

NEW CDC GUIDELINES FOR SELECTED INFECTION-CONTROL PROCEDURES

BY: DR. CHRIS MILLER

The success of infection control cannot always be monitored on a routine basis in a dental office; mistakes and oversights can go unnoticed. Thus it is very important that infection-control procedures are performed correctly and that appropriate products and equipment involved are selected and used as directed by the manufacturers.

The new Centers for Disease Control and Prevention (CDC) guidelines for infection control in dentistry¹ present a comprehensive list of these procedures. This article will highlight what is new in the guidelines concerning hand hygiene, surface asepsis, dental-unit water asepsis, and instrument processing. For a complete description of the guidelines along with scientific verification, you are encouraged to review other published material.¹⁻³

Hand Hygiene

There are several new CDC guidelines that relate to hand hygiene.

- perform hand hygiene with a nonantibacterial or an antibacterial soap and water when the hands are visibly dirty or contaminated with blood or saliva
- if the hands are not visibly soiled, an alcohol hand rub can be used
- for hand hygiene during surgery use plain soap and water followed by drying; then use an alcohol surgical hand rub with persistent activity or an antimicrobial soap and water
- use disposable or washable containers for handwashing agents. Do not just fill up the containers when near empty— dispose of them or wash them. *(This will keep any contaminants from being carried over to the fresh detergent.)*
- use hand lotions at the end of the day to prevent skin dryness associated with handwashing;
- consider the compatibility of lotion and antiseptic products and the effect of petroleum or other oil emollients on the integrity of gloves *(may weaken glove integrity)* during product selection and glove use

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- keep fingernails short, with smooth, filed edges, to allow thorough cleaning and prevent glove tears
- do not wear artificial fingernails or extenders when having direct contact with patients at high risk ,e.g., those in intensive care units or operating rooms
- use of artificial fingernails is usually not recommended
- do not wear hand or nail jewelry if they make donning gloves more difficult or compromise the appropriate fit and integrity of the glove
- during a “Boil Water Advisory” use antimicrobial-containing products that do not require water for use, i.e., alcohol-based hand rubs for handwashing; if hands are visibly contaminated, use bottled water, if available, and soap for handwashing or an antiseptic towelette

This is the first time CDC has recommended use of a nonantimicrobial detergent or a waterless alcohol-based hand rub in dentistry. The efficacy of these products has been established.⁴

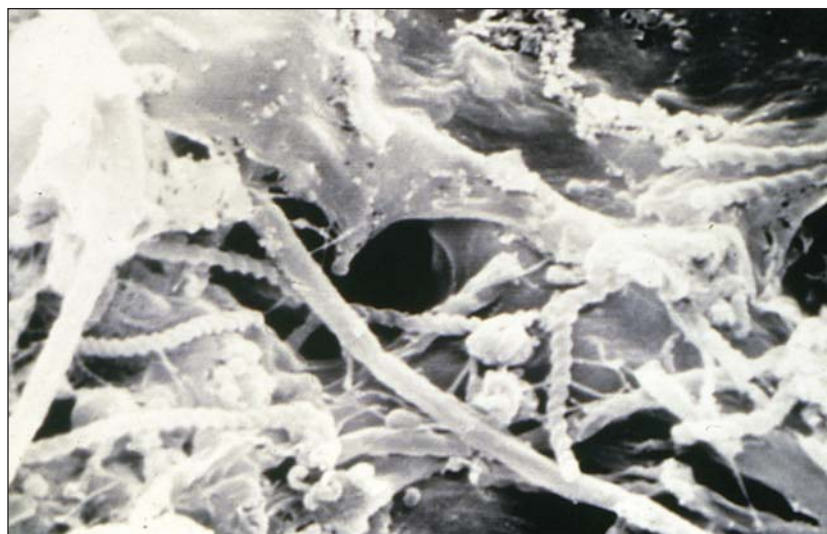


FIGURE 8

**Biofilm present in an untreated dental unit waterline.
Magnification is 6000X**

Dental-Unit Water Asepsis

Water exiting a dental unit through handpieces, air/water syringes, and ultrasonic scalers is highly contaminated with microbes unless the unit has been specially treated.^{5,6} After bacteria (present in the incoming water) enter the dental unit, they can attach to the walls of the water-line tubing and accumulate to form a biofilm (Figure 1) that coats the water lines the way oral biofilm (dental plaque) coats teeth. As water passes over the water-line biofilm, bacteria are shed into the flowing water to levels that can reach over a million bacteria per mL.⁵ The maximum allowable for drinking water is 500 colony-forming units (CFU) per mL.

