

TB MED 266

TECHNICAL BULLETIN

# **Disinfection and Sterilization of Dental Instruments and Materials**

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Department of the Army  
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# ***SUMMARY of CHANGE***

TB MED 266

Disinfection and Sterilization of Dental  
Instruments and Materials

This revised Technical Bulletin provides--

- o A listing of dental instrument classification and the level of decontamination required for each classification (para 1-5).
- o Additional information on dry heat sterilizers (para 1-5a(4)) and chemical disinfectants (para 1-5a(5)).
- o New procedures for biologic monitors (para 1-5b(2)).
- o Changed shelf-life requirements for some items (para 1-5e).
- o More specific universal precaution protective barriers (para 1-6).
- o Updated hand-washing procedures (para 1-7).
- o Revised decontamination procedures for dental items (para 2-2).
- o Definitions of the classes of regulated medical waste (para 2-2g(3)(c)).
- o Updated infection control precautions (para 3-1).
- o New infection control procedures for the standard dental laboratory (para 3-2) and the clean dental laboratory (para 3-3).
- o Procedures for disinfection of impressions, casts, and other laboratory materials (para 3-4).
- o Revised infection control techniques for laboratory equipment (para 3-5).

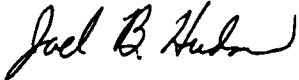
TECHNICAL BULLETIN

Disinfection and Sterilization of Dental Instruments and Materials

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**History.** This publication is a revision of TB MED 266, last published on 31 July 1989.

**Summary.** This TB MED provides information to dental health care workers concerning methods of disinfection and sterilization of dental instruments and materials to protect their health and those of the patients receiving treatment.

**Applicability.** This information applies to all U.S. Army dental health care workers.

**Proponent and exception authority.** The proponent agency of this publication is The Surgeon General, HQDA (DASG-DC).

**Suggested improvements.** You can help

improve this bulletin. If you find any mistakes or if you know a way to improve procedures, please let us know. Mail your memorandum or DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to the US ARMY DENTAL COMMAND (MCDS), 2050 WORTH ROAD, FORT SAM HOUSTON TX 78234-6000.

**Distribution.** Approved for public release; distribution is unlimited. Distribution of this publication is made in accordance with DA Form 12-34-E, block number 2387, requirements for TB MED 266, intended for command level C for Active Army, Army National Guard, and U.S. Army Reserve.

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\*This bulletin supersedes TB MED 266, 31 July 1989. Note that the 31 July 1989 TB MED 266 superseded that part of TB MED 2 pertaining to the sterilization of dental material.

## Chapter 1 Introduction

### 1-1. Purpose

This bulletin provides dental health care workers (DHCWs) information concerning methods and means of disinfection and sterilization of dental environments, instruments, and materials. Vigorous safeguards, exacting techniques, and controlled professional standards are required to protect the health and welfare of persons receiving treatment at military dental facilities. All measures are aimed at reducing the risks of transfer of infection, elimination of bacterial, viral, and fungal reservoirs, and establishing discipline for asepsis. All U.S. Army dental facilities will comply with section 1030, part 1910, title 29, Code of Federal Regulations (29 CFR 1910.1030) (Final Rule, Occupational Safety and Health Administration (OSHA) Bloodborne Pathogens Standard), 29 CFR 1910.1200 (Hazard Communication), and all other Federal, State, and local regulations pertaining to infection control, exposure control, and hazards in the workplace.

### 1-2. References

A list of references and forms can be found in appendix A.

### 1-3. Explanation of abbreviations and terms

The glossary contains a list of abbreviations and terms used in this publication.

### 1-4. Responsibilities

a. Commanders of dental units will ensure compliance with practices stated in this bulletin.

b. The quality improvement committee will administer and monitor the unit's sterilization and infection control program to—

(1) Ensure an orientation briefing to newly assigned personnel prior to the individual being assigned to patient treatment areas and/or areas involved in handling contaminated materials per the local infection control and exposure control standing operating procedure (SOP).

(2) Ensure that sustainment training occurs to keep personnel current in the area of infection control and exposure control.

(3) Ensure that formal documentation occurs reflecting orientations and sustainment training in the area of infection control and exposure control.

(4) Ensure review (monitoring and evaluation) of sterilization log books, instrument expiration dates, and other aspects of the infection control program.

c. Supervisors of the sterilization process will ensure that personnel performing the sterilization tasks have—

(1) Documented formal training in the sterilization process.

(2) Orientation briefings on the local sterilization SOP.

(3) Sustainment training in the areas of sterilization and infection control.

### 1-5. General

The variety of instruments and materials used in a dental facility present significant problems and demands on techniques of decontamination, disinfection, and sterilization. The typical medical classification of inanimate objects in table 1-1 is a helpful guide in determining the level of decontamination required in dentistry.

#### a. Methods of sterilization.

(1) Saturated steam under pressure is the preferred method to be used in Army dental care facilities. Saturated steam under pressure is the recommended method of sterilization for all dental materials unless otherwise indicated by the nature of the material, instruments, or recommendation of the material manufacturer. Users must have a basic understanding of the operations of the type of sterilizers being used.

