Guidelines for Infection Control in Dental Health-Care Settings — 2003

INSIDE: Continuing Education Examination

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
Sterilization and Disinfection of Patient-Care Items

Patient-care items (dental instruments, devices, and equipment) are categorized as critical, semi-critical, or noncritical, depending on the potential risk for infection associated with their intended use (Table 4) (242). Critical items used to penetrate soft tissue or bone, have the greatest risk of transmitting infection and should be sterilized by heat. Semi-critical items touch mucous membranes or non-intact skin and have a lower risk of transmission; because the majority of semi-critical items in dentistry are heat-tolerant, they also should be sterilized by using heat. If a semi-critical item is heat-sensitive, it should, at a minimum, be processed with high-level disinfection (2). Noncritical patient-care items pose the least risk of transmission of infection, contacting only intact skin, which can serve as an effective barrier to microorganisms. In the majority of cases, cleaning, or if visibly soiled, cleaning followed by disinfection with an EPA-registered hospital disinfectant is adequate. When the item is visibly contaminated with blood or OPIM, an EPA-registered hospital disinfectant with a tuberculocidal claim (i.e., intermediate-level disinfectant) should be used (2,243,244). Cleaning or disinfection of certain noncritical patient-care items can be difficult or damage the surfaces; therefore, use of disposable barrier protection of these surfaces might be a preferred alternative. FDA-cleared sterilant/high-level disinfectants and EPA registered disinfectants must have clear label claims for intended use, and manufacturer instructions for use must be followed (245). A more complete description of the regulatory framework in the United States by which liquid chemical germicides are evaluated and regulated is included (Appendix A).

<table>
<thead>
<tr>
<th>TABLE 4. Infection-control categories of patient-care instruments</th>
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<tr>
<td>Category</td>
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<tr>
<td>Critical</td>
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<td>Semi-critical</td>
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<tr>
<td>Non-critical</td>
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<td>Dental Instrument or Item</td>
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* Although dental handpieces are considered a semi-critical item, they should always be heat-sterilized between uses and not high-level disinfected (246). See Dental Handpieces and Other Devices Attached to Air or Waterlines for detailed information.

Three levels of disinfection, high, intermediate, and low, are used for patient-care devices that do not require sterility and two levels, intermediate and low, for environmental surfaces (242). The intended use of the patient-care item should determine the recommended level of disinfection. Dental practices should follow the product manufacturer’s directions regarding concentrations and exposure time for disinfectant activity relative to the surface to be disinfected (245). A summary of sterilization and disinfection methods is included (Appendix C).

Transporting and Processing Contaminated Critical and Semi-critical Patient-Care Items

DHCP can be exposed to microorganisms on contaminated instruments and devices through percutaneous injury, contact with nonintact skin on the hands, or contact with mucous membranes of the eyes, nose, or mouth. Contaminated instruments should be handled carefully to prevent exposure to sharp instruments that can cause a percutaneous injury. Instruments should be placed in an appropriate container at the point of use to prevent percutaneous injuries during transport to the instrument processing area (13). Instrument processing requires multiple steps to achieve sterilization or high-level disinfection. Sterilization is a complex process requiring specialized equipment, adequate space, qualified DHCP who are provided with ongoing training, and regular monitoring for quality assurance (247). Correct cleaning,
packaging, sterilizer loading procedures, sterilization methods, or high-level disinfection methods should be followed to ensure that an instrument is adequately processed and safe for reuse on patients.

**Instrument Processing Area**

DHCP should process all instruments in a designated central processing area to more easily control quality and ensure safety (248). The central processing area should be divided into sections for 1) receiving, cleaning, and decontamination; 2) preparation and packaging; 3) sterilization; and 4) storage. Ideally, walls or partitions should separate the sections to control traffic flow and contain contaminants generated during processing. When physical separation of these sections cannot be achieved, adequate spatial separation might be satisfactory if the DHCP who process instruments are trained in work practices to prevent contamination of clean areas (248). Space should be adequate for the volume of work anticipated and the items to be stored (248).

**Receiving, Cleaning, and Decontamination**

Reusable instruments, supplies, and equipment should be received, sorted, cleaned, and decontaminated in one section of the processing area. Cleaning should precede all disinfection and sterilization processes; it should involve removal of debris as well as organic and inorganic contamination. Removal of debris and contamination is achieved either by scrubbing with a surfactant, detergent, and water, or by an automated process (e.g., ultrasonic cleaner or washer-disinfector) using chemical agents. If visible debris, whether inorganic or organic matter, is not removed, it will interfere with microbial inactivation and can compromise the disinfection or sterilization process (244, 249–252). After cleaning, instruments should be rinsed with water to remove chemical or detergent residue. Splashing should be minimized during cleaning and rinsing (13). Before final disinfection or sterilization, instruments should be handled as though contaminated. Considerations in selecting cleaning methods and equipment include 1) efficacy of the method, process, and equipment; 2) compatibility with items to be cleaned; and 3) occupational health and exposure risks. Use of automated cleaning equipment (e.g., ultrasonic cleaner or washer-disinfector) does not require presoaking or scrubbing of instruments and can increase productivity, improve cleaning effectiveness, and decrease worker exposure to blood and body fluids. Thus, using automated equipment can be safer and more efficient than manually cleaning contaminated instruments (253). If manual cleaning is not performed immediately, placing instruments in a puncture-resistant container and soaking them with detergent, a disinfectant/detergent, or an enzymatic cleaner will prevent drying of patient material and make cleaning easier and less time-consuming. Use of a liquid chemical sterilant/high-level disinfectant (e.g., glutaraldehyde) as a holding solution is not recommended (244). Using work-practice controls (e.g., long-handled brush) to keep the scrubbing hand away from sharp instruments is recommended (14). To avoid injury from sharp instruments, DHCP should wear puncture resistant, heavy-duty utility gloves when handling or manually cleaning contaminated instruments and devices (6).

Employees should not reach into trays or containers holding sharp instruments that cannot be seen (e.g., sinks filled with soapy water in which sharp instruments have been placed). Work-practice controls should include use of a strainer-type basket to hold instruments and forceps to remove the items. Because splashing is likely to occur, a mask, protective eyewear or face shield, and gown or jacket should be worn (13).

**Preparation and Packaging**

In another section of the processing 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. Hinged instruments should be processed open and unlocked. An internal chemical indicator
should be placed in every package. In addition, an external chemical indicator (e.g., chemical indicator tape) should be used when the internal indicator cannot be seen from outside the package. For unwrapped loads, at a minimum, an internal chemical indicator should be placed in the tray or cassette with items to be sterilized (254) (see Sterilization of Unwrapped Instruments). Dental practices should refer to the manufacturer’s instructions regarding use and correct placement of chemical indicators (see Sterilization Monitoring). Critical and semi-critical instruments that will be stored should be wrapped or placed in containers (e.g., cassettes or organizing trays) designed to maintain sterility during storage (2,247,255–257). Packaging materials (e.g., wraps or container systems) allow penetration of the sterilization agent and maintain sterility of the processed item after sterilization. Materials for maintaining sterility of instruments during transport and storage include wrapped perforated instrument cassettes, peel pouches of plastic or paper, and sterilization wraps (i.e., woven and nonwoven). Packaging materials should be designed for the type of sterilization process being used (256–259).

Sterilization

The sterilization section of the processing area should include the sterilizers and related supplies, with adequate space for loading, unloading, and cool down. The area can also include incubators for analyzing spore tests and enclosed storage for sterile items and disposable (single-use) items (260). Manufacturer and local building code specifications will determine placement and room ventilation requirements.

Sterilization Procedures. Heat-tolerant dental instruments usually are sterilized by 1) steam under pressure (autoclaving), 2) dry heat, or 3) unsaturated chemical vapor. All sterilization should be performed by 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 (243,247). Items to be sterilized should be arranged to permit free circulation of the sterilizing agent (e.g., steam, chemical vapor, or dry heat); manufacturer’s instructions for loading the sterilizer should be followed (248,260). Instrument packs should be allowed to dry inside the sterilizer chamber before removing and handling. Packs should not be touched until they are cool and dry because hot packs act as wicks, absorbing moisture, and hence, bacteria from hands (247). The ability of equipment to attain physical parameters required to achieve sterilization should be monitored by mechanical, chemical, and biological indicators. Sterilizers vary in their types of indicators and their ability to provide readings on the mechanical or physical parameters of the sterilization process (e.g., time, temperature, and pressure). Consult with the sterilizer manufacturer regarding selection and use of indicators.