Although this water contamination has not caused any obvious widespread public health problems, it is not wise to use highly contaminated water in any healthcare activity. Also, compromised patients may be susceptible to environmental microbes such as *Pseudomonas aeruginosa* that could be present in the water.^{7,8}

Approaches to improve dental-unit water quality include: continuous antimicrobial treatment of the water by a chemical, e.g., ozone, iodine, chlorhexidine, silver-peroxide combination, or physical means (heat, UV light, reverse osmosis); periodic chemical treatment of the water lines to control biofilm buildup; passing the water through microbial filters before it enters the patient’s mouth. More thorough descriptions of these approaches can be found elsewhere.²

The new CDC water-line recommendations are:

- use dental- unit water that meets the regulatory standards set by the EPA for drinking water (fewer than 500 CFU/mL of heterotrophic water bacteria) for routine dental treatment output water
- the office should consult with the dental- unit manufacturer for appropriate methods and equipment to maintain the recommended quality of dental water
- follow recommendations for monitoring water quality provided by the manufacturer of the unit or water-line treatment product;
- discharge water and air for a minimum of 20–30 seconds after each patient, from any dental device connected to the dental water system that enters the patient’s mouth, e.g., handpieces, ultrasonic scalers, air/water syringe
- consult with the dental- unit manufacturer on the need for periodic maintenance of non-retractile mechanism.
- during a “Boil Water Advisory” do not deliver water from the public water system to the patient through the dental operative unit, ultrasonic scaler, or other dental equipment that uses the public water system; do not use water from the public water system for dental treatment, patient rinsing, or handwashing; follow guidance given by the local water utility on proper flushing of water lines after the advisory is lifted. If no guidance is provided, flush dental water lines and faucet for 1–5 minutes before using for patient care; disinfect dental water lines as recommended by the dental- unit manufacturer after the advisory is lifted

SURFACE ASEPSIS

Clinical contact surfaces, e.g., light handles and switches, radiographic equipment, handpiece holders and control switches, drawer handles, countertops, and supply containers need to be covered with barriers impervious to water or they need to be cleaned and disinfected after they become contaminated and before being involved in the care of a subsequent patient. Housekeeping surfaces, e.g., floors, walls, and sinks, present little, if any, risk for the spread of disease, and do not have to be managed between each patient unless an unusual contamination occurs such as a major spill of body fluids.

Surface Covers (Barriers)

Surfaces that are difficult to clean and disinfect such as electrical switches, knurled knobs, light handles, and handpiece holders best lend themselves to covering. Plastic covers (sleeves) that are shaped like the surfaces to be covered are available and facilitate the covering process. Be sure to completely cover a surface. Do not touch the underlying surface when removing the barriers. This eliminates the need for cleaning and disinfection between patients. Gloves need to be worn when removing barriers after the appointment. Then the gloves are removed and the hands washed to place fresh barriers for the next patient.

Cleaning and Disinfection

Uncovered clinical contact surfaces need to be cleaned and chemically disinfected between appointments while wearing heavy gloves, a mask, eyewear, and protective clothing. Chemicals used in infection control have different levels of microbial kill. If a chemical can kill all microbes including high levels of the very resistant bacterial spore, it is referred to as a sterilant. Less lethal chemicals are referred to as disinfectants. High-level disinfectants, which can be liquid sterilants used for shorter contact times, kill most if not all microbes, but not high levels of bacterial spores. Intermediate-level disinfectants cannot kill bacterial spores, but they can kill other fairly resistant microbes such as *Mycobacterium bovis* (tuberculocidal) as well as most fungi and viruses. Low-level disinfectants are even less lethal (nontuberculocidal). A hospital disinfectant is a low-level disinfectant shown to kill three specific bacteria: *Staphylococcus aureus*, *Salmonella choleraesuis*, and *Pseudomonas aeruginosa*.

It is important to preclean the surface before disinfecting. This can be accomplished by the spray-wipe-spray technique². If disinfectant wipes are used, wipe the surface (cleaning), discard that wipe, then wipe again with a fresh wipe for disinfection.