(a) Steam-type autoclaves produce saturated steam to accomplish the sterilization process. Typical cycles are 20 to 30 minutes at 121 °Centigrade (C) (250 °Fahrenheit (F)) at 15 to 30 pounds per square inch (psi) pressure after reaching the proper sterilization conditions or 3 minutes (unwrapped) or 10 minutes (wrapped) at 135 °C (275

°F) at 30 psi after reaching the proper sterilization conditions. This type of sterilization may corrode instruments. Instruments must be dry before packaging for sterilization. If storage is anticipated, instruments must be packaged in appropriate materials for proper sterilization conditions to be met. After the cycle, items should be left in the sterilizer for the entire drying time to prevent excess moisture in the packaging.

(b) Methods of steam sterilization include gravity displacement, prevacuum, and vacuum pulsing. Follow all manufacturers' instructions for operation and maintenance of the sterilizer.

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**Table 1-1**  
**Dental Instrument Classification**

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**Classification:** Critical.

**Level of decontamination:** Sterilization required.

**Material:** Items that penetrate or touch broken skin or mucous membranes: needles, scalpels, surgical instruments, dental explorers, etc.

**Note:** N/A

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**Classification:** Semicritical.

**Level of decontamination:** Sterilization or high-level disinfection required.

**Material:** Items that touch mucous membranes but do not enter sterile body areas: amalgam condensers, handpieces, etc.

**Note:** The Centers for Disease Control and Prevention recommends that whenever possible sterilization is the method of choice for semicritical items. The Centers for Disease Control and Prevention also recommends that these instruments should be packaged before the sterilization process if immediate use is not likely.

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**Classification:** Noncritical.

**Level of decontamination:** Tuberculocidal intermediate-level disinfection required.

**Material:** Surfaces that do not touch mucous membranes: counter tops, articulators, light handles, etc.

**Note:** Many times barrier protection will prevent contamination of items in this category.

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(2) Steam and chemical sterilizers produce non-saturated steam at 132 °C (270 °F) by mixing chemicals with very little water. Typical sterilizer cycles are 20 to 30 minutes. Chemical sterilization does *not* corrode carbide steel and other corrosion-sensitive instruments. Manufacturers' operating and maintenance instructions must be followed. Packaging designed for this type of sterilizer must be used. Some chemical sterilizers produce hazardous gas during the cycle and must have proper ventilation. Chemical residue from the sterilizer may also be classified as a hazardous waste.

(3) Ethylene oxide (EO) may be the method of choice for sterilization of heat labile and moisture-sensitive medical items, supplies, and equipment.

(a) Because of its toxicity, potential flammability, and explosive nature, EO must be used with caution. Users must have a basic understanding of EO system hardware and potential sources of EO release to the environment. Efforts should be directed toward decreasing ambient levels of EO in the worker environment and residual levels in sterilized devices. Operation of the EO sterilizer must adhere to the standards established in the occupational health program contained in the Accreditation Manual for Hospitals produced by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO).

(b) All EO-sterilized items are to be aerated in a mechanical aerator. Manufacturers of medical devices provide in writing the sterilization and aeration instructions to be followed when their products are required to be EO sterilized.

(4) Dry heat may be used for the sterilization of anhydrous oils, greases, powders, burs, pliers, and instruments with cutting surfaces. No corrosion potential exists with this type of sterilization.

(a) Dry heat sterilizers have typical cycle times of 1 hour at 171 °C (340 °F) or 2 hours at 160 °C (320 °F). Packaging choice must not insulate the instrument load from proper heat penetration. Proper load distribution is critical for proper sterilization conditions to be

met. Follow all manufacturers' instructions for sterilization and sterilizer maintenance.

(b) Rapid dry heat sterilizers are also available for quick instrument turnaround. Typical cycle times are 12 minutes at 191 °C (375 °F) for wrapped items and 6 minutes at 191 °C (375 °F) for unwrapped items. The same criteria for proper use must be followed for this type of sterilizer as for standard dry heat sterilizers.

(c) Opening dry heat sterilizers during the cycle for any reason will adversely affect sterilization conditions for that load.

(d) Unwrapped items processed through a dry heat sterilizer may be considered sterile if they are used immediately after the sterilization cycle or if they are kept in a sterile environment and used during the same work shift. The same items would be considered decontaminated by sterilization and *clean* for use if stored in a controlled environment for longer than one work shift. This latter method is sufficient for many noncritical items in dentistry.

(5) Chemical sterilization and disinfection is also a choice for some limited circumstances. Steam sterilization is the preferred method to be used to sterilize dental instruments and materials; nevertheless, some instruments cannot be subjected to high temperatures and, in a field environment when equipment is not available, chemical sterilization and disinfection may have to be used. All chemical disinfectants rely on adequate cleaning of the surface, material, or instrument that is to be disinfected before application of the disinfectant. The disinfectant must remain in contact with the surface to be disinfected for the appropriate time needed to achieve proper disinfection (contact time).

(a) Disinfectants are classified as high, intermediate, or low relative to their effectiveness against vegetative bacteria, bacterial spores, tubercle bacilli, and viruses.

(b) Chemical disinfectants recommended for the dental environments should meet as many of the properties of an ideal disinfectant as possible. Those properties are:

1. Broad spectrum—the widest possible antimicrobial action.
2. Fast acting—rapid, lethal action on all forms of microorganisms.
3. Not affected by physical factors—active in the presence of organic matter and compatible with soaps, detergents, and other chemicals.
4. Non-toxic—not chemically toxic to user.
5. Surface compatible—should not physically affect the surface being disinfected.
6. Residual effect—the property of continuing to disinfect or affect microorganisms for long periods of time.
7. Easy to use—complicated disinfecting leads to non-compliance.
8. Economical.

