

# **PRACTICAL INFECTION CONTROL FOR DENTAL SEALANT PROGRAMS IN A PORTABLE DENTAL CARE ENVIRONMENT**

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## **I. INTRODUCTION**

The global HIV epidemic has increased awareness in the dental community of the importance of proper infection control practices. The goal of these practices should be preventing disease transmission, especially bloodborne diseases. My task today is to apply the general principles<sup>1, 2</sup> of infection control to dental sealant programs, particularly, in those environments where portable dental equipment is used, i.e., not in dental offices, but in "field" situations.

There are two facts that I would like to make clear at the outset on this presentation:

1. for infection control purposes, the application of dental sealants to any patient is considered dental treatment, and
2. that infection control practices recommended for the provision of dental services are also recommended for any type of dental sealant procedure, whether performed in a private dental office or in the portable dental care environment ("field").

I would also like to point out that infection control is a two-way street: it is for the protection of the patient, and it is for the protection of the DENTAL HEALTH CARE WORKER.

I want you all to know that I have done homework for this presentation: I personally visited a number of dental sealant programs, which are under the auspices of city and county dental health departments. I observed the environment in which some of these sealant programs operate; in school gyms, auditorium stages, and classrooms, where, in many instances, running water is not conveniently located to the operation, temperatures cannot be controlled (no air conditioning), and space is at a premium. But I am also aware of the dedication of staff members, their concern for proper dental sealant techniques, and desire to adhere to the most current infection control recommendations.

## II. PRINCIPLES OF INFECTION CONTROL, WITH APPLICATION OF THESE PRINCIPLES OF INFECTION CONTROL TO THE DENTAL SEALANT PROGRAM

All practices to minimize transmission of bloodborne disease are based on four basic principles of infection control<sup>2</sup>:

1. Take action to stay healthy;
2. Avoid contact with blood;
3. Limit the spread of blood;
4. Make objects safe for use: by objects, I mean dental instruments and operatory equipment.

Understanding and using these principles will provide a sound basis for decision making. All members of the dental sealant program team should be familiar with these principles and other written guidelines for infection control practices, namely:

1. Recommended Infection-Control Practices for Dentistry, 1993<sup>1</sup>, which was published last May; and
2. The Dental Infection Control File, 1993<sup>2</sup>, which includes an infection control handbook that outlines practical decontamination procedures in the dental office. Adherence to effective infection control principles minimizes the risk of disease transmission.

### PRINCIPLE 1.

#### Take action to stay healthy

It is important that all persons take positive steps to maintain their own health. This is especially true for persons working in any health-care setting, including the oral health-care setting.

##### *A. Protect yourself with immunizations.*

Immunizations will reduce your risk of becoming infected and, indirectly, protect subjects from infection; again, this is a two-way street.

1. Hepatitis B virus (HBV) immunization: Because contact with blood, or saliva contaminated with blood is anticipated, the dental hygienist who places the sealants and dental personnel who

handle contaminated instruments should be immunized for HBV<sup>3</sup>.

2. Other immunizations: If these sealants are placed during the (winter) "flu" season, immunization against influenza may be wise. Because your patients usually are children, immunization against the childhood diseases (e.g., measles, mumps, rubella, polio) is recommended for personnel who are not already immune.

##### *B. Wash your hands.*

What are the ten offenders in disease transmission in health care settings? [HOLD UP YOUR TEN FINGERS] Your hands can spread the microorganisms that may cause disease. Hand washing removes the microorganisms you may pick up from touching patients and contaminated instruments or surfaces. Handwashing protects you and the next patient you will treat. Hands **always** should be washed:

- Before each patient
- After each patient (completion of sealant placement)
- Before putting on gloves
- After removing glove
- Between patients

It is not necessary to use "special" soap for hand washing. It is important that you lather your hands well with soap and rub them vigorously for at least ten seconds before rinsing them under a stream of water. They should then be dried with a single-use disposable towel. **Antimicrobial-containing products that do not require water for use, such as foams or rinses, can be used in areas where soap, water, and sinks are unavailable.**<sup>4</sup> These products are sometimes referred to as "waterless handwashing products," and have been reviewed and cleared for marketing by the Food and Drug Administration (FDA); they are available through hospital supply companies.