The new CDC guidelines say:

- a low-level EPA-registered hospital disinfectant (with a label claim of HIV and HBV kill) can be used to clean and disinfect clinical contact surfaces. If the surface is visibly contaminated with blood, an intermediate-level disinfectant is to be used
- do not use liquid chemical sterilants/high-level disinfectants on environmental surfaces;
- clean housekeeping surfaces with a detergent and water or an EPA-registered hospital disinfectant/detergent on a routine basis, depending on the nature of the surface and the type and degree of contamination, and as appropriate, based upon the location in the facility, and when visibly soiled; prepare fresh cleaning or EPA-registered disinfecting solutions daily and as instructed by the manufacturer
- clean mops and cloths after use and allow to dry before reuse or use single-use, disposable mop heads or cloths
- clean walls, blinds, and window curtains in patient-care areas when they are visibly dusty or soiled
- clean spills of blood or other potentially infectious materials and decontaminate surface with an EPA-registered hospital disinfectant with low- (HBV and HIV label claims) to intermediate-level (tuberculocidal claim) activity depending on size of spill and surface porosity

INSTRUMENT PROCESSING

Any item that is used in the mouth and will be reused on another patient is to be cleaned, packaged, and heat-sterilized between uses using FDA-cleared sterilizers. If the item is heat-sensitive, and low-temperature sterilizers are not available, it needs to be cleaned, then sterilized by immersion in a liquid chemical cleared by FDA as a sterilant.

The Instrument Processing Facility

One of the key aspects of instruments processing is to prevent the intermingling of nonsterile with sterile instruments. With this in mind, the CDC now recommends the following:

- instrument processing be centralized in the office in an area that is divided physically or, at a minimum, spatially, into distinct areas for: 1) receiving, cleaning, and decontamination; 2) preparation and packaging; 3) sterilization; and 4) storage;
- do not store instruments in an area where contaminated instruments are held or cleaned;
- train office staff to use work practices that prevent contamination of clean areas.

Instrument Decontamination

Instruments need to be thoroughly cleaned so that the debris (blood, saliva, dental materials) will not insulate the microbes from the sterilizing agent during the subsequent sterilizing process. Thus the CDC now recommends that:

- all visible blood and organic contamination be removed from dental instruments and devices before sterilization or disinfection procedures
- use automated cleaning equipment (washers, washers-disinfectors, ultrasonic cleaners)
- use work-practice controls that minimize contact with sharp instruments if manual cleaning is necessary (e.g., long-handled brush).

Packaging

Because the goal of instrument processing is to provide sterile instruments for subsequent patients, it is important to maintain the sterility of instruments during transport from the sterilizer to chairside and during storage. This is best accomplished by packaging the instrument before they are placed in the sterilizer. Recontamination of unpackaged sterilized instruments can occur from contact with dust in the air, spatter of oral fluids from staff, contact with moisture, and contact with nonsterile surfaces such as hands, countertops, and trays.

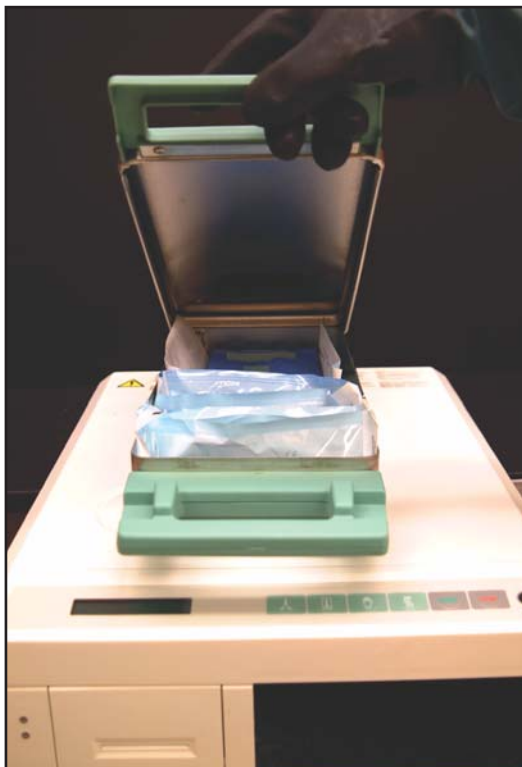


FIGURE 2

**Loading of the cassette steam sterilizer.
Keep from stacking package upon package**



FIGURE 3

**Loading of a fixed-chamber steam sterilizer.
Place the packages on their edges.**

CDC now states that:

- before sterilization of critical and semicritical instruments, inspect instruments for cleanliness, then wrap or place them in containers designed to maintain sterility during storage
- use packaging material compatible with the sterilization method used and that has received FDA clearance

Sterilization

Steam, dry heat, and unsaturated chemical vapor sterilizers all must be loaded (Figures 2 and 3), operated, and maintained as described by the manufacturer and properly monitored by mechanical, chemical, and biological means.