(c) All disinfectants must be registered with the Environmental Protection Agency (EPA). All disinfectants must be used according to the manufacturer's instructions. Proper personal protective equipment (PPE) for the type of chemical and the task being performed must be used. Hazard communication (HAZCOM) training may be indicated for many chemical disinfectants.

1. *Chlorine solutions.* Sodium hypochlorite in 0.05 to 0.5 percent concentrations is recommended for surface, material, and instrument disinfection. A contact time of 10 minutes at 20 °C (68 °F) is required for proper disinfection. Solutions should be prepared daily because of the instability of sodium hypochlorite solutions. Chlorine solutions may harm exposed skin, eyes, and mucous membranes. Corrosion of some metals may occur with sodium hypochlorite. Chlorine dioxide in commercial preparations is EPA registered and has American Dental Association (ADA) approval for surface, material, and instrument disinfection. Contact time for disinfection at 20 °C (68 °F) is 3 minutes. One commercial preparation is available that can be used as a sterilant with an immersion time of 6 hours at 20 °C (68 °F). Chlorine dioxides can be corrosive, irritating to the eyes, skin, and mucosa and have unpleasant odors.

2. *Glutaraldehydes.* Two to 3.2 percent glutaraldehyde (neutral or alkaline) can disinfect materials and instruments in 10 to 30 minutes at 20 °C (68 °F) depending on their formulations. Glutaraldehydes

are not recommended for surface disinfection. Chemical sterilization can be achieved by immersion for 6 to 10 hours. Glutaraldehydes can be corrosive, irritating to the eyes, skin, and mucosa, and have unpleasant odors. Glutaraldehyde vapor is potentially dangerous. Work practice and engineering controls may be required to keep exposure below limits found in the OSHA Air Contaminant Standard (29 CFR 1910.1000).

3. *Iodophors.* Iodophors are chemical preparations using the powerful germicidal action of iodines, while reducing their caustic and staining effects. They have typical contact times of 5 to 20 minutes depending on the formulation. These chemicals cannot be used as sterilants. Iodophors can be corrosive, irritating to the eyes, skin, and respiratory mucosa, and have unpleasant odors.

4. *Phenols.* Phenols are combination synthetic preparations with typical contact times of 10 to 20 minutes. They are good cleaners and work well with most detergents. Phenols can be corrosive, irritating to the skin, eyes, and respiratory mucosa, and have unpleasant odors.

(d) Containers for chemical disinfection should be chosen based on manufacturer's recommendations. No container should be used without a lid or suitable cover to keep out dust and air contaminants and to reduce evaporation and chemical vapor release.

(e) All chemical disinfectants should be carefully checked for the recommendations concerning *reuse* of the chemical. Many disinfectants may only be used once before the chemical agent must be replaced; some others may need to be replaced daily; and others may have extended reuse lifetimes. Data referring to *reuse* is usually concerned with chemicals that are used for immersion. Chemicals in bulk storage or kept in spray bottles have a useable life that will be different from their recommended *reuse* life.

(f) Follow all instructions concerning mixing, use, storage, disposal, and required PPE for chemical disinfectants. File the appropriate material safety data sheets as required by HAZCOM policies. The manufacturer is the ultimate source for all information on the product.

b. *Sterilization process monitoring.*

(1) *Chemical indicator (CI).*

(a) CIs are physical or chemical devices employed to monitor one or more sterilization process parameters to detect failures in packaging, loading, and/or sterilizer function.

(b) Since there are presently no official performance standards for CIs available, users are advised of the following:

1. Selection should be based on reliability, safety, and efficiency.
2. Manufacturers of CIs provide written instructions to interpret indicator results, safety, and performance characteristics of the sterilization process monitor.
3. A CI will be considered an adjunct to a sound biological monitoring program, not a replacement for it.

(c) A CI must be used with every package processed.

(d) The CI can be in or on the package being sterilized or both.

(2) *Biologic monitoring.*

(a) The purpose of biological monitoring is to document the effectiveness of specific sterilization cycles under conditions of use. After incubation, the test specimen should have no viable organisms present. A control monitor should be processed along with the test monitor to ensure the incubation conditions are correct.

(b) The Centers for Disease Control and Prevention (CDC) recommend that a biological test be done weekly on dry heat, steam sterilizers, and steam and chemical sterilizers. A biological test will be done with every EO load. U.S. Army Dental Corps policy requires the same standard as the CDC recommendation.

(c) *Bacillus stearothermophilus* spores will be used to test steam sterilizers and non-saturated steam sterilizers.

(d) *Bacillus subtilis* spores will be used to test dry heat and EO sterilizers.

(e) Bowie Dick type test (or an equivalent) for prevacuum and vacuum pulsing sterilizers will be run on each day of use. This test will test steam penetration by demonstrating the adequacy of air removal from the chamber and load, or the presence of an air leak.

(f) Biologic monitors will be placed in a typical load for the

sterilizer being tested. The monitor should be placed in the most difficult area for sterilization to occur. A biologic monitor should never be run in a separate load by itself.

