



PRESENTER'S SCRIPT

Module 7 Sterilization and Disinfection

SLIDE 1

This slide series was created to complement the Centers for Disease Control and Prevention's (CDC's) publication titled, *Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care*. This publication was developed to help increase adherence with established infection prevention practices.

This slide series provides an overview of the basic principles of infection prevention and control that form the basis for CDC recommendations for dental health care settings. It can be used to educate and train infection prevention coordinators, educators, consultants, and other dental health care personnel (DHCP).

The *Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care* can be found at www.cdc.gov/oralhealth/infectioncontrol/pdf/safe-care2.pdf.

SLIDE 2

This slide series is divided into 10 modules. The first module provides an introduction to infection prevention for dental settings. It is followed by 9 additional slide modules—one for each element of standard precautions, as well as for dental unit water quality and program evaluation. Module 7 provides information on sterilization and disinfection of patient-care items and devices.

SLIDE 3

Patient-care items—such as dental instruments, devices, and equipment—are categorized as critical, semicritical, or noncritical, depending on the potential risk of infection associated with their intended use.

SLIDE 4

Critical items, such as surgical instruments and periodontal scalers, are those that penetrate soft tissue or contacts bone, enters into or contacts the vascular or other normally

sterile tissue. They have the greatest risk of transmitting infection and should always be sterilized using heat. Alternatively, use sterile, single-use disposable devices.

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Semicritical items (such as mouth mirrors, amalgam condensers, and reusable dental impression trays) are those that come into contact with mucous membranes or non-intact skin (such as exposed skin that is chapped, abraded, or has dermatitis). These items have a lower risk of transmission. Because the majority of semicritical items in dentistry are heat-tolerant, they should be sterilized using heat. If a semicritical item is heat-sensitive, the DHCP should replace it with a heat-tolerant or disposable alternative. If none are available, the item should, at a minimum, be processed using high-level disinfection.

SLIDE 6

Dental handpieces and associated attachments, including low-speed motors and reusable prophylaxis angles, should always be heat sterilized between patients. Do not subject the handpiece to high-level disinfection and do not simply wipe the surface with a low-level disinfectant. Although these devices are considered semicritical, studies have shown that their internal surfaces can become contaminated with patient materials during use. If these devices are not properly cleaned and heat sterilized, the next patient may be exposed to potentially infectious materials. Manufacturer's instructions for cleaning, lubrication, and sterilization should be followed closely to ensure both the effectiveness of the process and the longevity of handpieces.

SLIDE 7

Digital radiography sensors are also considered semicritical and should be protected with a barrier cleared by the US Food and Drug Administration (FDA), followed by cleaning and heat sterilization or high-level disinfection between patients. If the item cannot tolerate these procedures,

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then, at a minimum, protect with an FDA-cleared barrier and clean and disinfect between patients with a hospital disinfectant with intermediate-level (i.e., tuberculocidal claim) activity that is registered with the US Environmental Protection Agency (EPA). Because these items vary by manufacturer, and their ability to be sterilized or disinfected also varies, refer to the manufacturer's instructions for reprocessing.

SLIDE 8

Noncritical patient-care items—such as radiograph head or cone, facebow, or blood pressure cuff—are those that only contact intact skin. These items pose the least risk of transmission of infection. In the majority of cases, cleaning—or if visibly soiled, cleaning followed by disinfection with an EPA-registered hospital disinfectant—is adequate. Protecting these surfaces with disposable barriers might be a preferred alternative.

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A single-use device, or referred to as a disposable device, is intended for use on one patient. Single-use (disposable) devices are usually not heat-tolerant and cannot be reliably cleaned. Most single-use devices are labeled by the manufacturer for only a single use and do not have reprocessing instructions. Use single-use devices for one patient only and dispose of appropriately. Examples include syringe needles, prophylaxis cups and brushes, and plastic orthodontic brackets.

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All reusable dental equipment should be cleaned and maintained according to the manufacturer's instructions to prevent patient-to-patient transmission of infectious agents. The manufacturer's instructions for reprocessing reusable dental instruments and equipment should be readily available, ideally in or near the reprocessing area. All cleaning equipment (such as the ultrasonic cleaner and instrument washer) and sterilization equipment (such as the autoclave and dry heat sterilizer) should be cleared by FDA. Packaging materials (such as paper or plastic peel packages and instrument cassettes) should also be FDA-cleared. Cleaning, disinfection, and sterilization of dental equipment should be assigned to DHCP with training in the required reprocessing steps to ensure that reprocessing results in a device that can be safely used for patient care.