Steam Sterilization. Among sterilization methods, steam sterilization, which is dependable and economical, is the most widely used for wrapped and unwrapped critical and semi-critical items that are not sensitive to heat and moisture (260). Steam sterilization requires exposure of each item to direct steam contact at a required temperature and pressure for a specified time needed to kill microorganisms. Two basic types of steam sterilizers are the gravity displacement and the high-speed pre-vacuum sterilizer. The majority of tabletop sterilizers used in a dental practice are gravity displacement sterilizers, although pre-vacuum sterilizers are becoming more widely available. In gravity displacement sterilizers, steam is admitted through steam lines, a steam generator, or self-generation of steam within the chamber. Unsaturated air is forced out of the chamber through a vent in the chamber wall. Trapping of air is a concern when using saturated steam under gravity displacement; errors in packaging items or overloading the sterilizer chamber can result in cool air pockets and items not being sterilized. Pre-vacuum sterilizers are fitted with a pump to create a vacuum in the chamber and ensure air removal from the sterilizing chamber before the chamber is pressurized with steam. Relative to gravity displacement, this procedure allows faster and more positive steam penetration throughout the entire load. Pre-vacuum sterilizers should be tested periodically for adequate air removal, as recommended by the manufacturer. Air not
removed from the chamber will interfere with steam contact. If a sterilizer fails the air removal test, it should not be used until inspected by sterilizer maintenance personnel and it passes the test (243,247). Manufacturer’s instructions, with specific details regarding operation and user maintenance information, should be followed.

**Unsaturated Chemical-Vapor Sterilization.** Unsaturated chemical-vapor sterilization involves heating a chemical solution of primarily alcohol with 0.23% formaldehyde in a closed pressurized chamber. Unsaturated chemical vapor sterilization of carbon steel instruments (e.g., dental burs) causes less corrosion than steam sterilization because of the low level of water present during the cycle. Instruments should be dry before sterilizing. State and local authorities should be consulted for hazardous waste disposal requirements for the sterilizing solution.

**Dry-Heat Sterilization.** Dry heat is used to sterilize materials that might be damaged by moist heat (e.g., burs and certain orthodontic instruments). Although dry heat has the advantages of low operating cost and being noncorrosive, it is a prolonged process and the high temperatures required are not suitable for certain patient-care items and devices (261). Dry-heat sterilizers used in dentistry include static-air and forced-air types.

- The static-air type is commonly called an oven-type sterilizer. Heating coils in the bottom or sides of the unit cause hot air to rise inside the chamber through natural convection.

- The forced-air type is also known as a rapid heat-transfer sterilizer. Heated air is circulated throughout the chamber at a high velocity, permitting more rapid transfer of energy from the air to the instruments, thereby reducing the time needed for sterilization.

**Sterilization of Unwrapped Instruments.**

An unwrapped cycle (sometimes called *flash sterilization*) is a method for sterilizing unwrapped patient-care items for immediate use. The time required for unwrapped sterilization cycles depends on the type of sterilizer and the type of item (i.e., porous or nonporous) to be sterilized (243). The unwrapped cycle in tabletop sterilizers is preprogrammed by the manufacturer to a specific time and temperature setting and can include a drying phase at the end to produce a dry instrument with much of the heat dissipated. If the drying phase requirements are unclear, the operation manual or manufacturer of the sterilizer should be consulted. If the unwrapped sterilization cycle in a steam sterilizer does not include a drying phase, or has only a minimal drying phase, items retrieved from the sterilizer will be hot and wet, making aseptic transport to the point of use more difficult. For dry-heat and chemical-vapor sterilizers, a drying phase is not required. Unwrapped sterilization should be used only under certain conditions: 1) thorough cleaning and drying of instruments precedes the unwrapped sterilization cycle; 2) mechanical monitors are checked and chemical indicators used for each cycle; 3) care is taken to avoid thermal injury to DHCP or patients; and 4) items are transported aseptically to the point of use to maintain sterility (134,258,262). Because all implantable devices should be quarantined after sterilization until the results of biological monitoring are known, unwrapped or flash sterilization of implantable items is not recommended (134). Critical instruments sterilized unwrapped should be transferred immediately by using aseptic technique, from the sterilizer to the actual point of use. Critical instruments should not be stored unwrapped (260). Semi-critical instruments that are sterilized unwrapped on a tray or in a container system should be used immediately or within a short time. When sterile items are open to the air, they will eventually become contaminated. Storage, even temporary, of unwrapped semi-critical instruments is discouraged because it permits exposure to dust, airborne organisms, and other unnecessary contamination before use on a patient (260). A carefully written protocol for minimizing the risk of contaminating unwrapped instruments should be prepared and followed (260).
Other Sterilization Methods. Heat-sensitive critical and semi-critical instruments and devices can be sterilized by immersing them in liquid chemical germicides registered by FDA as sterilants. When using a liquid chemical germicide for sterilization, certain post-sterilization procedures are essential. Items need to be 1) rinsed with sterile water after removal to remove toxic or irritating residues; 2) handled using sterile gloves and dried with sterile towels; and 3) delivered to the point of use in an aseptic manner. If stored before use, the instrument should not be considered sterile and should be sterilized again just before use. In addition, the sterilization process with liquid chemical sterilants cannot be verified with biological indicators (263). Because of these limitations and because liquid chemical sterilants can require approximately 12 hours of complete immersion, they are almost never used to sterilize instruments. Rather, these chemicals are more often used for high-level disinfection (249). Shorter immersion times (12–90 minutes) are used to achieve high-level disinfection of semicritical instruments or items. These powerful, sporicidal chemicals (e.g., glutaraldehyde, peracetic acid, and hydrogen peroxide) are highly toxic (244,264,265). Manufacturer instructions (e.g., regarding dilution, immersion time, and temperature) and safety precautions for using chemical sterilants/high-level disinfectants must be followed precisely (15,245). These chemicals should not be used for applications other than those indicated in their label instructions. Misapplications include use as an environmental surface disinfectant or instrument-holding solution. When using appropriate precautions (e.g., closed containers to limit vapor release, chemically resistant gloves and aprons, goggles, and face shields), glutaraldehyde-based products can be used without tissue irritation or adverse health effects. However, dermatologic, eye irritation, respiratory effects, and skin sensitization have been reported (266–268). Because of their lack of chemical resistance to glutaraldehydes, medical gloves are not an effective barrier (200,269,270). Other factors might apply (e.g., room exhaust ventilation or 10 air exchanges/hour) to ensure DHCP safety (266,271). For all of these reasons, using heat-sensitive semi-critical items that must be processed with liquid chemical germicides is discouraged; heat-tolerant or disposable alternatives are available for the majority of such items. Low-temperature sterilization with ethylene oxide gas (ETO) has been used extensively in larger health-care facilities. Its primary advantage is the ability to sterilize heat- and moisture-sensitive patient-care items with reduced deleterious effects. However, extended sterilization times of 10–48 hours and potential hazards to patients and DHCP requiring stringent health and safety requirements (272–274) make this method impractical for private-practice settings. Handpieces cannot be effectively sterilized with this method because of decreased penetration of ETO gas flow through a small lumen (250,275). Other types of low-temperature sterilization (e.g., hydrogen peroxide gas plasma) exist but are not yet practical for dental offices. Bead sterilizers have been used in dentistry to sterilize small metallic instruments (e.g., endodontic files). FDA has determined that a risk of infection exists with these devices because of their potential failure to sterilize dental instruments and has required their commercial distribution cease unless the manufacturer files a premarket approval application. If a bead sterilizer is employed, DHCP assume the risk of employing a dental device FDA has deemed neither safe nor effective (276).