(g) Positive biologic monitor test results require definitive action for the sterilizer identified as ineffective.

1. Notify the area supervisor and unit infection control officer. Take the sterilizer out of operation.

2. Recall all items sterilized since the last negative biologic monitor test. Reprocess these items in another sterilizer.

3. Document the positive test in the sterilizer log.

4. Run a second biologic monitor to verify the operational status of the sterilizer.

5. If the second biologic monitor is positive, request repair of the sterilizer. Tag the unit and unplug the power cord to prevent use until the unit is properly repaired.

6. If the second biologic test is negative, run a normal load with another biologic monitor to verify the correct operation of the unit before returning the unit to service.

7. Always run a biologic monitor when returning a sterilizer to service, whether because of repair or a period of non-use.

8. All positive biologic monitor results and the corrective action taken must be reported to the quality improvement committee for review.

(3) *Monitoring mechanical operation.*

(a) The operator must ensure that the device is functioning properly. Monitoring the mechanical operation involves observation of time and/or temperature recording devices and temperature and/or pressure gauges. These must be examined and monitored by the sterilizer operator during each sterilizing cycle. A sterilizer with built in paper recording devices requires the operator to record the load control number, his or her initials, and the date when each load is run.

(b) When time and/or temperature recorders are not provided, it must be emphasized that timing of the sterilization cycle does not begin until after the maximum temperature and pressure (if applicable) is obtained.

c. *Labeling of sterilization loads.*

(1) All supplies subjected to a sterilizing cycle will bear an identification load control number after completion of the sterilization process.

(2) At no time should any item be stamped with a load control number until after the item has completed the sterilization cycle. Sterile items will be stamped or marked in accordance with this technical bulletin indicating the date on which sterility expires and the load control number.

(3) All parts of packages should be clearly labeled on the exterior of opaque wrapping so that the contents of the pack may be easily ascertained by any user.

(4) The load control number (see table 1-2) will consist of seven digits as follows:

(a) The first two digits indicate the numerical designation of each sterilizer.

(b) The third, fourth, and fifth digits indicate the calendar day of the year, numbered consecutively from day 001 through day 365.

(c) The sixth and seventh digits indicate the number of the sterilization load during the 24-hour period.

**Table 1-2**  
**Example of a load control number (# 0921503)**

Explanation	Sterilizer number	Day	Load number
Digits	1, 2	3, 4, 5	6, 7
Load control number	09	215	03

(5) All packages will be marked visibly with an expiration date.

(6) Color coding systems may be used only as an adjunct to the required expiration date and load control number.

d. *Record keeping and care of sterilizers.*

(1) Mechanical process control monitors procedures are as follows:

(a) Temperature and/or pressure gauges must be examined by the operator during the sterilization cycle.

(b) Prior to removing materials from the sterilizer, the sterilizer log must be initialed to verify attainment of adequate temperature and duration of exposure.

(c) Recordings (if applicable) must be maintained in the immediate area of the sterilizer for a period of 12 months. (See AR 25-400-2.) Facilities that must meet JCAHO standards must keep these records for 3 years.

(2) Laboratory or incubator reading results of biological testing on sterilizers will indicate any positive readings after 24 to 72 hours of incubation. A final written report from the laboratory is then sent back to the sterilizer user. The written report results or the local incubator results must be recorded in the sterilizer log book.

(3) A log book for each sterilizer will be maintained with the following information:

(a) Sterilizer number.

(b) Date.

(c) Load control number.

(d) Expiration date based on material in load.

(e) Contents of load.

(f) Operator.

(g) Result of biological tests, result of control, and initials of person recording results.

(4) The log book with biological test results will be kept on file in the using area for a minimum of 12 months. Biological test results may be destroyed upon approval and recording of results by the quality improvement committee into their minutes.

(5) All facilities that incubate their own biologic monitors will maintain a log book of that procedure. The log book will record:

(a) Sterilizer number.

(b) Date and time incubation started.

(c) Date and time test results read.

(d) Results of test and control.

(e) Operator identification.

(6) Operator preventive maintenance procedures for sterilizers are published by the manufacturer or may be contained in TM 8-6500-001-10-PMCS or FM 8-38. A schedule of normal maintenance procedures will be kept in the sterilizer log book. This is an operator responsibility, not a medical maintenance function.

(7) Qualified medical maintenance technicians should be called for repair of controls or replacement of parts when indicated. Medical maintenance personnel will maintain maintenance records in accordance with TB 38-750-2.

e. *Shelf life.*

(1) The shelf life of sterilized items is event related and not time related. It is dependent upon the quality of the wrapper material, the storage conditions, the conditions during transport, and the amount of handling. Shelf life is not simply a matter of sterility maintenance, but is also a function of materials life and inventory control. Periodic inspection of wrapper integrity is essential to ensure the proper condition of the package contents. Instruments and sterile packs should be stored in environmentally controlled areas, preferably in closed storage systems. First-in/first-out storage arrangements will keep the inventory flowing and ensure proper circulation of packs. If packs are expiring on a regular basis, perhaps the instrument inventory is too large. Keeping the proper number of instruments on hand will allow for frequent turnover of the packs. The maximum shelf life is as follows:

(a) Nylon, plastic, plastic and paper laminate—12 months.

