Care & Maintenance of Dental Restorations

Shelly Withers, RDH, MS; Marilynn Heyde, RDH, MPH
Continuing Education Units: 1 hour


Disclaimer: Participants must always be aware of the hazards of using limited knowledge in integrating new techniques or procedures into their practice. Only sound evidence-based dentistry should be used in patient therapy.

This continuing education course will provide an overview of the various types of esthetic restorations and how to properly care for them. The course will also discuss methods for evaluating and maintaining amalgam restorations.

Conflicts of Interest Disclosure Statement
• The authors report no conflicts of interest associated with this work.

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Overview
The purpose of the course is to provide clinicians with an update of the current literature on dental restoration maintenance. With the variety of dental materials available, it is important for clinicians to understand how to maintain all types of restorations. The course will address the effects of routine preventive procedures on various restorations as well as methods for maintaining amalgam restorations.

Learning Objectives
Upon completion of this course, the dental professional should be able to:
• Discuss the various types of materials used in esthetic restorations.
• Describe the possible damaging effects of routine preventive procedures and the effect of increased bacterial retention.
• Determine appropriate polishing agents for esthetic restorations.
• Evaluate existing amalgam restorations for contraindications to amalgam polishing procedures.
• Recognize that individual state practice acts for dental auxiliaries to perform finishing and polishing procedures may vary.

Course Contents
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• Effects of Preventive Procedures on Dental Restorations
• Care Considerations for Esthetic Restorations
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Introduction
Dental hygienists play an important role in the maintenance of dental restorations. The dental hygienist has the opportunity to evaluate the condition of restorations at dental hygiene recare appointments, as well as the responsibility to properly maintain them. The challenge is maintaining the appearance of the restorations without damaging them in the process. Especially, with esthetic restorations that closely match the appearance of natural teeth.¹

This course will discuss the effects of common preventive procedures on esthetic restorations and the increased possibility of bacterial retention as a result. Tips for maintaining esthetic restorations will be discussed and suggestions provided for alternatives to regular prophylaxis paste. Indications and contraindications for performing finishing/polishing procedures on amalgam restorations will be covered.

Types of Materials Used in Esthetic Restorations
The demand for esthetics in dentistry has created an amazing variety of ceramic, composite and porcelain restorative materials that are available for dental restorations (Table 1). For instance, ceramic restorations are so natural looking that even the dental professional may need to carefully evaluate what they observe in the patient’s mouth. While ceramic restorations have a natural appearance and are pleasing esthetically, there are also limitations that must be considered when the restorations are placed. Ceramics are quite strong, but the occlusal forces of mastication, bruxism,
Evaluation of marginal and occlusal integrity of esthetic restorations is an integral part of the care dental hygienists should provide at each recare appointment.

There are various types of restorations that the dental professional may observe in a typical day. They range from slightly radiopaque to completely radiopaque on a radiographic image. Figure 1 shows an example of the following restorations:

- Tooth #13 exhibits a CEREC ceramic restoration comprised of lithium disilicate.
- Tooth #14 has a PFM (porcelain-fused-to-metal) restoration and gutta percha in the root canals from endodontic therapy.
- Teeth #15, 18 and 19 have been restored with gold crowns and have smooth contours that follow the anatomical crown closely.

**Effects of Preventive Procedures on Dental Restorations**

Many patients receive preventive dental hygiene procedures twice a year and periodontal maintenance procedures up to four times per year. The instrumentation technique and products selected by the dental hygienist can be beneficial or detrimental to the patient's dental restorations. The dental hygienist needs to identify the restorative materials that are present before starting treatment. Restorations can be identified through reviewing radiographs, tactile detection and applying air to the surface of the restoration. Often times, a black line of metal may be apparent when an explorer is used on the restoration. Esthetic restorations may also reveal a dry, chalky appearance when air is applied.

Preventive and maintenance procedures are often performed using a combination of hand and ultrasonic instrumentation, followed by polishing.

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**Table 1. Restorative Materials Used in Esthetic Restorations.**

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Ceramic</td>
<td>Glass-based and crystalline-based restorative material, Lucite, lithium disilicates, alumina-based and zirconia-based ceramics are most widely used.</td>
</tr>
<tr>
<td>Composite</td>
<td>Resin restorative material categorized by particle sizes, Nanofilled contain the smallest particles and macrofilled contain the largest, Packable and flowable types are available.</td>
</tr>
<tr>
<td>Porcelain</td>
<td>Made of ceramic fired at high temperatures, Restorations may be all porcelain or porcelain-fused-to-metal (PFM).</td>
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It is important to use the combination that will be most effective for deposit removal, while causing the least amount of damage to restoration and tooth structure. There is conflicting evidence regarding the effect of scaling with hand instruments versus ultrasonic instrumentation and the amount of tooth structure that is lost in each case. Some studies report that scaling with hand instruments produces greater loss of tooth substance. However, other studies indicate that there is not a significant difference in the amount of tooth structure lost when comparing hand and ultrasonic instrumentation.