Sterilization Monitoring. Monitoring of sterilization procedures should include a combination of process parameters, including mechanical, chemical, and biological (247,248,277). These parameters evaluate both the sterilizing conditions and the procedure’s effectiveness. Mechanical techniques for monitoring sterilization include assessing cycle time, temperature, and pressure by observing the gauges or displays on the sterilizer and noting these parameters for each load (243,248). Some tabletop sterilizers have recording devices that print out these parameters. Correct readings do not ensure sterilization, but incorrect readings can be the first indication of a problem with the sterilization cycle. Chemical indicators, internal and external, use sensitive chemicals to assess physical conditions (e.g., time and temperature) during the sterilization process. Although chemical indicators do not prove sterilization has been achieved, they allow detection of certain equipment malfunctions, and they can help identify procedural errors. External indicators applied to the outside of a package (e.g., chemical indicator tape or special markings) change color rapidly when a specific parameter is reached, and they verify that the package has been exposed to the sterilization process. Internal chemical indicators should be used inside
A single-parameter internal chemical indicator provides information regarding only one sterilization parameter (e.g., time or temperature). Multi-parameter internal chemical indicators are designed to react to >2 parameters (e.g., time and temperature; or time, temperature, and the presence of steam) and can provide a more reliable indication that sterilization conditions have been met (254). Multi-parameter internal indicators are available only for steam sterilizers (i.e., autoclaves). Because chemical indicator test results are received when the sterilization cycle is complete, they can provide an early indication of a problem and where in the process the problem might exist. If either mechanical indicators or internal or external chemical indicators indicate inadequate processing, items in the load should not be used until reprocessed (134).

Biological indicators (BIs) (i.e., spore tests) are the most accepted method for monitoring the sterilization process (278, 279) because they assess it directly by killing known highly resistant microorganisms (e.g., Geobacillus or Bacillus species), rather than merely testing the physical and chemical conditions necessary for sterilization (243). Because spores used in BIs are more resistant and present in greater numbers than the common microbial contaminants found on patient-care equipment, an inactivated BI indicates other potential pathogens in the load have been killed (280). Correct functioning of sterilization cycles should be verified for each sterilizer by the periodic use (at least weekly) of BIs (2, 9, 134, 243, 278, 279). Every load containing implantable devices should be monitored with such indicators (248), and the items quarantined until BI results are known. However, in an emergency, placing implantable items in quarantine until spore tests are known to be negative might be impossible. Manufacturer’s directions should determine the placement and location of BI in the sterilizer.

A control BI, from the same lot as the test indicator and not processed through the sterilizer, should be incubated with the test BI; the control BI should yield positive results for bacterial growth. In-office biological monitoring is available; mail-in sterilization monitoring services (e.g., from private companies or dental schools) can also be used to test both the BI and the control. Although some DHCP have expressed concern that delays caused by mailing specimens might cause false-negatives, studies have determined that mail delays have no substantial effect on final test results (281, 282). Procedures to follow in the event of a positive spore test have been developed (243, 247). If the mechanical (e.g., time, temperature, and pressure) and chemical (i.e., internal or external) indicators demonstrate that the sterilizer is functioning correctly, a single positive spore test probably does not indicate sterilizer malfunction. Items other than implantable devices do not necessarily need to be recalled; however the spore test should be repeated immediately after correctly loading the sterilizer and using the same cycle that produced the failure. The sterilizer should be removed from service, and all records reviewed of chemical and mechanical monitoring since the last negative BI test. Also, sterilizer operating procedures should be reviewed, including packaging, loading, and spore testing, with all persons who work with the sterilizer to determine whether operator error could be responsible (9, 243, 247). Overloading, failure to provide adequate package separation, and incorrect or excessive packaging material are all common reasons for a positive BI in the absence of mechanical failure of the sterilizer unit (260). A second monitored sterilizer in the office can be used, or a loaner from a sales or repair company obtained, to minimize office disruption while waiting for the repeat BI. If the repeat test is negative and chemical and mechanical monitoring indicate adequate processing, the sterilizer can be put back into service. If the repeat BI test is positive, and packaging, loading, and operating procedures have been confirmed as performing correctly, the sterilizer should remain out of service until it has been inspected, repaired, and re-challenged with BI tests in three consecutive empty chamber sterilization cycles (9, 243). When possible, items from suspect loads dating back to the last negative BI should be recalled, rewrapped, and re-sterilized (9, 283). A more conservative approach has been recommended (247) in which any positive spore test is assumed to represent sterilizer malfunction and requires that all materials processed in that sterilizer, dating from the sterilization cycle having the last negative biologic indicator to the next cycle indicating satisfactory biologic indicator results, should be considered non-sterile and retrieved, if possible, and reprocessed or held in quarantine until the results of the repeat BI are known. This approach is considered conservative because the margin of safety in steam sterilization is sufficient enough that infection risk, associated with items in a load indicating spore growth, is minimal, particularly if the item
was properly cleaned and the temperature was achieved (e.g., as demonstrated by acceptable chemical indicator or temperature chart) (243). Published studies are not available that document disease transmission through a non-retrieved surgical instrument after a steam sterilization cycle with a positive biological indicator (243). This more conservative approach should always be used for sterilization methods other than steam (e.g., dry heat, unsaturated chemical vapor, ETO, or hydrogen peroxide gas plasma) (243). Results of biological monitoring should be recorded and sterilization monitoring records (i.e., mechanical, chemical, and biological) retained long enough to comply with state and local regulations. Such records are a component of an overall dental infection-control program (see Program Evaluation).

Storage of Sterilized Items and Clean Dental Supplies

The storage area should contain enclosed storage for sterile items and disposable (single-use) items (173). Storage practices for wrapped sterilized instruments can be either date- or event-related. Packages containing sterile supplies should be inspected before use to verify barrier integrity and dryness. Although some health-care facilities continue to date every sterilized package and use shelf-life practices, other facilities have switched to event-related practices (243). This approach recognizes that the product should remain sterile indefinitely, unless an event causes it to become contaminated (e.g., torn or wet packaging) (284). Even for event-related packaging, minimally, the date of sterilization should be placed on the package, and if multiple sterilizers are used in the facility, the sterilizer used should be indicated on the outside of the packaging material to facilitate the retrieval of processed items in the event of a sterilization failure (247). If packaging is compromised, the instruments should be re-cleaned, packaged in new wrap, and sterilized again. Clean supplies and instruments should be stored in closed or covered cabinets, if possible (285). Dental supplies and instruments should not be stored under sinks or in other locations where they might become wet.
Infection Control

Dentistry’s Newsletter for Infection Control and Safety

OSAP Check-Up: 2003 CDC Guidelines
Is your infection control program up to date?

The U.S. Centers for Disease Control and Prevention (CDC) recently released expanded recommendations for infection control in dental settings. Published in the December 19, 2003, edition of Morbidity and Mortality Weekly Report, “Guidelines for Infection Control in Dental Health-Care Settings — 2003” offers both science-based and strong theoretical advice designed to prevent or reduce the risk of disease transmission from patient to dental worker, from dental worker to patient, and from patient to patient. The document consolidates and updates previous recommendations from CDC and other agencies and discusses concerns not addressed in earlier recommendations for dentistry. To view the full document, visit www.cdc.gov/OralHealth/infectioncontrol/guidelines/index.htm.

Major additions and changes to the 2003 guidelines include:
- application of standard precautions rather than universal precautions;
- work restrictions for dental healthcare personnel infected with or occupationally exposed to infectious diseases;
- management of occupational exposures to bloodborne pathogens such as hepatitis B virus (HBV), hepatitis C virus (HCV); and human immunodeficiency virus (HIV);
- selection and use of devices with sharps safety features;
- hand-hygiene products and surgical hand antisepsis;
- contact dermatitis and latex hypersensitivity;
- sterilization of unwrapped instruments (“flash” cycles);
- dental water quality;
- dental radiography;
- aseptic technique for parenteral medications;
- oral surgical procedures;
- tuberculosis (TB); and
- infection control program evaluation.

The new CDC guidelines apply to all paid or unpaid dental healthcare personnel (DHCP) who might be occupationally exposed to blood and body fluids by direct contact or through contact with contaminated supplies, equipment, environmental surfaces, water, or air. Although the guidelines focus mainly on outpatient dental settings, the recommended infection control practices can be applied to all settings where dental treatment is provided.

This month’s Infection Control In Practice turns CDC’s comprehensive, 66-page guideline into a checklist for use in your practice setting. If you can answer “yes” to all the questions in this list, your infection control program is up to date.