If soap, water, and sink are unavailable, and, an antimicrobial foam also is unavailable, I realize that some DHCWs might consider use of a generic disposable towelette ("Baby Wipes"); these towelettes, are lightly moistened with a bit of soap, alcohol, and water. While there is no guarantee of germicidal action, the objective of the disposable towelette is to remove at least a portion of the transient microbial population. **CDC does not**

**recommend that you use these disposable towelettes when dental treatment such as placement of dental sealants is being performed on a patient.**

## **PRINCIPLE 2.**

### **Avoid contact with blood**

#### *A. Wear Protective coverings.*

1. Gloves: (and we are referring to dental examination gloves) Because the operator may anticipate contact with blood, blood contaminated with saliva, or the patient's oral mucous membrane, gloves should be worn for all dental treatment procedures. A pair of gloves is to be used on a single patient, and should never be reused or come in contact with another patient. Use a new pair of gloves for each patient. And remember! Hands must be washed and dried before putting on new gloves. Washing examination gloves before or after use may damage them and actually increase the flow of liquid through undetected holes in the gloves. Gloves are not designed to be disinfected or sterilized for reuse; they are "single-use disposables."

Discuss oil-based products in hand creams; use water-based; but it's OK to place petroleum jelly on patient's lips prior to sealant application; jelly is on only for a short time.

2. Facial protection: Because spatter of patient oral fluids can be anticipated, such as when a dental prophylaxis is given, or when compressed air is being used to dry the teeth before the sealant is applied, wear a chin-length face shield, or a surgical mask and protective glasses or goggles.

This spattered material may get into your eyes, mouth, or nose, where mucous membranes may provide a portal of entry for microorganisms. You should also wear facial protection while cleaning instruments or when disposing of contaminated fluids.

3. Protective clothing: Protect your street clothes from contamination by covering them with a gown or coat, or by wearing a uniform. Long sleeves and a high neck will provide the most protection. Change these work clothes at least daily, or more often if soiled, especially if they become visibly contaminated with blood. When removing visibly contaminated clothing, fold the soiled area inside, being careful not to contaminate your hands. Put soiled clothing into a laundry or plastic bag and keep it in that bag until it is laundered.

#### *B. Avoid injuries.*

1. Handle sharp instruments with care: Use extreme care to avoid injuries when handling dental

instruments, such as explorers and probes that are sharp and can easily pierce or cut your skin. During cleanup, all personnel should wear sturdy utility gloves and use extreme caution when picking up sharp instruments. For instance, these sharp instruments should not be picked up by the handful.

2. Have a written policy for injuries: Every dental sealant program should have a written policy for the management of injuries.

## **PRINCIPLE 3.**

### **Limit the spread of blood**

#### *A. Limit the spread of blood and blood contaminated with saliva.*

Blood, and saliva contaminated with blood, can be spread during sealant application and during cleanup. Use techniques that prevent the unnecessary contamination of any area.

1. Set up the operatory before beginning treatment: Because the treatment of each patient will be very similar, you should be able to plan ahead and anticipate the needs of your patients. If you have to get or rearrange supplies and equipment after you have contaminated your gloved hands, you may spread microorganisms to surfaces that should be kept clean. Use disposable items and unit dose materials whenever possible. I have seen many disposable items, including: trays, mixing wells for mixing the monomer and polymer, acid etch applicator; as well as single unit dose acid etch.

2. Minimize splashes and spatter: Splashes and spatter may directly contaminate items with blood and saliva contaminated with blood. This contamination may occur both during and after sealant placement.

During treatment, you can minimize spatter of blood and blood-contaminated saliva by using cotton rolls (in a cotton roll holder), high-velocity evacuation and proper patient positioning. I have noticed that many dental sealant programs employ a technique of having the patient brush his/her teeth before sealant application, in lieu of cleaning the teeth with a prophylaxis and paste. Advise the patient to keep his/her mouth closed so that spatter is not generated from the brushing. It is also a good idea to place the used toothbrush in a plastic bag for the patient to take home.