There is potential for instrumentation with ultrasonic scalers and hand instruments to damage composite restorations (hybrid and microfilled), glass ionomers, laminate veneers and titanium implant abutments. When using ultrasonic instrumentation, the clinician needs to follow the safe practices of establishing proper water flow to prevent overheating, proper power needed for deposit removal, and proper adaptation of the side of the tip. Ultrasons have the potential to alter the margins of amalgam restorations and fracture porcelain. In order to avoid damaging the restoration, the tips of scalers should never be directed into the junction where the enamel and restorative material meet.

For clinicians who prefer to use air polishing systems, recent research shows air polishing may be more effective at plaque and stain removal than polishing with rotating cups and abrasive pastes. Sodium bicarbonate powders have been used traditionally. However, there are additional agents available for use with air polishers. These include glycine, calcium sodium phosphosilicate, calcium carbonate and aluminum trihydioxide powders. Clinicians should be familiar with the properties of each agent and understand the manufacturers’ respective recommendations. For example, due to the surface alterations that were observed visually and with a Scanning Electron Microscope, aluminum trihydioxide powder should be avoided on resin composites, resin-modified composites and around the margins of cemented restorations. In general, dental hygienists should avoid the use of air polishers on composite restorations.

Fluoride application is beneficial for preventing recurrent decay near dental restorations. According to Artopoulou et al., 1.1% sodium fluoride (NaF) is the preferable choice for esthetic restorations. Sodium fluoride has been shown to cause less stain and deterioration of porcelain surfaces than 0.4% stannous fluoride (SnF₂). Dental hygienists should also avoid the use of acidulated phosphate fluoride, which may cause alteration of the filler particles and discoloration of the resin. If fluoride mouthrinses are recommended for home care, avoid suggesting rinses that contain alcohol, which acts as a solvent for the BIS-GMA resin. This results in softening the material, which can increase roughness and stain.

The use of CAD/CAM (computer-aided design and computer-aided manufacturing) restorations within dental practices has increased and dental hygienists will need to be familiar with their characteristics in order to properly maintain them. Some materials, such as e.max CAD lithium disilicate ceramic, have good abrasion resistance, but prophylactic pastes produced a reduction in translucency. In order to keep the restoration looking new and as natural as possible, it is important to follow manufacturers’ recommendations regarding the appropriate product to use for maintaining the restoration.

**Care Considerations for Esthetic Restorations**

Dental professionals need to have an understanding of how to properly maintain and care for the patient’s restorations. Through the years it has been maintained that polishing should be “selective” to remove the stain the clinician was not able to remove during scaling. The theory was that polishing was performed for esthetic purposes. However, with the new generation of polishing pastes there has been a paradigm shift that polishing can also be considered therapeutic.

The evidence suggests that conventional prophylaxis pastes have the potential to increase the surface roughness of resin composite, hybrid ionomer and compomer restorative materials. According to Warren et al., routine polishing during prophylaxis should be avoided. However, the clinician must evaluate the needs of the patient and form an individualized care plan with the evidence-based information to provide the ultimate care to the patient.
Manufacturers are developing prophy pastes that are safe to use on the new esthetic restorations. This new generation of prophy pastes that contain either Calprox, aluminum oxide, or xylitol and fluoride can be used safely on esthetic restorations when the “fine” grit is selected. The desensitizing paste is perfect for the patient who might be experiencing sensitivity and biofilm accumulation near the cervical restoration. These pastes contain 8% arginine and calcium carbonate and are safe to use on resin composite, porcelain, amalgam, gold and dental enamel.

Proper adaptation of instruments is crucial in order to prevent scratches, fractures, or chips on the teeth and/or dental materials. Scaling procedures should be performed carefully, and sites that are rough following the procedure may have to be re-polished to prevent plaque accumulation. Any areas of roughness will increase bacterial adhesion. Research has shown a positive correlation between surface roughness and the amount of S. mutans that adheres to the restoration.

**Maintenance of Amalgam Restorations**

Amalgam restorations that have been present in the dark, warm, acidic environment of the mouth may be prone to tarnishing and corrosion. Tarnish is a surface discoloration resulting from poor oral hygiene, dental biofilm, acidic foods and sulfides. Corrosion is deterioration caused by chemical or electro-chemical reactions. Marginal corrosion can lead to recurrent caries and appears as a bluish-black area around the restoration.

Finishing and polishing refers to the removal of marginal irregularities, the definition of anatomic contours and the smoothing away of any surface roughness. Not only are finished and polished amalgams less prone to plaque retention, they also have greater resistance to the effects of corrosion and tarnish. A study by Cardoso et al., showed existing amalgam restorations (with no visible defects) that had previously been slated for replacement, were no longer perceived as needing replacement after finishing and polishing procedures were performed on the amalgam restoration.

When evaluating amalgam restorations for their suitability for finishing and polishing procedures, there are several items that need to be considered.