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OSAP Chart & Checklist

OSAP Check-Up: 2003 CDC Guidelines continued from page 1

Personnel Health Elements of an Infection Control Program

- Does the practice setting have a written health program for DHCP?
- Does this written program specify policies, procedures, and guidelines for:
  - education and training?
  - immunizations?
  - exposure prevention and postexposure management?
  - medical conditions, occupational illness, and related work restrictions?
  - contact dermatitis and latex hypersensitivity?
  - maintenance of records, data management, and confidentiality?
- Have referral arrangements been established with a qualified healthcare professional/facility to ensure prompt and appropriate delivery of preventive services, occupationally related medical services, and postexposure management with any necessary medical follow-up?
- Is a list of all required and recommended immunizations for dental workers maintained?
  - When was this list last updated?
  - date: ______________
- Is it consistent with the latest recommendations from public health agencies on appropriate immunizations for healthcare workers?
- Have at-risk DHCP been referred to the facility’s prearranged qualified healthcare professional or to their own healthcare professional to receive appropriate immunizations?
- Is baseline tuberculin skin testing provided for clinical DHCP who might have contact with persons with suspected or confirmed infectious TB?
- Is a list of all required and recommended immunizations for dental workers maintained?
  - When was this list last updated?
  - date: ______________
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- Have at-risk DHCP been referred to the facility’s prearranged qualified healthcare professional or to their own healthcare professional to receive appropriate immunizations?
- Is baseline tuberculin skin testing provided for clinical DHCP who might have contact with persons with suspected or confirmed infectious TB?
- Is a comprehensive postexposure management and medical follow-up program in place?
- Does this program:
  - include policies and procedures for prompt reporting, evaluation, counseling, treatment, and medical follow-up of occupational exposures?

Education and training

- Have DHCP been educated and trained on their risk of occupational exposure to potentially infectious agents and the necessary infection-control procedures/protocols to safely perform their assigned duties?
- Was this training provided:
  - at the time of initial employment?
  - when new tasks or procedures affect occupational exposure?
  - at least annually?
- Were the training materials and procedures clear and easy to understand?

Postexposure management

- Do DHCP know to report occupational injuries and exposures immediately?
- When an occupational exposure occurs, is an exposure incident report created listing:
  - date and time of exposure;
  - details of the procedure being performed, including how and where the exposure occurred; if related to a sharp device, the type and brand of device and how and when the exposure occurred in the course of handling/using the device;
  - details of the exposure, including type and amount of fluid or material and the severity of the exposure (for example, for percutaneous exposure, the depth of the injury and whether fluid was injected; for a skin or mucous membrane exposure, the estimated volume of material and the condition of the skin [chapped, cut, abraded, intact]);
  - details about the exposure source (whether the source material contained HBV, HCV, or HIV; if the source patient is HIV-positive, the stage of disease, history of antiretroviral medication, viral load, drug resistance, if known);
  - details about the exposed person (vaccination and vaccine-response status); and
Infection Control in Practice is a resource prepared for clinicians by the Organization for Safety and Asepsis Procedures with the assistance and expertise of its member-contributors. OSAP is a nonprofit, independent organization providing information and education on infection control and occupational health and safety to dental care settings worldwide.

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- **Medical conditions, work-related illness, and work restrictions**
  - Does the practice setting have comprehensive written policies on work restrictions and exclusions that include a statement of authority defining who can implement such policies?
  - Are these policies readily available to DHCP?
  - Do these policies encourage workers to seek appropriate preventive and curative care and to report any illnesses, medical conditions, or treatments that can make them more susceptible to opportunistic infection or exposures?
  - Do these policies protect against lost wages, benefits, or job status in the event of such an illness or medical condition?
  - Are policies and procedures in place for evaluating, diagnosing, and managing workers with suspected or known occupational contact dermatitis?
  - Does the facility’s policy provide for definitive diagnosis and management advice (for example, treatment, work restrictions, and accommodations) by a qualified healthcare professional?

- **Preventing Transmission of Bloodborne Pathogens**
  - **HBV vaccination**
    - Have DHCP been informed of the risks of HBV transmission and the availability of the hepatitis B virus (HBV) vaccine?
    - Have DHCP been offered the HBV vaccination series?
    - Was serologic testing performed 1-2 months after vaccination to confirm immunity?
    - Did DHCP who declined vaccination sign a declination form for their medical record file?

- **Preventing exposures to blood and other potentially infectious materials**
  - Are standard precautions used during all patient encounters?
  - Does the practice setting have a written, comprehensive program designed to minimize and manage DHCP exposures to blood and body fluids?
  - To prevent injuries from contaminated sharps, does the practice setting use:
    - engineering controls (such as sharps containers, automated instrument cleaners, safety needles, nonneedle sharps, needle recappers, and other safer medical devices)?
    - work practices (such as the one-handed scoop technique and placement of sharps containers nearest their point of use in the operatory)?

- **Records maintenance, data management, and confidentiality**
  - Does the practice setting establish and keep confidential DHCP medical records, such as immunization records and documentation of tests received as a result of occupational exposure?
  - Is the practice setting in compliance with all applicable federal, state, and local laws for medical recordkeeping and confidentiality?

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**In P R A C T I C E**

Preventing Transmission of Bloodborne Pathogens

HBV vaccination

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- Did DHCP who declined vaccination sign a declination form for their medical record file?

Preventing exposures to blood and other potentially infectious materials

- Are standard precautions used during all patient encounters?
- Does the practice setting have a written, comprehensive program designed to minimize and manage DHCP exposures to blood and body fluids?
- To prevent injuries from contaminated sharps, does the practice setting use:
  - engineering controls (such as sharps containers, automated instrument cleaners, safety needles, nonneedle sharps, needle recappers, and other safer medical devices)?
  - work practices (such as the one-handed scoop technique and placement of sharps containers nearest their point of use in the operatory)?

Engineering controls

- Does the practice setting identify, evaluate, and consider for use devices with engineered safety features (for example, safer anesthetic syringes, blunt suture needles, retractable scalpels, or needleless IV systems):
  - at least annually?
  - as they reach the dental market?

Work practice controls

- Are disposable syringes and needles, scalpel blades, and other sharp items continued on page 4
Hand Hygiene
- Are hands washed with a nonantimicrobial or antimicrobial soap and water when they are visibly dirty or contaminated with blood or other potentially infectious material?
- Is hand hygiene performed:
  - after accidental barehanded touching of inanimate objects likely to be contaminated by blood, saliva, or respiratory secretions?
  - before and after treating each patient?
  - before donning gloves?
  - immediately after removing gloves?
- Before oral surgical procedures, is surgical hand antisepsis performed before donning sterile surgeon’s gloves? (Surgical hand antisepsis involves using either (a) an antimicrobial soap and water or (b) a plain soap and water handwash followed by an alcohol-based hand rub with persistent activity.)
- Are liquid hand-care products stored in either disposable closed containers or closed containers that can be washed and dried before refilling?
- Are refillable containers always washed and dried (and not simply “topped off”) before refilling?
- Are hand lotions used during the clinic day compatible with the antiseptics in hand hygiene products?
- Are DHCP fingernails kept short, with smooth, filed edges to allow thorough cleaning and prevent glove tears?
- Are artificial fingernails discouraged among DHCP in the practice setting?
- If it affects glove donning or fit, is hand or nail jewelry removed for patient care?

Personal Protective Equipment
- Is task-appropriate personal protective equipment (PPE) worn when exposure to blood and body fluids is expected?
- Is barrier protection (including gloves, mask, eyewear, and gown) removed before departing work areas such as operatories, the instrument processing room, or the dental lab?

Face and eye protection
When performing procedures likely to cause splash or spatter:
- Are surgical masks worn?
- Is eye protection with solid side shields or a face shield worn to protect mucous membranes of the eyes, nose, and mouth?
- Are masks changed between patients?
- Are masks changed during patient treatment if they become wet?
- Between patients, is reusable face protection (eyewear, face shields) cleaned and before removing from a nondisposable aspirating syringe.

Face and eye protection
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- Between patients, is reusable face protection (eyewear, face shields) cleaned and before removing from a nondisposable aspirating syringe.

Sterilization and Disinfection
- Are all reusable critical dental instruments cleaned, dried, packaged, and then heat-sterilized before use?
Are all reusable heat-tolerant semicritical dental instruments cleaned and then heat-sterilized before use?

Are items and instrument packages correctly and loosely loaded into the sterilizer to allow penetration of the sterilizing agent?

Are instrument packages allowed to dry in the sterilizer before they are handled? (This prevents contamination.)

Have heat-sensitive semicritical instruments been replaced with heat-tolerant or disposable versions?

If heat-sensitive instruments are used in patient care, are they cleaned and then processed using an FDA-cleared sterilant/high-level disinfectant or an FDA-cleared low-temperature sterilization method? Note: Never use liquid chemical sterilants/high-level disinfectants for environmental surface disinfection or as holding solutions.