3. Be careful not to splash contaminated solutions during cleanup. Blood, and saliva contaminated with blood, can be spread by anything that has been in a patient's mouth. Use techniques that prevent the unnecessary contamination of any area or object. When you clean instruments, don't spatter blood-contaminated water outside the sink area. When you

rinse instruments, don't use a stream of water forceful enough to cause splashing. Hold the instruments at an angle that doesn't cause water to splash onto you, the counters, walls, or floors. Because ultrasonic cleaners create spatter, always cover them during operation to contain the spatter.

#### *B. Cover surfaces that can't be decontaminated easily.*

Surfaces that are likely to become contaminated can be covered with impervious (waterproof) materials while they are still clean. You can either cover a surface before it becomes contaminated or leave it uncovered and disinfect it after treatment. To decide, consider how likely it is to become contaminated, the cost of disposable coverings, and the time saved by not having to decontaminate the surface. Disinfection of some surfaces, such as light handles, hand-operated chair controls, and suction hoses, can be time consuming and difficult. Consider covering these surfaces. Use a disposable waterproof covering. Clear plastic wrap, aluminum foil, or paper with an impervious backing are all types of coverings that can be used for this purpose.

Whether to cover before treatment or to disinfect afterward is up to you. If you decide not to cover a surface, make sure that you can disinfect it thoroughly and adequately. Change the covering after each patient if it has been touched during treatment or has been contaminated by spatter. When changing the covering, do the following: remove the soiled covering while you are still gloved, remove your gloves and wash your hands, recover the surface with clean material (and, wash your hands once again before putting on new gloves for the next patient).

#### *C. Handle waste and soiled linens properly.*

Handle waste and soiled linens in a way that will protect you, your patients, and persons outside the dental sealant treatment area (like school administrators, teachers, and children not being treated) from potentially infectious hazards and from being offended by unsightly waste.

1. Medical waste: You should consider materials that are soaked with blood, oral tissues, and suctioned fluids as potentially infective medical waste. In general, if the waste is solid, it should be either incinerated or autoclaved before disposal in a sanitary landfill. If the waste is liquid, it can be poured down a drain that is connected to a sanitary sewer system. Local laws may vary, however, and you should follow your State and local regulations for disposal of medical waste.

2. Disposable sharp objects: Because disposable sharp items, such as needles and disposable scalpels,

are generally not used in a sealant program, you probably will not have to deal with these items.

3. Solid waste: Other solid waste, such as blood-contaminated gauze, cotton rolls, disposable gowns, and masks, should be well-secured in a sturdy leakproof plastic bag. When putting waste into a bag (a "red bag" with biohazard label), take care not to contaminate the outside of the bag. If you do accidentally contaminate the outside, place the bag in a second, clean bag. Waste should be disposed of according to the requirements of local or State environmental regulatory agencies. Consult with these agencies before disposing of such material.

4. Nondisposable linens and protective clothing: Risk of transmission of any microorganisms from soiled linens and clothing is very low. Therefore, hygienic handling and properly secured storage, followed by thorough laundering, are the goals for soiled linens and protective clothing. Handle soiled linen or protective clothing as little as possible to prevent contamination of the air and of persons who handle soiled linens. Before laundering, wear gloves while handling soiled linens and protective clothing. Then, after handling remove gloves and wash your hands.

Wash soiled linens and protective clothing in hot or cold water according to the directions on the label of the detergent product. Use of laundry additives, such as bleach and fabric softeners, is optional. Use normal washing and drying cycles, according to the instructions of detergent and machine manufacturers. Washing and drying will remove or kill potentially harmful microorganisms, including viruses. The heat from ironing also can kill microorganisms.

5. Liquid waste: Whenever you are handling blood, suctioned fluids, or other liquid waste, wear gloves; other protective barriers (such as a face shield) may be appropriate if splashing of patient material is anticipated. Liquid that is collected by blood-collection and high-velocity evacuation systems is contaminated with blood. Liquids contaminated with blood may be poured into a drain or toilet that is connected to a sanitary sewer system.