First, there must not be any recurrent caries or fractures in the restoration or surrounding tooth structure. Second, a proximal contact must be present. Third, amalgams should only be polished if the anatomy can be maintained or improved. For example, deep occlusal anatomy or marginal ridges that are below the plane of occlusion cannot be improved. Finally, if all margins can be contoured to be continuous and smooth with the cavosurface margin, the amalgam can benefit from the finishing and polishing procedure.

Restorations with open margins or large voids at the cavosurface margin are contraindicated for finishing and polishing procedures (Figure 3). A restoration that has gross overhangs, or is present on a tooth that is treatment planned for extraction or a crown, is not a good candidate for the finishing and polishing procedure.

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**Figure 3.** Margins of the amalgam restoration on #18 are breaking down and in need of replacement. Thus, the amalgam would not be a good candidate for the finishing and polishing procedure.

**Figure 4.** Radiographic image of the patient in Figure 3 after placement of an MO CEREC restoration on tooth #18. Images courtesy of Dr. Luke Iwata, Loma Linda, CA
**Conclusion**

Dental hygienists must understand the composition and properties of esthetic and restorative materials and their respective biocompatibility. Individualized plans should be developed when providing preventive procedures that are based on patient health and restorative needs. Dental hygienists should closely monitor restorations for signs of wear and the need for replacement. For instance, it can be beneficial to polish the amalgam before replacing restorative materials. Make sure to document your findings and communicate them with the dentist, so that together, you can take excellent care of your patient’s dental restorations.
Course Test Preview
To receive Continuing Education credit for this course, you must complete the online test. Please go to:

1. The dental hygienist has the responsibility to evaluate and properly maintain dental restorations.
   a. True
   b. False

2. Leucite and lithium disilicate are commonly found in composite esthetic restorations.
   a. True
   b. False

3. Dental restorations can be identified through:
   a. Radiographic images
   b. Tactile detection
   c. Applying air to the surface of the restoration
   d. All of the above.

4. When using the ultrasonic, all of the following are considered safe practices, except one. Which one is the exception?
   a. Proper adaptation of the side of the ultrasonic tip
   b. Direct tip of the ultrasonic scaler into the junction where enamel and restoration meet
   c. Establish proper water flow to prevent overheating
   d. Establish proper power for effective deposit removal

5. Aluminum trihydroxide is an abrasive agent that should be avoided on:
   a. Resin composites
   b. Resin-modified composites
   c. Margins of cemented restorations
   d. All of the above.

6. Which fluoride application is the preferred choice for esthetic restorations?
   a. 0.4% Stannous Fluoride (SnF2)
   b. 1.1% Sodium Fluoride (NaF)
   c. Acidulated Phosphate Fluoride (APF)
   d. All of the above.
   e. None of the above.

7. Conventional prophylaxis paste does not increase surface roughness on resin composite restorative materials.
   a. True
   b. False

8. What was the original powder used in air polishing systems?
   a. glycine
   b. calcium sodium phosphosilicate
   c. aluminum trihydrdoxide
   d. Sodium bicarbonate
9. Which of the following products works well as an alternative to regular prophylaxis paste?
   a. Desensitizing paste with 8% arginine and calcium carbonate
   b. Specialty pastes created for esthetic restorations
   c. Fine polishing paste with xylitol and fluoride
   d. All of the above.
   e. None of the above.

10. What term is used to describe deterioration of amalgam restorations caused by chemical or electro-chemical reactions?
    a. Tarnish
    b. Pitting
    c. Corrosion
    d. Staining

11. It is acceptable to polish amalgam restorations that have recurrent caries present.
    a. True
    b. False

12. Which of the following conditions are contraindications for finishing and polishing procedures on amalgam restorations?
    a. Open margins
    b. Large voids at the cavosurface margin
    c. Gross overhangs
    d. Teeth that are treatment planned for extraction
    e. All of the above.

13. It is the dental hygienist’s responsibility to document their findings and report them to the dentist.
    a. True
    b. False

14. What is the restorative material used on tooth #15?
    a. Gold
    b. Amalgam
    c. Cerec
    d. Composite
15. What is the restorative material used on tooth #13?

a. Gold  
b. Amalgam  
c. Porcelain  
d. Composite
References


About the Authors

Shelly Withers, RDH, MS
Shelly Withers is an Assistant Professor at the Loma Linda University School of Dentistry where she teaches classes in research and radiology. She obtained a Master of Science degree in Health Professions Education in 2007 and a Bachelor of Science degree in Dental Hygiene from Loma Linda University in 2000. Her research interests include caries assessment technology, remineralization techniques and educational psychology. She is a member of Sigma Phi Alpha National Dental Hygiene Honor Society, ADHA and ADEA.

Marilynn Heyde, RDH, MPH
Marilynn Heyde is a graduate from Loma Linda University in 1974 with a BS in Dental Hygiene. In 2000, Marilynn completed a Master’s in Public Health Education. Marilynn’s career has included private practice, public health dental education, and dental hygiene education. At this time, Marilynn is an Associate Professor at Loma Linda University, teaching dental hygiene students preclinical courses and anesthesia. Marilynn has taught dental hygienists a variety of courses in the field of dental hygiene over the past 15 years.

Email: mheyde@llu.edu