Are the manufacturer's instructions for preparation, use, and reuse of chemical sterilants/high-level disinfectants always followed?

Have all DHCP been trained on OSHA guidelines for exposure to chemical disinfectants/sterilants?

Have areas and tasks that have potential for such exposure been identified?

Are single-use disposable instruments used only on one patient and then properly discarded?

Are all noncritical patient-care items barrier-protected during use? Alternatively, are they cleaned (or if visibly soiled, cleaned and disinfected) after each use?

Is an EPA-registered hospital disinfectant used to clean/disinfect noncritical patient-care items that are not barrier-protected during use?

If noncritical patient-care items are visibly contaminated with blood, are the items properly cleaned to remove soil, then disinfected using an EPA-registered hospital disinfectant with a tuberculocidal claim?

The instrument processing area

Does the practice setting have a designated central processing area?

Is the area divided physically, or at least spatially, into separate areas for:

- receiving, cleaning, and decontamination;
- preparation and packaging;
- sterilization; and
- storage.

Are work practice controls used to minimize handling of loose contaminated instruments during transport to the instrument processing area? For example:

- Are instruments transported in a covered container?
- Are dental team members trained to use work practices that prevent contamination of clean areas? For example:
  - Are sterilized instrument packs and clean supplies stored away from the area where contaminated instruments are held or cleaned?

Receiving, cleaning, and decontamination work area

Are dental instruments and devices cleaned of all visible blood and other contamination before they are sterilized or disinfected?

Is automated cleaning equipment (such as an ultrasonic cleaner or washer-disinfector) used to remove debris, improve cleaning effectiveness, and decrease worker exposure to blood?

Are work practice controls (such as a long-handled brush) used to minimize contact with sharp instruments if manual cleaning is necessary?

Are puncture-/chemical-resistant utility gloves worn when handling contaminated instruments and performing instrument cleaning and decontamination procedures?

Is appropriate PPE (a mask, protective eyewear, and protective clothing) worn when splashing or spraying is anticipated during cleaning?

Preparation and packaging

After cleaning, are critical and semicritical instruments inspected for remaining debris?

Before sterilization, are instruments and other patient-care items packaged using an FDA-cleared container system or wrap that is compatible with the type of sterilization process used? (Packaging instruments in cassettes or trays before sterilization maintains their sterility after the sterilization cycle.)

Is an internal chemical indicator placed inside each instrument package prior to sterilization?

If the internal indicator is not visible from outside the package, is an external indicator affixed to the pack?

Are packages labeled with the date and if multiple sterilizers are used within the facility, the sterilizer used? (This simplifies retrieval of processed items in case of a sterilization failure.)

Unwrapped instruments

Although not recommended for routine instrument processing, certain circumstances may demand that instruments be processed unpackaged (for example, the only available instrument falls to the floor during patient care). If it is necessary to sterilize instruments without packaging, for example, using a flash cycle:

- Are instruments cleaned and dried before the unwrapped sterilization cycle?
- Are mechanical and chemical indicators used for each unwrapped sterilization cycle? (Place an internal chemical indicator among the instruments or items to be sterilized.)
- Are unwrapped instruments allowed to dry and cool in the sterilizer before they are handled? (This prevents contamination and thermal injury.)
- Are unwrapped semicritical instruments sterilized on a tray or in container system? continued on page 6
Are critical instruments that are sterilized without packaging handled to maintain sterility during removal from the sterilizer and transport to the point of use? For example:
- Are they transported to the operatory in a sterile covered container?
- Are sterilized, unwrapped critical instruments used immediately after they have cooled? (Do not store critical instruments unwrapped.)

**Implantable devices**
- Are implantable devices always packaged for sterilization?
- Is a biological indicator always included in each package containing an implantable device?
- Are biological monitoring results received and recorded before the implantable device is surgically placed?

**Sterilization monitoring**
- Are mechanical, chemical, and biological monitors used according to the manufacturer’s instructions to ensure the effectiveness of the sterilization process?
- Is each load monitored with mechanical and chemical indicators?
- Is a chemical indicator placed on the inside of each instrument package to be sterilized?
  - If the internal indicator is not visible from the outside, is another chemical indicator added to the outside of package?
- If mechanical or chemical indicators suggest inadequate processing, are instruments pulled from recirculation, repackaged, and sterilized again with new indicators?
- Are sterilizers monitored at least weekly using a biological indicator and a matching control? (Using both a test and a control indicator from the same lot ensures that factors outside of the sterilization process have not affected the spores’ ability to be cultured.)
  - Is the test indicator placed within an instrument pack and sterilized with a normal load?
  - Is the control indicator — which is not subjected to a sterilization cycle — incubated at the same time as the test indicator?
- If a spore test comes back positive, are proper troubleshooting procedures implemented? (For a flowchart on managing sterilization failures, visit [www.osap.org/resources/extra/sterifail.htm](http://www.osap.org/resources/extra/sterifail.htm))
- Are sterilization records (mechanical, chemical, and biological) maintained in compliance with state and local regulations?

**Managing Environmental Surfaces**
- Are surface barriers used to protect clinical contact surfaces from contamination, especially those that are difficult to clean?
- Are surface barriers changed between patients?
- If they are not barrier protected during patient care, are clinical contact surfaces cleaned and disinfected between patient appointments?
- For clinical contact surfaces that are not visibly contaminated with blood, are surfaces cleaned and then disinfected using an EPA-registered hospital disinfectant with (a) HIV and HBV kill (at minimum) and/or (b) tuberculocidal activity?
- Are clinical contact surfaces that are visibly contaminated with blood cleaned and then disinfected using a hospital disinfectant with tuberculocidal activity?
- Prior to disinfection, are manufacturer instructions for precleaning surfaces closely followed?
- After cleaning, is the disinfectant allowed to remain on the treated surface for the contact time stated on the product’s label?
- Is appropriate PPE in place when cleaning and disinfecting environmental surfaces? For example:
  - puncture- and chemical-resistant utility gloves,
  - protective clothing (such as a gown, jacket, or lab coat), and
  - face protection (protective eye-wear/face shield with a mask).
- Are housekeeping surfaces such as floors, walls, and sinks routinely cleaned using either a detergent and water or an EPA-registered hospital disinfectant/detergent?
- Are cleaning schedules set by the nature of the housekeeping surface, the type and degree of contamination, and if appropriate, location in the facility?
- Are housekeeping surfaces cleaned and disinfected when visibly soiled?
- Are mops or cloths cleaned after use and allowed to dry before reuse, or are single-use, disposable mop heads or cloths used to clean housekeeping surfaces?
- Are fresh cleaning or EPA-registered disinfecting solutions prepared daily.

**Storing patient-care items**
- Are sterile items and dental supplies stored in covered or closed cabinets to minimize the chance of contamination?
- Are wrapped packages of sterilized instruments examined before they are opened to ensure the packaging (and sterility of the instruments inside) has not been compromised?
- If packaging has been compromised, are the contents reclened, repacked, and resterilized?
- Does the practice setting use either date- (“first in, first out”) or event-related storage for wrapped, sterilized instruments and devices? (Both methods are considered acceptable.)
Never use liquid chemical sterilants/high-level disinfectants to disinfect environmental surfaces.

Regulated Medical Waste

☐ Are the practice setting have a written medical waste management program that outlines proper disposal of regulated medical waste as dictated by federal, state, and local regulations?
☐ Are DHCP who handle and dispose of regulated medical waste trained in proper handling and disposal methods?
☐ Are they informed of the possible health and safety hazards associated with medical waste?
☐ Are leakproof, color-coded/biohazard-labeled containers (for example, biohazard bags) used to contain nonsharp regulated medical waste?
☐ Are sharp items (needles, scalpels, orthodontic bands, broken metal instruments, burs) placed in a puncture-resistant, leakproof, color-coded/biohazard-labeled sharps container?
☐ Are sharps containers closed immediately before they are removed or replaced to prevent contaminated sharps from spilling or protruding?
☐ If allowed by state and local law, are blood, suctioned fluids, and other liquid waste carefully poured down a drain connected to a sanitary sewer system?
☐ Are gloves, face protection (mask with protective eyewear/face shield), and protective clothing worn when performing this task?