### **PRINCIPLE 4.**

#### **Make instruments and equipment safe for use**

##### *A. Know how the decontamination processes differ*

1. There are three decontamination processes: Cleaning; Sterilization; and Disinfection:

a. *Cleaning* - you physically remove debris and reduce the number of microorganisms present.

Cleaning is the basic first step of all decontamination. You always need to clean before you sterilize or disinfect. For items that do not require sterilization or disinfection, thorough cleaning with soap and water is all that is necessary.

- b. *Sterilization* - Sterilization is a process that kills all microbial life. It kills bacteria] spores, which are the most difficult form of microorganism to kill. This is significant because if you use a process that kills large numbers of bacterial spores, you will also kill all other types of microorganisms. You will kill the organisms that cause tuberculosis, hepatitis B, AIDS, and a variety of other infections.
- c. *Disinfection* - Disinfection is a process that kills disease-causing microorganisms, but not necessarily all microorganisms. Nonpathogenic microorganisms may remain on an object after you have disinfected it. How many and what kind of microorganisms you can kill with disinfection depends on what level of disinfection you use.

2. There are three levels of disinfection: low, intermediate, and high.

- a. *Low-level disinfection* is the least effective disinfection process. It does not kill bacterial spores or *Mycobacterium tuberculosis* var. *bovis*, a laboratory test microorganism that is used to classify the strength of disinfectant chemicals.
- b. *Intermediate-level disinfection* is a disinfection process that does kill *M. tuberculosis* var. *bovis*. This is significant because it is among the most resistant of the microorganisms that do not form spores. If you use a process that kills *M. tuberculosis* var. *bovis*, you will also kill organisms that are much easier to kill, such as the ones that cause hepatitis B and AIDS.
- c. *High-level disinfection* is a disinfection process that is capable of killing some, but not necessarily all, bacterial spores. This powerful process will also kill *M. tuberculosis* var. *bovis*, as well as other bacteria, fungi, and viruses.

3. The difference between sterilization and high-level disinfection: Sterilization kills every microorganism on the object that is sterilized. High-level disinfection kills the same types of microorganisms - including spores - but isn't as thorough. It will kill some spores, but not large numbers of them.

### B. Choose the right way to decontaminate

The choice of how to decontaminate anything should be based on *how it will be used*. Everyone on the dental sealant team should know how to choose the correct decontamination process.

1. How to choose the right way to decontaminate: To know which decontamination process you should use, apply the following "rules":

- If an instrument will penetrate tissue or touch bone, **STERILIZE** it.
- If an instrument will touch mucous membranes but will not penetrate tissue or touch bone, **STERILIZE** it if it will not be damaged by heat. If it will be damaged, **USE HIGH-LEVEL DISINFECTION**.
- For instruments and devices that will *not* be used in the mouth, and that will touch only intact skin, **USE INTERMEDIATE- OR LOW-LEVEL DISINFECTION**. The level of disinfection you use depends on whether the items are visibly contaminated with blood.
- For equipment surfaces that may contact intact skin, and for housekeeping surfaces (e.g., countertops, floors, walls), **USE INTERMEDIATE- or LOW-LEVEL DISINFECTION**. You may also use **SIMPLE CLEANING** - clean with an appropriate cleaning agent and water as necessary. The level of disinfection you use depends on whether the surfaces are visibly contaminated with blood.

2. Another way to remember the "rules": The names critical, semicritical, and noncritical have been given to the three ways items contact patients.

- Instruments that will touch bone or penetrate soft tissue are called **CRITICAL**. Scalars are examples of critical items.
- Instruments that will touch mucous membranes but will not touch bone or penetrate soft tissue are called **SEMICRITICAL**. Mirrors and cotton roll holders are examples of semicritical items.
- Instruments and devices that will not be used in the mouth, and that will touch only intact skin are called **NONCRITICAL**.
- Equipment surfaces and housekeeping surfaces also are considered **NONCRITICAL** surfaces.

3. With these shorthand names - CRITICAL, SEMICRITICAL, and NONCRITICAL - you can state the rules more simply:

- Sterilize all critical instruments and those semicritical instruments that are not damaged by heat. Heat sterilization methods are preferable.
- Use high-level disinfection ONLY on semicritical instruments that are damaged by heat,
- Use intermediate- or low-level disinfection on noncritical instruments or devices.