(b) Papers and wovens—72 hours.

(c) Papers and wovens, placed in hermetically sealed or envelope (taped closed) protective covers (after a sufficient cooling period following the sterilization cycle)—12 months.

(d) Papers and wovens removed from hermetically sealed or envelope protective covers and not opened or contaminated—72 hours.

(2) Commercially prepared sterile items will be considered sterile unless the integrity of the packaging has been compromised or the manufacturer's expiration date has been reached.

(3) Some packaging is hard to categorize. The manufacturer should be consulted to determine the maximum shelf life of any packaging not noted in (a) through (d) above.

(4) Items not packaged but kept in strictly sterile, environmentally controlled areas can be considered sterile for that work shift only. After one work shift, these items can only be considered "sterilized" in that they cannot cross contaminate other items and they can be considered "clean" for use. The CDC recommends that items in the critical or semicritical categories be packaged prior to sterilization if they will not be used immediately.

(5) Items removed from packaging but not used must be reprocessed.

*f. Decontamination for shipping or repair.* Dental treatment items in need of repair will be disinfected and sterilized prior to shipment to and upon receipt from maintenance. If sterilization or high-level disinfection is not possible, the proper warning label will be attached in accordance with 29 CFR 1910.1030 (Final Rule, OSHA Bloodborne Pathogens Standard).

*g. Solutions.* Preparation and sterilization of parenteral and irrigating liquids by health care facilities are discouraged. However, there may be instances when solutions must be processed in the health care facilities; for example, in emergency and field situations. In such instances, a quality assurance program must be implemented to assure sterility and nonpyrogenicity.

*h. Reprocessing of single-use items.* Single-use items will not be reprocessed and/or re-sterilized in the health care facility unless the manufacturer provides specific written instructions for processing and reusing these items. Only in emergency situations can single-use items be reprocessed for patient care use. This emergency situation must be well documented. Use DA Form 4106 (Quality Assurance/Risk Management Document). (See AR 40-68.)

## 1-6. Universal precautions

Universal precautions is an approach to infection control. According to the concept of universal precautions, all human blood and certain human body fluids are treated as if known to be infectious for human immunodeficiency virus (HIV), hepatitis B virus (HBV), and other bloodborne pathogens. Universal precautions also refers to systems designed to protect health care workers (HCWs) and patients by minimizing variations in the protocols for treating patients. Under the concept of universal precautions, the required infection control items and procedures are determined by the characteristics of the procedures, not by the characteristics of the patient. All patients are to be treated alike (potentially infectious) and any "high risk" protocols, treatment rooms, or special appointment times are not appropriate. The U.S. Army Dental Care System functions under the concept of universal precautions.

*a.* Dental clinic personnel will wear appropriate protective barriers such as eye wear or chin-length face shields, disposable gloves, disposable masks, protective garments, and other needed items when performing procedures capable of causing splash or splatter of blood or other potentially infectious materials (OPIM), during anticipated contact with blood or OPIM, contact with mucous membranes, or touching items possibly contaminated with those fluids.

(1) Disposable gloves are single-patient-use items. They may *not* be washed and reused under any circumstances. The type of gloves is chosen based on the procedure being performed. Latex exam gloves are adequate for most dental procedures unless a sterile field requires the use of sterile gloves. Nitrile latex gloves offer increased resistance to punctures. Overgloves can be used to cover contaminated gloves if HCWs need to touch uncontaminated areas or items. Hands must be washed before donning and when removing gloves.

(2) Utility gloves that are chemical and puncture resistant must be used when handling contaminated instruments, when performing operatory cleanup, and for other contact with contaminated surfaces

or disinfectant chemicals. Utility gloves may be decontaminated or sterilized according to manufacturers' instructions as long as their barrier properties are not compromised.

(3) Masks used for barrier protection in dentistry should have at least a 95 percent filtration rate of particles 3 to 5 microns in diameter. Masks should be worn whenever splash, spray, spatter, or aerosol is anticipated during patient care or cleanup procedures.

(4) Protective eyewear should meet safety standards for projectiles as well as protection from splash, sprays, or spatter. At a minimum, eyewear should consist of safety eyeglasses with solid sideshields. Goggles and face shields are also acceptable. Splash shields can be used when protection from projectiles is not needed, but splash shields rarely meet the standards required for protection from projectiles. Splash shields protect safety and personal glasses from contamination during dental procedures. Contaminated glasses should be washed between patients. Face shields and splash shields do not protect DHCWs from aerosols. Therefore, they are *not* substitutes for proper use of face masks.

(5) Protective garments must be worn to protect clothing and uniforms from contamination whenever contamination is anticipated during dental procedures or cleanup tasks. The level of protection (long sleeves, closed neck, garment length, etc.) is determined by the procedure that is being performed. Generally cotton/polyester-type fabric garments are satisfactory for routine dental procedures. Disposable cover garments are also acceptable. Contaminated garments must be removed or covered with non-contaminated garments when leaving the work area. Laundering of *protective* garments is the responsibility of the U.S. Army Dental Command (DENCOM). Recommendations in the OSHA Bloodborne Pathogens Standard (29 CFR 1910.1030) and the latest CDC recommendations for protective garment laundering should be followed.