Extracted teeth

☐ Are extracted teeth disposed of within the practice setting treated as regulated medical waste? (If the teeth are returned to the patient, waste disposal regulations do not apply.)
☐ Are extracted teeth containing amalgam discarded in regulated medical waste containers that will not be incinerated? (Incineration releases mercury vapor from amalgam, creating a hazard.)

When extracted teeth will be used in educational settings or sent to a dental lab:
☐ Are extracted teeth cleaned and placed in a leakproof container with solution to maintain hydration during transport?
☐ Is the transport container labeled with the biohazard symbol?
☐ Are teeth that do not contain amalgam heat-sterilized before they are used for educational purposes?

Dental Unit Waterlines, Biofilm, and Water Quality

☐ Does the water used in routine patient treatment meet EPA standards for drinking water (that is, less than 500 CFU/mL of heterotrophic water bacteria)?
☐ Are the products and protocols recommended by your dental unit manufacturer used to maintain water quality?
☐ Are recommendations for monitoring water quality followed? (Obtain and follow monitoring schedules recommended by the dental unit manufacturer and/or the maker of the waterline treatment device/chemical.)
☐ For devices that are connected to the dental water system and enter the patient’s mouth, are water and air discharged for at least 20-30 seconds after use on each patient? (Such devices include handpieces, ultrasonic scalers, and air/water syringes.)
☐ If the dental unit is equipped with anti-retraction mechanisms, are the unit manufacturer’s recommendations for periodic maintenance followed?
☐ Are staff aware of procedures to follow in the event of a boil-water advisory? (See the OSAP Practice Tip, p. 12.)

Dental Handpieces, Other Devices Attached to Air Lines and Waterlines

☐ Are handpieces and other intraoral instruments that can be removed from the air and waterlines of dental units cleaned and then heat-sterilized between patients?
☐ Are manufacturer’s instructions for cleaning, lubrication, and sterilization of other such intraoral instruments followed every time the instruments are processed for reuse? (Failure to follow manufacturer instructions can void equipment warranties.)

Dental Radiography

☐ Are gloves worn by dental workers when exposing radiographs and handling contaminated film packets?
☐ Is other PPE (such as protective eyewear, mask, and gown) also worn if spattering of body fluids is likely?
☐ Are heat-tolerant or disposable filmholders, positioners, and other intraoral devices used whenever possible?
☐ Are heat-tolerant radiographic accessories cleaned and then heat-sterilized?
☐ If any heat-sensitive semicritical devices are used, are they (at minimum) cleaned and high-level disinfected according to the manufacturer’s instructions for periodic maintenance followed?
☐ Are strength testing devices used to check strength of radiographic film during exposure?

Do not advise patients to close their lips tightly around the tip of the saliva ejector to evacuate oral fluids. It can cause oral fluids to retract.

Continued on page 8
OSAP Chart & Checklist

OSAP Check-Up: 2003 CDC Guidelines  continued from page 7

cording to the device and germicide manufacturer’s instructions?
 fscanf
 Are exposed radiographs films transported and handled aseptically to prevent contamination of developing equipment?
 fscanf
 Are sterile irrigating fluids delivered into the vial?
 fscanf
 Are sterile surgeon’s gloves worn when performing oral surgical procedures?
 fscanf
 Are single-use devices used for one patient only and then properly discarded?
 fscanf

Avoid using carpeting and cloth upholstery in operatories, labs, and instrument processing areas.

Digital radiography
 If your practice setting uses a digital x-ray system with intraoral sensors:
 fscanf
 Are IV bags, tubings, and connections used for one patient only and disposed of appropriately?
 fscanf
 Is medication from any syringe administered to only one patient?
 fscanf
 Are single-dose vials of parenteral medications used whenever possible?
 fscanf

Are single-dose vials of parenteral medications used whenever possible?

Aseptic Technique

for Parenteral Medications
 fscanf
 Are iv bags, tubings, and connections used for one patient only and disposed of appropriately?
 fscanf
 Is medication from any syringe administered to only one patient?
 fscanf
 Are single-dose vials of parenteral medications used whenever possible?
 fscanf

Biopsy Specimens
 fscanf
 Are biopsy specimens placed in a sturdy, leakproof container for transport?
 fscanf
 Is the container labeled with the biohazard symbol?
 fscanf
 If the outside of a biopsy specimen container becomes visibly contaminated, is it either cleaned and disinfected or placed in an impervious bag labeled with the biohazard symbol?
 fscanf

Dental Laboratory
 fscanf
 Is PPE worn when handling items that have not been decontaminated?
 fscanf
 Is specific information on disinfection (for example, solution used and duration) included when laboratory cases are sent from the dental facility to an off-site lab and back?
 fscanf
 Unless the sender indicates that they have been disinfected, are all dental prostheses and prosthodontic materials (such as impressions, bite registrations, occlusal rims, and extracted teeth) cleaned, disinfected using an EPA-registered hospital disinfectant with tuberculocidal activity, and rinsed?
 fscanf
 Have material manufacturers been consulted on the stability of specific impression materials relative to disinfection procedures?
 fscanf
 Are heat-tolerant items used in the mouth (such as metal impression trays and face-bow forks) clean and heat-sterilized after use on a patient?
 fscanf
 Are manufacturer instructions followed for cleaning and sterilizing or disinfesting items that do not normally contact the patient but become contaminated during laboratory procedures (for example, burs, polishing points, rag wheels, articulators, case pans, and lathes)?
 fscanf
 If manufacturer instructions are not available, are items processed according to the degree of contamination?
 fscanf
 Are heat-tolerant items cleaned and heat-sterilized, or are they cleaned and then disinfected using an EPA-registered hospital disinfectant an

Single-Use (Disposable) Devices
 fscanf
 Are single-use devices used for one patient only and then properly discarded?
 fscanf

Oral Surgical Procedures
 fscanf
 Is surgical hand antisepsis performed before gloving by all dental workers participating in an oral surgical procedure? (Surgical hand antisepsis involves using either (a) an antimicrobial soap and water or (b) plain soap and water handwash followed by alcohol-based hand rub with persistent activity.)
 fscanf
 Are sterile surgeron’s gloves worn when performing oral surgical procedures?
 fscanf
 Is sterile saline or sterile water used as a coolant/irrigant during oral surgical procedures?
 fscanf
 Are sterile irrigating fluids delivered using devices specifically designed for that purpose, for example, a bulb or sterile irrigating syringe, single-use disposable products, or sterile water delivery systems with disposable or sterilizable tubing?
HIV and HBV claim and/or a tuberculocidal claim?

**Tuberculosis and Dentistry**
- Does your practice setting have a written TB infection-control plan?
- Are all dental team members trained to know the signs and symptoms of TB as well as how it is transmitted?
- Is a baseline tuberculin skin test performed for all dental workers who might have contact with persons with suspected or confirmed active TB?
- Is each patient assessed for history or symptoms of TB? Are findings documented on the medical history form?

If a patient with active or suspected TB arrives for treatment:
- Is the patient evaluated away from other patients and dental workers?
- When not being evaluated, is the patient asked to wear a surgical mask and instructed to cover his or her mouth and nose when coughing or sneezing?
- Is elective dental treatment deferred until the patient is noninfectious?
- Are patients in need of urgent dental care referred to a previously identified facility with TB engineering controls and a respiratory protection program?

For DHCP who may have active TB:
- Are personnel with a deep, productive cough lasting longer than three weeks referred for medical evaluation? This is especially important when other signs or symptoms consistent with active TB are present (for example, weight loss, night sweats, fatigue, bloody sputum, anorexia, and fever).
- Are such DHCP instructed not to return to work until a physician determines that the worker does not have TB or is no longer infectious?
- Has a community risk-assessment been performed for your practice setting?

**Evaluating Your Infection Control Program**
- Is a plan for evaluating the practice setting’s infection control program in place?

**Introducing From Policy to Practice: OSAP’s Guide to the Guidelines**

As its title suggests, From Policy to Practice: OSAP’s Guide to the Guidelines takes new infection control recommendations from the Centers for Disease Control and Prevention (CDC) and helps you — the dental worker — put them into practice.

OSAP has created a 170-page, all-inclusive workbook to walk users through the new and expanded 2003 infection control guidelines. Each chapter contains practical, how-to instructions, charts and checklists, pictures and captions, answers to common questions, and guidance for making sound clinical judgments. Suggested retail price, $69.95. 10 hours of CE credit available.
To help practices stay on track, OSAP provides this calendar listing typical schedules for periodic maintenance, recordkeeping, and infection control activities. This schedule is intended only to serve as a guide. Proper practices, procedures, and maintenance schedules can vary according to the kinds of products used, the practice type, and patient volume. Always follow the device or equipment manufacturer’s instructions for maintenance and infection control.