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DHCP should process all instruments in a designated central processing area to more easily control quality and ensure safety. The central processing area should be divided into sections for receiving, decontamination, and cleaning; preparation and packaging; sterilization; and storage. To prevent cross-contamination, the instrument processing area should have a workflow pattern designed to ensure that devices and instruments clearly flow from high contamination areas to clean and sterile areas. In the cleaning area, reusable contaminated instruments are received, sorted, and cleaned. In the packaging area, cleaned instruments and other dental supplies should be inspected; assembled into sets or trays; and wrapped, packaged, or placed into container systems for sterilization. The sterilization area should include the sterilizers and related supplies with adequate space for loading, unloading, and cool down, and the storage area should contain enclosed storage for sterile items and disposable or single-use items.

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Cleaning is the basic first step in all decontamination processes to remove debris and organic contamination from instruments. If blood, saliva, and other contamination are not removed, these materials can shield microorganisms and compromise the disinfection or sterilization process. Automated cleaning equipment (such as ultrasonic cleaners and washer-disinfectors) should be used to remove debris to improve cleaning effectiveness and decrease worker exposure to blood. DHCP should handle contaminated instruments carefully. Instruments should be placed in an appropriate container at the point of use to prevent percutaneous injuries, such as needlestick or cut with a sharp object, during transport to the instrument processing area. DHCP should also wear appropriate personal protective equipment when handling and reprocessing contaminated patient equipment.

SLIDE 13

Automated or mechanical cleaning equipment, such as ultrasonic cleaners, instrument washers, and washer-disinfectors, are commonly used to clean dental instruments. Automated cleaners increase the efficiency of the cleaning process and reduce the handling of sharp instruments. After cleaning, instruments should be rinsed with water to remove chemical or detergent residue.

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If manual cleaning is not performed immediately, soak instruments in a rigid container filled with detergent, disinfectant or detergent, or an enzymatic cleaner. This step prevents drying of patient material and makes cleaning easier and less time-consuming. Do not use high-level disinfectants or sterilants (such as glutaraldehyde) as instrument-holding solutions. To avoid injury from sharp instruments, DHCP should wear puncture-resistant, heavy-duty, utility gloves (not patient-care gloves) when handling or manually cleaning contaminated instruments and devices. To protect against splashes, a face mask, eye protection or face shield, and a gown or jacket should be worn.

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After cleaning, instruments should be inspected, wrapped, packaged, or placed into container systems before heat sterilization. Instruments should be thoroughly dry before they are packaged, wrapped, or otherwise contained. DHCP should follow the manufacturer's instructions for packaging of patient-care items. For example, packaging should be compatible with the type of sterilization process used, hinged instruments should be processed open and unlocked, and instruments should be disassembled if indicated by the manufacturer.

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Use a chemical indicator inside each wrapped package to verify that the sterilizing agent (such as steam) has penetrated the package and reached the instruments inside. If the internal chemical indicator is not visible from the outside of the package, place an external indicator (such as indicator tape) on the outside of the package.

Packages should be labeled to show the sterilizer used, the cycle or load number, the date of sterilization, and, if applicable, the expiration date. This information can facilitate the retrieval of processed items in the event of an instrument processing or sterilization failure.

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Heat-tolerant dental instruments usually are sterilized by steam under pressure (called autoclaving), dry heat, or unsaturated chemical vapor. All sterilization should be performed using medical sterilization equipment cleared by FDA. The sterilization times, temperatures, and other operating parameters recommended by the manufacturer of the equipment used, as well as instructions for correct use of containers, wraps, and chemical or biological indicators, should always be followed.

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The majority of patient-care items in dentistry are heat-tolerant and therefore should be heat sterilized. Heat-sensitive instruments can be sterilized or high-level disinfected by soaking them in a liquid chemical germicide cleared by FDA as sterilants. However, these powerful chemicals are highly toxic and manufacturer instructions—for example, regarding dilution, immersion time, and temperature—and safety precautions for using chemical sterilants or high-level disinfectants must be followed precisely. For these reasons, using heat-sensitive semicritical items that must be processed with liquid chemical germicides is discouraged. Heat-tolerant or disposable alternatives are available for the majority of such items.