(6) Barrier protection of items or surfaces difficult to clean or disinfect is acceptable. Barriers must be designed to protect the surface or item in question and be removed and replaced in the proper sequence during cleanup to prevent cross contamination.

*b.* Engineering and work practice controls are the primary methods used to minimize the exposure of DHCWs to blood or OPIM.

(1) Engineering controls isolate or remove the hazard from the DHCW. Rubber dam, high-speed evacuators, sharps disposal containers, and other such controls are examples in dentistry. Engineering controls must be evaluated and examined on a regularly scheduled basis to judge their effectiveness.

(2) Work practice controls reduce the likelihood of exposure to blood or OPIM by altering the manner in which a task is performed. Any work practice that reduces the chance of splatter, splashing, spraying, or generation of droplets can be a work practice control. Eliminating bending or recapping of needles would be a work practice control. These controls should be evaluated and examined on a regular basis to judge their effectiveness.

*c.* Nonimmune DHCWs should be immunized for protection from a number of infectious diseases. This includes rubella (German measles), rubeola (measles), mumps, and poliomyelitis. Annual influenza immunization should be provided for all DHCWs at no cost to themselves. DHCWs must be offered, at no cost to themselves, the HBV vaccination series. This offer must include training about the vaccination, risk of exposure to blood or OPIM in the workers' job, and information about HBV infection and epidemiology. This training and the initial vaccination must occur within 10 working days of assignment to a job where there is reasonable risk of exposure to blood or OPIM. Employees who refuse the vaccination series must sign a declination form approved by OSHA. See 29 CFR 1910.1030 (Final Rule, OSHA Bloodborne Pathogens Standard) for further information.

## 1-7. Hand washing

*a. Skin flora.* The skin harbors two types of flora: resident and transient. Resident organisms can survive and multiply on the skin, can be cultured repeatedly, are usually of low virulence, and are not easily removed. Conversely, transient bacteria do not readily survive and multiply on the skin and are not firmly attached. It has been

shown that the mere mechanical action of rubbing the hands together and rinsing them under running water is an important aspect in the removal of transient organisms.

*b. Hand washing.* HAND WASHING IS CONSIDERED TO BE ONE OF THE MOST IMPORTANT PROCEDURES IN PREVENTING INFECTIONS. The purpose of hand washing is to remove resident bacteria and transient organisms acquired from contact with patients or contaminated surfaces.

*c. Soap.* Any approved antimicrobial liquid soap (chlorhexidene gluconate, for example) can achieve satisfactory results. Bar soap should be avoided as it has been shown to harbor and even allow microorganisms to grow and multiply. Clinic latrines should also be provided with liquid soap, not bar soap.

*d. Hand-washing techniques.* A rigid hand-washing policy must be followed by all personnel involved with patient care.

(1) At the beginning of the work day—

(a) Remove all jewelry, and check hands for cuts and abrasions.

(b) Trim and clean fingernails, using a nail cleaner. False fingernails or nail polish should not be worn. Contamination may occur from fungal growth occurring between false and natural nails.

(c) Scrub hands and forearms with an approved liquid soap for 2 minutes; rinse well under warm water.

(d) Repeat the cleaning process twice, lathering for 10 seconds, and rinse thoroughly. Some hand cleansing agents will irritate the skin if not thoroughly removed.

(e) Dry hands first, then forearms, with a disposable paper towel, and then use that towel to turn off faucets if they are hand controlled.

(2) Between patients—

(a) Lather hands and forearms for 10 seconds, rinse, and repeat lather step. Rinse thoroughly with warm water.

(b) Dry hands first, then forearms, with a disposable paper towel, and then use that towel to turn off faucets if they are hand controlled.

(3) To perform a surgical scrub—

(a) Remove all jewelry and clean fingernails with a clean plastic or wood stick. Examine hands for cuts and abrasions.

(b) Scrub nails, hands, and forearms with an antimicrobial soap and a sterile brush or sponge for 7 minutes, using multiple scrub and rinse cycles.

(c) Rinse hands and forearms with cool water, starting at the fingertips and keeping the hands above the elbows. Let the water drip from the elbows, not the hands.

(d) Dry with a sterile towel beginning with the hands and working toward the elbows.

(e) Apply gloves in an aseptic manner.

(4) Repeat hand cleansing between patient appointments, before handling records, before lunch, after a break in routine, and before leaving the clinic.

protective garments are required if splash, spray, or splatter is anticipated during the cleaning of instruments or surfaces. These safeguards protect against contamination from blood, OPIM, and/or chemical agents.

*b. Patient debris and body fluids (bioburden) must be removed from all instruments prior to sterilization or disinfection. This is accomplished by using a mechanical cleaning device such as an ultrasonic cleaner, inspection of the instruments, and cleaning by hand if necessary. Room temperature or warm water should be used with the appropriate agent selected for the task being performed. Use only detergent formulations designed for ultrasonic cleaners in those devices and follow all manufacturers' instructions on the use of the machine and cleaning solution. All instruments will be thoroughly cleaned to remove debris prior to sterilization and/or high-level disinfection.*

(1) If instrument cleaning is delayed, presoaking contaminated instruments in a detergent or pre-soak disinfectant formulated for instrument holding is recommended. The instruments can be held in an ultrasonic cleaner or other suitable container. Ultrasonic cleaners should be labeled with a universal biohazard label. If an alternate container is used, it must meet the requirements of the OSHA Bloodborne Pathogens Standard (29 CFR 1910.1030). These containers (including ultrasonic cleaners) must be designed so the DHCW does not have to reach into the container with his or her hand to retrieve the instruments.