- Use intermediate- or low-level disinfection or simple cleaning with soap and water on equipment and housekeeping surfaces.

Cleaning alone will be sufficient for most noncritical items that are not contaminated by blood — noncritical instruments and devices, as well as equipment and housekeeping surfaces. You also could use low-level disinfection for these items. When an item is visibly contaminated with blood, choose intermediate-level disinfection.

Both types of NONCRITICAL ITEMS — instruments and devices, as well as equipment and housekeeping surfaces — will be treated as one category. All are similar, because they are not used in the mouth, and are decontaminated with the same method.

The following chart summarizes these “rules.”

SUMMARY OF METHODS FOR DECONTAMINATION IN THE DENTAL OFFICE				
CATEGORY	DEFINITION	USED IN THE MOUTH	RISK OF DISEASE TRANSMISSION <sup>1</sup>	METHOD OF DECONTAMINATION
CRITICAL	Touch Bone or Penetrate Tissue	Yes	Very High to High	Sterilization
SEMICRITICAL	Touch Mucous Membranes, but Will Not Touch Bone or Penetrate Tissue	Yes	Moderate	Sterilization or High-Level Disinfection
NONCRITICAL	Contact with Intact Skin	No	Low to None	Intermediate to Low-Level Disinfection or Simple Cleaning <sup>2</sup>

1. Depends on the nature and the amount of contamination and how the item or surface is used.
2. Depends on whether or not the items are visibly contaminated by blood.

*C. When you decontaminate, do it right*

To make contaminated items safe for use, you must not only choose the right process, you must also make sure that you do it properly.

1. **STERILIZATION:** Between patients, you should use a heating process capable of sterilization (i.e., steam under pressure [autoclaving], dry heat, or heat/chemical vapor) for all:

- low-speed handpiece components used in the mouth
- reusable prophylaxis angles

You should follow the manufacturers’ instructions for cleaning, lubrication, and sterilization procedures. Wiping or soaking in liquid chemical germicides is not an acceptable method for decontaminating these items.

2. DISINFECTION: How to tell which chemical to use:

a. *Sterilization and High-Level Disinfection.*

If “sterilant/disinfectant” and the word “sporicidal,” (kills spores) are on the label, you can use the same concentration of the chemical for either sterilization or high-level disinfection. Generally, eight to ten hours immersion is required for sterilization; 10 to 20 minutes for high-level disinfection. The contact time is the important difference to notice. Follow the instructions on the label.

This SLIDE illustrates the label for a disinfectant/sterilant we “invented.” The name KILZALL emphasizes that it kills spores and is used for sterilizing or high-level disinfection *only* on instruments that are sensitive to heat. This type of powerful chemical is *never* to be used on environmental surfaces.

b. *Intermediate-Level Disinfection:* Look for the terms “tuberculocidal” and “hospital disinfectant” on the label of any chemical you use for intermediate-level disinfection. This SLIDE illustrates the label for a tuberculocidal hospital disinfectant we “invented.” We named our fictitious chemical KILZALOT to emphasize what to look for when reading a label of this class of chemical. KILZALOT is used for intermediate-level disinfection of environmental surfaces. This type of chemical is not for use on between-patient processing of dental instruments.

c. *Low-Level Disinfection:* Notice that our fictitious KILZAFEW label (on this SLIDE) shows its EPA registration as a “hospital disinfectant,” but does not indicate that it is tuberculocidal (that it inactivates *M. tuberculosis* var. *bovis*). In fact, the label states that it may not produce thorough disinfection in the presence of *M. tuberculosis* var. *bovis*. Because it is the least powerful of the hospital disinfectants, KILZAFEW is used for low-level disinfection of environmental surfaces. Similar to the “KILZALOT” product, it is not for use on dental instruments.

3. What to do when you can't apply the “rules”:  
The design of some dental equipment makes it difficult or impossible to decontaminate it adequately. Both the material an item is made of and the texture of its surface can make it difficult to apply the “rules.”