There are several styles and models of steam sterilizers. One is a cassette sterilizer in which a removable cassette serves as the instrument/package holder and the sterilizing chamber. These units also use multiple presterilization purges of steam to facilitate removal of the air from the chamber. Others have fixed sterilizing chambers some of which have presterilization and/or poststerilization vacuum cycles. Those which evacuate air from the chamber before the sterilization cycle allow the incoming steam to reach all the “nooks and crannies” of the instruments in a very efficient manner. Those which evacuate the chamber after the sterilization cycle enhance steam removal and facilitate drying of the instruments/packages. Those without such vacuum cycles can still achieve sterilization.

The unsaturated chemical vapor sterilizer uses a predominately organic solution (active ingredient of formaldehyde) as the sterilizing agent. This unit greatly reduces or eliminates rusting of carbon steel instruments and cutting edges (as occurs in steam) and yields a dry package after the run.

The dry heat sterilizer also eliminates rusting and yields dry packages at the end of the run.

New recommendations from CDC are:

- clean and heat sterilize handpieces and other intraoral instruments, i.e., slow-speed attachments, that can be removed from the air and waterlines of dental units between patients
- allow packages to dry in the sterilizer before they are handled to avoid contamination; (*wet paper packages can wick microbes that contact the exterior through the package to the instruments inside*)
- monitor each load with mechanical (time, temperature, pressure) and chemical indicators;
- place a chemical indicator on the inside of each package. If it is not visible from the outside, also place an exterior chemical indicator on the package
- place items/packages correctly and loosely into the sterilizer so as not to impede penetration of the sterilant
- do not use instrument packs if mechanical or chemical indicators suggest inadequate processing
- monitor sterilizers at least weekly using a biological indicator with a matching control, i.e., biologic indicator and control from same lot number
- in case of a positive spore test:
 - remove the sterilizer from service and review sterilization procedures to determine whether operator error could be responsible
 - retest the sterilizer by using biological, mechanical, and chemical indicators after correcting any identified procedural problems
 - if the repeat spore test is negative, and mechanical and chemical indicators are within normal limits, put the sterilizer back in service
- if the repeat spore test is positive:
 - do not use the sterilizer until it has been inspected or repaired or the exact reason for the positive test has been determined
 - recall (to the extent possible) and reprocess all items processed since the last negative spore test
 - before placing the sterilizer back into service, rechallenge the sterilizer with biological indicator tests in three consecutive empty chamber sterilization cycles after the cause of the sterilizer failure has been determined and corrected.

- implement practices based on date- or event-related shelf-life for the storage of wrapped, sterilized instruments and devices
- even for event-related packaging, at a minimum, place the date of sterilization, and if multiple sterilizers are used in the facility, the sterilizer used, on the outside of the packaging material to facilitate the retrieval of processed items in the event of a sterilization failure

According to the CDC, instruments to be used immediately after sterilization can be sterilized unwrapped using an “unwrapped cycle” of the sterilizer. This is sometimes referred to as “flash” sterilization because of the short cycle times. CDC’s recommendations for sterilization of unwrapped instruments are as follows:

- clean and dry instruments before the unwrapped sterilization cycle
- use mechanical and chemical indicators for each unwrapped sterilization cycle, i.e., place internal chemical indicators among the instruments or items to be sterilized
- allow unwrapped instruments to cool and dry in the sterilizer before they are handled to avoid contamination and thermal injury
- semicritical instruments (*see note*) that will be used immediately or within a short time can be sterilized unwrapped on a tray or in a container system, provided that the instruments are handled aseptically during removal from the sterilizer and transport to the point of use
- critical instruments (*see note*) intended for immediate reuse can be sterilized unwrapped if the instruments are maintained sterile during removal from the sterilizer and transport to the point of use, e.g., transported in a sterile covered container)
- do not sterilize implantable devices unwrapped
- do not store critical instruments unwrapped

Note: Semicritical instruments contact mucous membranes or nonintact skin, and will not penetrate soft tissue, contact bone, or enter into or contact the bloodstream or other normally sterile tissue.