(2) Ultrasonic cleaning is recommended because of its effectiveness in initial removal of bioburden while reducing hand contact with potential injury-causing reusable sharps. The cleaning solutions in ultrasonic cleaners should be changed according to the manufacturers' use instructions. The cleaning chamber should be decontaminated when the solution is changed.

(a) Place instruments in the holding container and submerge it in the cleaning solution. Load the ultrasonic cleaner with only the number of instruments recommended by the manufacturer.

(b) Cover the ultrasonic cleaner and process the instruments for the time recommended by the ultrasonic manufacturer (usually 5 to 10 minutes). If instrument cassettes are used, the processing time must be in accordance with the cassette manufacturer's guidelines.

(c) Remove the instrument container or cassette and rinse thoroughly under warm water.

(d) Inspect the instruments (including those inside cassettes) and initiate further cleaning if the instruments are still dirty. If hand scrubbing is necessary, scrubbing under warm water reduces the creation of spatter, spray, and aerosols. Dental health care workers (DHCWs) must use proper PPE when manipulating contaminated instruments by hand.

(e) After rinsing, dry all instruments before packaging for sterilization.

*c. Handpieces must be cleaned and sterilized between each patient. The handpiece and water line should be flushed for 30 seconds into a sink, container, or high-speed evacuation system before removing for proper processing. The manufacturer's instructions must be followed exactly to maintain the handpiece in the optimum condition. There is no universal procedure for processing handpieces because each manufacturer requires different procedures for its specific equipment. (For example, some handpieces require lubrication during the sterilization cycle while some do not.) If any question exists concerning the proper procedure, contact the manufacturer for the appropriate information.*

*d. The tips for air/water syringes must be sterilized between each patient. The air/water syringe handle can be sterilized, disinfected, or barrier protected. Disposable air/water syringe tips are also acceptable.*

*e. Dental burs are considered to be critical or semicritical items and therefore require sterilization. The CDC also recommends packaging dental burs if they are not going to be used immediately. To help prevent corrosion of dental burs, dry-heat sterilization can be used, a rust inhibitor can be sprayed on the burs, or a small piece of absorbent gauze can be added to the pack to absorb excess moisture.*

*f. Noncritical items such as pliers used for wire bending, acrylic*

## Chapter 2 Techniques and Procedures

### 2-1. General

There are three distinct phases in the process of attaining effective disinfection and sterilization. Each phase has an important bearing on the outcome and end results of the total standardized technique. There can be no shortcuts and the process should be carried out in sequence with meticulous care and attention to detail. The classification system in table 1-1 should be used to determine the level of disinfection and/or sterilization needed. Also keep in mind that the CDC recommends that any critical or semicritical item that will not be used immediately be packaged before sterilization.

### 2-2. Phase I—Decontamination

*a. All DHCWs responsible for cleaning and decontaminating instruments must wear heavy-duty utility gloves to handle contaminated reusable instruments. A mask, protective eyewear, and*



adjusting tools used extraorally, etc., can be disinfected with an intermediate tuberculocidal disinfectant or can be sterilized. These items do not have to be packaged for storage unless actual sterility is necessary for their clinical use. Once the cross contamination potential is eliminated by disinfection or sterilization, these noncritical items become "industrially clean" and can be stored in limited access areas until needed. It must be understood that without packaging, these items should never be used in situations that would change their classification to semicritical- or critical-level items. (See para 1-5.)

g. Aseptic techniques should be used to prepare dental treatment areas for patient care. Cross contamination can be eliminated by precise methodology when cleaning after patient care and preparing the instruments and area for the next patient.

(1) At the beginning of the treatment day, all water lines should be flushed for 3 to 5 minutes to reduce the microbial content of the water lines. This is necessary for all types of units unless the actual water hoses are removed and decontaminated. Prepare the operatory by placing appropriate barrier protection on those areas needing protection. Lay out materials needed for the procedure using the unit dose concept. Prepare instruments in an aseptic manner to avoid contamination. Instrument packs should not be opened far in advance of the actual procedure. If instruments are not used, they must be reprocessed at the end of the work shift. Opening large numbers of packs in anticipation of patient work load should be avoided as this can create confusion as to which instruments are clean and which have been used. Keep clutter and unnecessary items away from the patient treatment area to avoid possible contamination.

(2) During patient care, avoid touching items not part of the treatment environment. Have overgloves (plastic "food handlers" gloves are excellent) available to cover contaminated gloves if the DHCW must touch items out of the treatment area (phone, chart, radiographs, etc.). If no overgloves are available, remove contaminated gloves before touching non-treatment objects or use a circulating team member to accomplish these tasks. Never leave the treatment area without removing or covering PPE. Be aware of objects and surfaces contaminated during procedures so proper cleaning and disinfection can occur after the patient treatment.

(3) An established routine should be used between patients to help ensure proper technique in operatory preparation.