There may be ways to avoid having to decontaminate items with irregular surfaces that cannot be cleaned and disinfected easily. Some items, such as prophylaxis angles, cups and brushes, saliva ejectors, and tips for air/water syringes, are available in a disposable form and *must* be thrown away after use. You should use these items for one patient only because these items are neither designed nor intended to be cleaned, disinfected, or sterilized for reuse.

Others, such as light handles and hand-operated chair controls, can be covered to avoid contamination altogether. Still others, however, such as light-curing wands, are not disposable and cannot be covered. The manufacturers of particular pieces of equipment or material are the best sources of information for decontaminating these items.

4. Let's see if I can summarize here:

a. Instruments: Instruments should be either:

1. single-use disposable; they should be used for one subject only and discarded appropriately; OR
2. heat-tolerant; they should be cleaned and then treated between patients by a heating process capable of sterilization (e.g., steam autoclave or dry-heat sterilizer).<sup>1</sup> If cleaning and sterilization facilities are unavailable at the dental sealant site, contaminated instruments should be stored and transported to the appropriate facility in a rigid, covered container.

b. Surfaces contaminated during treatment that cannot be easily cleaned and disinfected:  
Light handles and hand-operated chair controls are examples of these surfaces. Where applicable, a disposable waterproof covering, such as plastic wrap, could be used. (One program I saw used baked-potato foil to cover the light handle.) If the covered surfaces are either touched by any member of the dental sealant team or contaminated with the patient's oral fluids, the coverings should be changed before the patient is seen.

c. Surfaces contaminated during treatment that can be easily cleaned and disinfected:  
Countertops and dental chairs are examples of these surfaces. If uncovered surfaces are either touched by any member of the dental sealant team or contaminated with the subject's oral fluids, the surfaces should be cleaned and then disinfected using an appropriate proprietary germicide registered with the Environmental Protection Agency (EPA) or sodium hypochlorite (common household bleach) diluted 1: 100, before the next patient is seen.

### III. PROBIEMS

In carrying out dental infection control procedures in the dental sealant program, there are usually many problems in logistics, such as:

1. Is the only available sink in the rest room? Is there a sink available?
2. Is there a place to clean and sterilize, or do you have to transport instruments to another building?
3. Is an ultrasonic cleaner available, or do you have to scrub instruments by hand?
4. How can you control the temperature of the room (auditorium, stage)? (use of fans to keep the area cool); and,
5. What is your budget? Cost containment?

Public health professionals responsible for dental sealant programs should remember basic principles that can be applied whatever the particular situation in the field. Specific decisions should be based upon the four principles of infection control:

1. Take action to stay healthy;
2. Avoid contact with blood;
3. Limit the spread of blood;
4. Make objects safe for use.

### REFERENCES:

1. CDC. Recommended infection-control practices for dentistry, 1993. MMWR 1993;42, No.RR-8.
2. US Department of Health and Human Services. Dental infection control file, 1993: practical infection control in the dental office. Atlanta, GA/Rockville, MD: CDC/FDA, 1993. (Available through the National Technical Information Services, Springfield, VA; document: PB 94113990).
3. CDC. Guidelines for prevention of transmission of human immunodeficiency virus and hepatitis B virus to health-care and public-safety workers. MMWR 1989;38(suppl. No. S6):1-37.
4. Garner JS, and Favero MS. Guidelines for handwashing and hospital environmental control, 1985. Atlanta, GA. CDC, HHS publication No. 99-1117.

### IV. INNOVATIONS

- A. Self-contained water systems, with air compressor, for water, air and suction.
- B. Use paper plates as a bracket table cover; holds all instruments and supplies.
- C. Use meat tray as a bracket table cover; place everything you need for the sealant application, and place into a head rest cover.
- D. Paper towels as dental bibs.

### V. AUDIENCE PARTICIPATION

Now that you know everything that there is to know about infection control in the application of dental sealants, let's test your knowledge by showing a few slides of situations and ask you how you would solve them:

SLIDE 35:  
SEALANT APPLICATION INSTRUMENT No. 1

SLIDE 36:  
SEALANT APPLICATION INSTRUMENT No.2

SLIDE 37:  
MIXING MONOMER WITH POLYMER; DISH

SLIDE 38:  
LIGHT CURING MACHINE