For a monthly dental office calendar you can customize to best meet the needs and schedules in your practice, visit osap.org/calendars/index.htm. (Adobe Acrobat Reader required.)

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**OSAP-FEDERAL SERVICES INFECTION CONTROL & SAFETY COURSE**
If you wish to obtain one (1) hour of continuing-education (CE) credit, complete the following test and fax or mail it to the OSAP Central Office for grading. Please include a check or credit card to cover handling charges. Pending satisfactory results (at least seven out of ten), you will be issued a letter for one (1) CE credit hour through the Academy of General Dentistry and the Dental Assisting National Board. AGD Approved National Sponsor, FAGD/MAGD credit, 10/23/93 to 12/31/05. OSAP also is an ADA CERP Recognized Provider.

1. True or False: It is okay to administer medication from one syringe to multiple patients as long as the needle is changed.
   a. True  
   b. False

2. Highspeed handpieces should be processed using:
   a. a liquid chemical sterilant  
   b. ethylene oxide  
   c. an autoclave or chemical vapor sterilizer  
   d. a tuberculocidal hospital disinfectant

3. The 2003 CDC infection control guideline for dentistry recommends the use of ________________ to protect against exposures to blood and all other body fluids (except sweat, which is not infectious).
   a. universal precautions  
   b. standard precautions  
   c. healthcare worker precautions  
   d. both a and b

4. When dental worker hands are dirty or are visibly soiled with blood or other body fluids, the worker must:
   a. don gloves  
   b. use waterless antimicrobial hand rub  
   c. thoroughly wash and dry hands  
   d. all of the above

5. To maintain surface asepsis, clinical contact surfaces should be:
   a. cleaned and disinfected between patients  
   b. covered with an appropriate protective barrier  
   c. both a and b  
   d. either a or b

6. When heat processing, use (a) ________________ with each instrument pack containing an implantable device:
   a. biological indicator  
   b. chemical indicator  
   c. mechanical indicators  
   d. all of the above

7. True or False: Flash sterilization should not be used for routine instrument processing
   a. True  
   b. False

8. What schedule is recommended for spore testing heat sterilizers in dentistry?
   a. weekly  
   b. monthly  
   c. quarterly  
   d. semi-annually

9. When performing or assisting on oral surgical procedures, you should wear:
   a. sterile surgeon’s gloves  
   b. mask and eyewear  
   c. a protective garment  
   d. all of the above

10. During a boil-water advisory, it is acceptable to:
    a. use bottled water for patient rinsing  
    b. use an alcohol-based hand rub on soiled hands  
    c. use tap water for handwashing if you use an antimicrobial soap  
    d. put new filters on dental unit waterlines

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When water treatment processes fail or are interrupted, or if natural disasters or other circumstances compromise the water distribution network, public drinking water can become contaminated. “Most notable in recent years was the outbreak of cryptosporidiosis in Milwaukee, Wisconsin, where the municipal water system was contaminated with the parasite Cryptosporidium parvum,” notes Shannon Mills, DDS, deputy director of the Joint Clinical Readiness Advisory Board. More than 400,000 persons became ill during the Milwaukee epidemic. Outbreaks involving Cryptosporidium and other waterborne organisms also have occurred in New York, Ontario, Washington, and other areas.

Issued by the public health department when local or regional water is deemed unsafe to drink, a boil-water advisory is a notice to the public to boil tap water before drinking it. “Because dentistry relies so heavily on water — it’s used for hand-washing, patient rinsing, as a coolant ... — boil-water advisories are serious business for dental facilities,” Dr. Mills asserts. “To make sure that practices and clinics can still deliver care during these public health advisories, the CDC has developed a set of guidelines that dental workers can follow.”

In the event of a boil-water advisory:

- Do not use water from the public water supply to treat patients. “This includes water plumbed through the dental unit, ultrasonic scaler, or other equipment that uses public water,” he explains. Of course, if your water source has been isolated from the municipal water system — for example, in a separate water reservoir or other water treatment device that has been cleared for marketing by the FDA — this restriction doesn’t apply.

- Avoid using water from faucets for patient rinsing and handwashing. Instead, have patients rinse with bottled water. For hand hygiene, use alcohol-based hand rubs if hands are not visibly soiled. If they are, use bottled water and soap or an antiseptic-containing towelette to clean the hands.

To treat public water so it is safe for hand hygiene or for diluting disinfectants (if necessary), bring water to a rolling boil for at least 1 minute and cool thoroughly before use.

When the boil-water advisory is lifted, follow your local water utility’s recommendations for flushing all waterlines served by the public water system and disinfect your dental unit waterlines according to the manufacturer’s instructions.

Shannon Mills, DDS, is a former OSAP Chairman and Editor of Infection Control In Practice. Statements expressed are his own and do not reflect the official policy of the U.S. Government.
The following is a list of CDC recommended infection control protocols that every dental practice should follow to help keep their patients safe from disease transmission during dental treatment.

How effective are your practice protocols?

- Instruments should be cleaned and inspected for cleanliness prior to sterilization
- Heat sterilize all reusable items and instruments that are heat tolerant using FDA cleared medical devices for sterilization
- Use high level disinfection/chemical sterilization on reusable items that are heat sensitive (“cold sterilization”)
- Package/wrap all instruments and/or cassettes prior to sterilization in wrapping compatible with the type of sterilization process used and that have received FDA clearance
- Use a chemical indicator in each instrument pack or cassette, or use sterilization pouches with internal and external indicators
- Monitor all heat sterilizers weekly with a biological monitor (spore test)
- Packages should be labeled with the date and, if multiple sterilizers are used within the facility, the sterilizer used should also be noted
- Keep contaminated items separated from clean/sterile items in the instrument processing area
- Use impervious barriers where appropriate to protect equipment and surfaces from contamination
- Replace equipment barriers after each patient
- Use intermediate level (tuberculocidal) disinfectants to clean and decontaminate surfaces in treatment areas
- Use personal protective equipment – gloves, safety glasses, face masks and gowns/lab coats when treating patients and reprocessing instruments
- Wash hands prior to donning gloves for treatment and immediately after removing gloves after treatment. If hands are not visibly soiled, an alcohol-based hand rub can also be used
- Change face masks between each patient or sooner if it becomes wet during treatment
- Wear a new pair of gloves for every patient; change gloves immediately if they become torn or punctured during a procedure
- Use sterile gloves for surgical procedures
- Segregate and dispose of contaminated sharps and waste according to state and federal guidelines
- Follow CDC prescribed protocol for follow-up after an exposure incident
- Vaccinate doctors, assistants and hygienists for Hepatitis B
- Maintain waterlines in dental units to provide water quality at 500 cfu/ml or less for treatment
- Use sterile water or sterile saline for surgical procedures
- Use single-dose medication vials whenever possible
- Prepare all medications in a clean area and use only sterile needles in multiple use medication vials
- Follow “standard precautions” (i.e. treating every patient) as if they are potentially infectious
- Screen patients for possible tuberculosis (TB) infections and provide only emergency treatment for patients who are known to have active TB or who are suspected of having TB because of symptoms that they exhibit
- Maintain a written infection control/exposure control for the practice – update annually
- Participate in or conduct annual OSHA-required infection control training updates

Mary Govoni, CDA, RDA, RDH, MBA
Mary Govoni brings over 40 years of experience in dentistry. She is a Certified Dental Assistant, a Registered Dental Assistant (MI) and a Registered Dental Hygienist, with experience in general and specialty practices both clinically and as an administrator. Mary is a former dental assisting educator and was a partner in a successful dental staffing service.

For the past 20 years, Mary has focused on speaking and consulting with dental teams on infection prevention, OSHA compliance, ergonomics, chairside efficiency and team communication and development. Recently Mary has added HIPAA compliance and employment law compliance to her areas of expertise. Mary has published numerous articles in professional journals. She is a life member and Past President of the American Dental Assistants Association, and serves on the ADAA Editorial Board as well as the Corporate Council for Dimensions of Dental Hygiene. Mary is also a consultant to the American Dental Association on Dental Practice (ADA) and a featured speaker on the Continuing Education and Lifelong Learning Seminar Series.

