch-and-rinse system than with the self-etch system.

Fluoride-Releasing Sealants

- "Fluoride-releasing resins were developed to increase caries resistance. They are thought to remineralize incipient caries, but this has yet to be proven clinically."

- "Fluoride-releasing resin sealants cannot be considered as a fluoride reservoir providing a long-term release of fluoride, and, as such, this kind of sealant provides no additional clinical benefit to light-polymerizing resin sealants."

Unfilled vs. Filled Resin Sealants

- For school dental sealant programs, it is important to use less than 10% filled resin sealant material (self-adjusting; no need to adjust with a handpiece).
- Sealants without fillers appear to have better penetration into fissures than sealants incorporating filler particles, due to their lower viscosity.
- Retention for unfilled (64.4%) was better than for filled (53.57%).

Resin and Glass Ionomer (GI)

- The ADA panel was unable to determine superiority of one type of sealant over another owing to the very low quality of evidence.
- Suggests that clinicians take into account retention when choosing the most appropriate type of sealant material.
- If a tooth cannot be isolated (e.g. is operculated), then GI should be used.
- GI may be considered a provisional sealant and must be replaced with a resin-based sealant when better isolation is possible.

Resin and Glass Ionomer (GI)

5-year Retention Rates (two studies)

- Naaman (2017) (literature review)
  - Resin-based = 83.8%
  - GI = 5.2%
- Kuhnisch (2012) (meta-analysis)
  - Resin-based = 83.8%
  - GI = <19.3%

Resin and GI

- Prevents caries
- AGP
- More reliable retention
- Contains BPA
- More familiar material
- Self-adjusting <10% fill
- Technique sensitive

- Prevents caries
- Modified non-AGP technique
- Fluoride releasing
- Fluoride re-charge
- Self-adjusting
- Does not contain BPA

Outcomes

- Retention is a “process” outcome (i.e. research has shown that a retained sealant can be 100% effective).
- Reduction in caries is a true “health outcome.”
- There is the suggestion in the literature that GI sealants reduce cavities even after they can no longer be detected.
- GI might be the better material for sealing partially erupted molars, as well as when salivary contamination cannot be avoided and its important to reduce aerosols.

Fluoride and SDF

- Sodium Fluoride Varnish (NaF; 22,600 ppm): Remineralizes early caries.
- Silver Diamine Fluoride (SDF; 44,800 ppm): Arrests dentine caries.
- ASTDD Dental sealant use is firmly supported for long term caries prevention over the use of SDF.

SDF

- Dental sealants are more effective than SDF for caries prevention in non-cavitated teeth.

- The AAPD SDF panel supports the use of 38% SDF for the arrest of cavitated caries lesions in primary teeth. (***Conditional recommendation, low-quality evidence***)

As of Today…

- Dental sealants are the most effective intervention to prevent dental caries on the occlusals of the permanent molars.
- Fluoride varnish and silver diamine fluoride are not as effective as dental sealants on the occlusals of the permanent molars.

Bisphenol A (BPA)

- Check product components
- Clinpro: “Bis-GMA/TEGDMA resin composite”
- Bis-DMA and Bis-GMA are both produced using BPA as a starting ingredient, so residual BPA not chemically converted into Bis-DMA or Bis-GMA is likely present in trace amounts in any dental material containing these ingredients.
- It is important to have program protocols that specifically address the removal of BPA.
- GI materials do not contain BPA or component materials.

General Information

- **Magnification:** Research findings inconsistent; magnification may be used, but it is not necessary and may not be helpful.
- **DIAGNOdent:** Many sound teeth are misdiagnosed as carious and possibly precluded from sealants.
- **Explorer:** May be used gently to check cleanliness of tooth and texture of tooth surface.
- **Bubbles:** Do not require repair unless at the margin.
- **Curing time:** Follow manufacturer's guidelines; test lights periodically.

Questions?