Critical instruments are those that penetrate soft tissue, contact bone, or enter into or contact the bloodstream or other normally sterile tissues.

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CONTINUING EDUCATION TEST QUESTIONS

ANSWER SHEET ON BACK COVER

- 1. When does the CDC recommend using an alcohol hand rub?**
 - A. At any time
 - B. Only before sterile gloving for surgery
 - C. At the end of the day
 - D. When the hands are not visibly soiled
- 2. Which of the following is true about containers for hand-washing agents?**
 - A. Must be made of glass
 - B. Should be washed before refilling
 - C. Are to be labeled with a biohazard symbol
 - D. Must be closed before moving
- 3. Which two agents have only recently been recommended by the CDC for use in dentistry?**
 - A. Nonantimicrobial hand-washing agents and alcohol hand-rubs
 - B. Spore tests and chemical indicators
 - C. Hand lotions and antimicrobial handwashing agents
 - D. Surface disinfectants and liquid sterilants
- 4. What is the Environmental Protection Agency standard for the maximum allowable level of total bacteria in drinking water?**
 - A. 200,000 CFU/mL
 - B. 1,000 CFU/mL
 - C. 500 CFU/mL
 - D. 200 CFU/mL
- 5. What is the maximum acceptable level of bacteria in water exiting a dental unit as recommended by the CDC?**
 - A. 200,000 CFU/mL
 - B. 1,000 CFU/mL
 - C. 500 CFU/mL
 - D. 200 CFU/mL
- 6. What role does dental unit waterline biofilm play in the microbial contamination of dental-unit water?**
 - A. Biofilm does not form in dental unit waterlines.
 - B. Biofilm forms but plays no role in water contamination.
 - C. Biofilm forms and traps bacteria from the incoming water thus lowering the level of bacteria in the outgoing water.
 - D. Biofilm forms and sheds bacteria into the flowing water causing increased levels of bacteria in the outgoing water.
- 7. Which of the following is an example of a clinical contact surface?**
 - A. Sink in the operator
 - B. Dental chair light handle
 - C. Floor in the operator
 - D. Wall next to the dental chair
- 8. When should clinical contact surfaces be cleaned and disinfected?**
 - A. After it becomes contaminated and before use with the next patient
 - B. Every time after the removal of a plastic surface barrier
 - C. At the beginning and end of the day
 - D. Only after treating patients known to have a bloodborne diseases
- 9. A hospital disinfectant is a:**
 - A. Sterilant.
 - B. High-level disinfectant.
 - C. Intermediate-level disinfectant.
 - D. Low-level disinfectant.
- 10. According to CDC, how often should a sterilizer be mechanically monitored?**
 - A. Annually
 - B. Monthly
 - C. Weekly
 - D. Every load
- 11. Any items that is used in the mouth and will be reused on another patient is to be cleaned, packaged and _____ between uses.**
 - A. Disinfected
 - B. Sterilized
 - C. Decontaminated
 - D. Monitored
- 12. What type of additional label claim does a low-level EPA-registered hospital disinfectant need to have before it should be used on a clinical contact surface?**
 - A. Tuberculocidal activity
 - B. Inactivates bacterial spores
 - C. Kills HBV and HIV
 - D. Destroys Staphylococcus aureus
- 13. The sterilizing agent (active ingredient) in an autoclave is steam, in a dry heat oven is hot air _____ and in an unsaturated chemical vapor sterilizer is:**
 - A. Warm water
 - B. Formaldehyde
 - C. Hydrogen peroxide
 - D. Glutaraldehyde
- 14. During a "Boil Water Advisory" what should not be used for hand hygiene?**
 - A. Tap water
 - B. Bottled water
 - C. Antiseptic towelettes
 - D. Alcohol hand-rubs
- 15. How many disinfectant wipes should be used when cleaning and disinfecting a clinical contact surface?**
 - A. One
 - B. Two
 - C. Three
 - D. Four
- 16. When should unwrapped instruments processed through an unwrapped sterilization cycle be used for patient care?**
 - A. After one day of storage
 - B. Between 1 and 4 hours after sterilization
 - C. Within one hour after sterilization
 - D. Immediately

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