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The ability of a sterilizer to reach conditions necessary to achieve sterilization should be monitored using a combination of mechanical, chemical, and biological indicators. Mechanical and chemical indicators do not guarantee sterilization, but they help detect procedural errors and equipment malfunctions. Mechanical monitoring involves assessment of cycle time, temperature, and pressure by observing the gauges or displays on the sterilizer. Chemical monitoring uses sensitive chemicals that change color when a given parameter is reached—for example, through the use of heat-sensitive external tape or an internal chemical indicator strip. Biological monitoring is the most accepted method for monitoring the sterilization process because it assesses the sterilization process directly by killing known, highly resistant microorganisms. Indicators are engineered to be specific for the type of sterilization used, therefore indicators for one type of sterilant cannot be successfully used in equipment that uses a different sterilant.

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Mechanical monitoring involves checking the sterilizer gauges, computer displays, or printouts and documenting the sterilization exposure time, temperature, and pressure in your sterilization records. These parameters are observed during the sterilization cycle, and they might be the first indication of a problem. Printouts can be used for recordkeeping.

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Chemical monitoring uses sensitive chemicals that change color when exposed to high temperatures or combinations of time and temperature. Examples include chemical indicator tapes, strips or tabs, and special markings on packaging materials. Chemical monitoring results are obtained immediately following the sterilization cycle and therefore can provide more timely information about the sterilization cycle than a spore test.

A chemical indicator should be used inside every package to verify that the sterilizing agent has penetrated the package and reached the instruments inside. If the internal chemical indicator is not visible from the outside of the package, an external indicator should also be used. External indicators should be inspected immediately when removing packages from the sterilizer. If the appropriate color change did not occur, do not use the instruments. Chemical indicators also help to differentiate between processed and unprocessed items, eliminating the possibility of using instruments that have not been cleaned and sterilized.

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Biological indicators, or spore tests, are the most accepted method for monitoring the sterilization process because they assess the sterilization process directly by killing known highly resistant microorganisms (such as *Geobacillus* or *Bacillus* species). A spore test should be used at least weekly to monitor sterilizers. However, because spore tests are only performed periodically—for instance, once a week or once a day—and the results are usually not obtained immediately, mechanical and chemical monitoring should also be performed.

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Sterilization monitoring—such as biological, mechanical, or chemical monitoring—and equipment maintenance records are important components of a dental infection prevention program. Maintaining accurate records ensures cycle parameters have been met and establishes accountability. In addition, if there is a problem with a sterilizer—such as an unchanged chemical indicator or positive spore test—documentation helps to determine if an instrument recall is necessary.

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Ideally, sterile instruments and supplies should be stored in covered or closed cabinets. Storage practices for wrapped sterilized instruments can be either date- or event-related. For date-related shelf-life practices, sterilized packages are expiration-dated and are used on a “first in, first out” basis. Event-related shelf-life practices recognize that the product should remain sterile indefinitely, unless an event causes it to become contaminated (such as torn or wet packaging).

DHCP should inspect packaging of sterilized instruments before opening and use to ensure that the material has not been compromised (wet, torn, or punctured) during storage. If a package has been compromised, the contents should be reprocessed—that is, cleaned, packaged, and heat-sterilized again—before patient use.

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Resources for sterilization and disinfection of patient-care items and devices include:

- CDC. *Guidelines for Infection Control in Dental Health-Care Settings — 2003* at www.cdc.gov/mmwr/PDF/rr/rr5217.pdf.
- CDC. *Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008* at www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf.
- CDC. *Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care* at www.cdc.gov/oralhealth/infectioncontrol/pdf/safe-care2.pdf.

Resources to use in the event of a reprocessing error or failure:

- CDC. Health Care-Associated Infections website: Outbreaks and Patient Notifications at www.cdc.gov/hai/outbreaks/outbreak-resources.html.
- Patel PR, Srinivasan A, Perz JF. Developing a broader approach to management of infection control breaches in health care settings. *Am J Infect Control*. 2008;36:685–690.
- Rutala WA, Weber DJ. How to assess risk of disease transmission to patients when there is a failure to follow recommended disinfection and sterilization guidelines. *Infect Control Hosp Epidemiol*. 2007;28:146–155.