For more information visit Hu-Friedy.com or join FriendsOfHu-friedy.com
For additional Infection Control resources visit Hu-Friedy.com/Education/Infection-Prevention-Resources
Preventing dental unit waterline contamination.

By John A. Molinari, PhD

Dental waterlines can become contaminated by organisms that colonize the system, rapidly leading to the formation of biofilms inside the lumens of the waterlines. Although the water coming into dental waterlines is sanitized and meets public health safety standards for potable quality (<500 cfu (colony forming units)/mL of bacteria and <1 coliform), water coming out of dental waterlines may contain up to 1,000,000 cfu/mL of bacteria. This contamination occurs because certain dental waterline factors (eg, system design, flow rates, materials) promote bacterial growth and the development of biofilm.¹⁻³

In 1995, the American Dental Association issued a statement on the quality of water used in dental treatment—encouraging industry and researchers to improve the design of dental equipment and to provide equipment with the ability to deliver treatment water with 200 cfu/mL or less of unfiltered output from water lines.¹⁻³ Similar standards are in effect for dialysate, one of the fluids used in dialysis. Standards also exist for safe drinking water quality as established by the Environmental Protection Agency (EPA), the American Public Health...
Increasing numbers of patients routinely seek dental treatment who have weakened immune systems and who may be periodically exposed to microbial opportunists via colonized water.

Association (APHA), and the American Water Works Association (AWWA), which set limits of no more than 500 cfu of heterotrophic bacteria per mL of drinking water. The number of bacteria in water used as a coolant/irrigant for nonsurgical dental procedures should be less than the 500 cfu/mL regulatory standard for safe drinking water established by the EPA, APHA, and AWWA.

Many products are available that address the composition, mechanisms of microbial accumulation, potential health risks, and the reduction of microbial accumulation in the dental operatory. As a result, dental health care workers (DHCW) are faced with many product choices and, unfortunately, they sometimes come upon confusing, conflicting information that can make subsequent purchasing decisions difficult.

WHAT TYPES OF MICROORGANISMS HAVE BEEN ISOLATED FROM COLONIZED DENTAL WATERLINES?

Research has identified multiple classes of organisms in dental waterline samples—ranging from nonpathogenic to pathogenic spectrums of microbes. Types of microbes commonly associated with dental waterlines are Bacterionema spp.; Corynebacterium spp.; gram negative bacilli and cocci; Klebsiella spp.; Neisseria (N. catarrhales); Pseudomonas spp., including P. aeruginosa; P. pyogenes, and Burkholderia capacia; Staphylococcus epidemicis; Streptococcus mutans; Streptococcus salivarius; Streptococcus mitis; Actinomyces spp.; Enterococcus spp.; α hemolytic streptococci; Staphylococcus aureus; B. subtilis; E. coli; Flavobacterium; nonhemolytic streptococci; Legionella pneumophila; Mycobacterium spp.; Aspergillus niger; Cladosporium; Achromobacter; and Alcaligenes faecalis. Even small roundworms have been found in contaminated dental waterlines.

Most of the isolated microbes are from the public water supply and are classified as opportunistic pathogens, meaning they do not usually pose a high risk of disease for healthy persons. This fact has direct implications for dentistry because increasing numbers of patients routinely seek dental treatment who have weakened immune systems and who may be periodically exposed to microbial opportunists via colonized water.

Infections in this type of patient are a problem following medical exposure to waterborne pathogens, such as Pseudomonas, Klebsiella, Legionella, and nontuberculous Mycobacterium species. Since these bacteria have been isolated in dental water supplies, we need to learn from the experiences of our medical colleagues by taking steps to minimize colonization and, therefore, the potential for infection and illness in immune compromised individuals.

Despite the presence of potentially pathogenic bacteria in numbers greatly exceeding levels established for drinking and recreational waters, few cases of illness among DHCWs or patients have been confirmed. However, because most dental offices are located in outpatient settings, epidemiological links between an infection and recent exposure to contaminated dental water are difficult to establish. The relatively small quantity of water entering a patient’s mouth during routine dental treatment is a possible reason for the lack of documented infection. Exposure to aerosols and entrance of contaminated water into open wounds are also possible routes of microbial transmission. Moreover, the widespread application of effective, accepted infection control principles and the high level of asepsis standards routinely exhibited in most dental facilities reduces the risk of exposing either patients or DHCW to water of poor microbiological quality.

WHAT ARE BIOFILMS?

Biofilm is a bacterial film that tightly adheres and lies flat against the walls of the dental waterline. It is characterized by cells that:

1. Are irreversibly attached to a substratum or interface with each other;
2. Are embedded in a matrix of extracellular polymeric substances that they have produced; and
3. Grow as a distinct community of bacteria and other microorganisms acting as a self-perpetuating and self-protecting unit.

Biofilms are virtually ubiquitous—existing in all environments where there is water and a suitable solid substrate for attachment. They can harbor numerous waterborne bacteria, fungi, protozoa, even roundworms. While at first glance biofilms may appear as simple amorphous masses on water-laden surfaces, they can have a surprisingly complex structure. It is possible for clumps of biofilm to become dislodged and come out as solid material when water flows through dental waterlines, which is of particular importance to both possible infectious exposure and the public’s perception of microbial exposure.

WHAT ARE THE CURRENT RECOMMENDATIONS FOR ADDRESSING DENTAL WATER ASEPSIS?

The most recent Centers for Disease Control and Prevention (CDC) infection control guidelines recommend that potable water be used for routine dental care and that sterile water be used for surgical procedures that involve exposure of bone, the vascular system, or tissue that is normally sterile. Table 1 (page 44) lists the CDC Recommendations for Dental Unit Waterlines, Biofilm, and Water Quality.

Ongoing efforts by manufacturers continue to provide DHCW with multiple choices for controlling the quality of source water used in patient care, including:

1. An alternate water supply that bypasses community water systems and dental waterlines by providing sterile or distilled water directly into water line attachments (ie, separate reservoir) combined with chemical treatment.
2. Filtration involving in-line filters to remove bacteria immediately before dental unit water enters instrument attachment.
3. Chemical disinfection involving periodic flushing of lines with a disinfectant fol-

As seen in Dimensions OF DENTAL HYGIENE
Table 1. CDC Recommendations for Dental Unit Waterlines, Biofilm, and Water Quality.

General Recommendations
1. Use water that meets EPA regulatory standards for drinking water (ie, <500 cfu/mL of heterotrophic water bacteria) for routine dental treatment output water.
2. Consult with the dental unit manufacturer for appropriate methods and equipment to maintain the recommended quality of dental water.
3. Follow recommendations for monitoring water quality provided by the manufacturer of the unit or waterline treatment product.
4. Discharge water and air for a minimum of 20 to 30 seconds after each patient from any device connected to the dental water system that enters the patient’s mouth (eg, handpieces, ultrasonic scalers, and air/water syringes).
5. Consult with the dental unit manufacturer on the need for periodic maintenance of anti-retraction mechanisms.

Special Considerations for Oral Surgical Procedures
1. Use sterile saline or sterile water as a coolant/irrigant when performing oral surgical procedures. Use devices specifically designed for delivering sterile irrigating fluids (eg, bulb syringe, single-use disposable products, and sterilizable tubing).
2. Minimize the number of water and air lines entering into individual unit waterlines.
3. Follow manufacturers' instructions for cleaning waterlines and ultrasonic scalers.
4. Thermal inactivation of facility water at a centralized source.
5. Reverse osmosis or ozonation using units designed for either single chair or entire practice waterlines.
6. Ultraviolet irradiation of water before entrance into individual unit waterlines.

While even many choices exist for cleaning and maintaining waterlines, some require a substantial commitment by personnel. One of the more popular options is the use of chemical agents either continuously or added periodically to clean waterlines. While no available chemical meets all standards, Table 2 lists the criteria that should be used to evaluate the efficacy and safety of dental waterline agents.

REFERENCES

As seen in Dimensions Of DENTAL HYGIENE
Introducing Team Vista™ by Hu-Friedy
The complete waterline security system

Team Vista provides a more effective and economical way to keep waterlines safer and cleaner. This easy-to-use system is designed for the quick cleaning and control of microbial contamination in dental unit waterlines. It's the only system that provides both an organic irrigant and registered antimicrobial cleaner for enhanced patient care and equipment protection.

For more information or to place an order, call 1-800-HU-FRIEDY or contact your authorized Hu-Friedy dealer representative.