(a) Use heavy-duty gloves (nitrile rubber are recommended). Remove handpieces, air/water syringe tips, and other items to be processed and transport these items and the reusable instruments to the central sterilization area. If no central sterilization area exists, reprocess the items according to local guidance. The OSHA Bloodborne Pathogens Standard (29 CFR 1910.1030) specifies the requirements of containers for transport and holding reusable sharps and other contaminated items. Reprocess instruments according to local policy and paragraph 2-2.

(b) All contaminated disposable sharps should be accounted for and carefully placed in designated containers.

(c) Remove all protective covers carefully so contamination of the protected item or surface does not occur. Collect all waste material and separate it into general waste and regulated medical waste (RMW) ("red bag waste") and dispose of according to local policy. Generally RMW is—

1. Liquid or semi-liquid blood or OPIM; contaminated items that would release blood or OPIM in a liquid or semi-liquid state if compressed; items that are caked with dried blood or OPIM.

2. Waste that is potentially capable of causing disease in man and may pose a risk to both individual or community health if not handled or treated properly. It consists of the classes listed in table 2-1.

(d) Environmental surfaces that were not covered and have become contaminated must be cleaned and disinfected. Clean with disposable paper towels and either a detergent or the surface disinfectant if the disinfectant is designed to function as a cleaner (many do both jobs). Once cleaning is accomplished, the surface should be wet with the appropriate disinfectant and left for the proper contact

time. Some disinfectants require removal after the disinfection process is completed. Refer to the manufacturers' instructions concerning the proper use of all disinfectants.

**Table 2-1**  
**Classes of regulated medical waste**

Category	Material
Class I	Culture stock and vaccine
Class II	Pathological waste
Class III	Blood and blood products
Class IV and VII	All used and unused sharps
Class V	Animal waste
Class VI	Isolation CDC Risk Group IV Group

(e) Suction hose ends, handpiece connectors, air/water syringe handles, etc., that cannot be removed and sterilized must be barrier protected or disinfected. To disinfect, hold in a paper towel to reduce overspray and wet completely with the disinfectant for cleaning. After cleaning, wet again and leave the disinfectant on the object for the required contact time. The object needs to be cleaned and disinfected only once daily if proper barrier protection is used. If contaminated, these items must be disinfected between patients.

(f) If not covered, spray and scrub supports and holders on the dental unit. Clean all areas that may have become contaminated during patient treatment. Wet with the disinfectant and leave on the equipment surface for the proper contact time.

(g) The cuspidor should be cleaned on the inside and the outside.

(h) Cleaning and disinfecting the dental chair and other environmental surfaces is based on the level of contamination they received during the dental procedure. Use common sense to determine which objects and surfaces need attention.

(i) Wash and remove contaminated gloves after all cleaning and disinfecting has occurred. Utility gloves can be decontaminated by disinfection or sterilization for reuse.

(j) Set up the operatory in the same manner as would be done at the beginning of the day. Use appropriate covers, unit-dose concept for supplies, and do not break aseptic techniques during set up, patient care, or cleanup.

h. In dental radiology, cross contamination during the film-taking process is quite possible; therefore, the following procedures will be used.

(1) A rigid hand-washing policy must be followed by all personnel involved with radiology patients.

(2) Film holding devices will be sterilized between each patient.

(3) All items that are not sterilizable should be immersed in an intermediate-level disinfectant between each patient for the proper contact time. Sterilizable equipment is preferred.

(4) If they are not disposable, cover panoramic unit bite blocks with a disposable cover and change between each patient. If covers are not available, sterilize or use an intermediate disinfectant.

(5) After removal from the patient's mouth, the film packet should be placed in a disposable container for transfer into the darkroom. Wrappers should be discarded into the disposable container to prevent cross contamination of counter top or developing unit. Use of barrier-protected film is an alternative to the complicated route required to prevent cross contamination during the developing procedure.

(6) Headrests should have plastic covers that are changed between patients. If the chair becomes contaminated during the procedure, it must be disinfected.

(7) Barrier protection is the preferred method to protect the radiology tubehead, exposure buttons, chair operating controls, and other equipment during the film-taking procedure. Covers should be changed between patients if they are touched with contaminated hands. If disinfection is required because of failure of the barrier protection or inadvertent contamination, caution should be used with spray disinfectants used on the tubehead or electric exposure buttons.

(8) Care must be taken in the darkroom and at automatic developing units to ensure no contamination occurs during the developing procedure.

### 2-3. Phase II—Sterilization

After completion of the decontamination process (Phase I), dental items requiring sterilization should be processed by the method of choice dictated by the object or material being sterilized (Phase II). Initiation of Phase II starts with packaging as follows:

a. The function of a package containing a sterile medical item is to assure that the contents are maintained in a sterile condition until the package is intentionally opened. Provisions must be made for the contents to be removed without contamination.

b. Users must evaluate the many packaging materials available and select those best suited to their needs. Packaging material of reusable woven fabrics must be laundered between uses. Factors to be considered include—

(1) Suitability for the sterilization method used. The material must provide for adequate air removal and sterilant penetration.

(2) Ability of the material to function as a barrier to microorganisms or their vehicles.

(3) Resistance to tear or puncture.

(4) Proven seal integrity.

(5) Ease of aseptic presentation. The package must be flexible and memory free.

(6) Absence of toxic ingredients and nonfast dyes.

(7) Economic.

c. The type of package dictates the shelf life of the sterilized items. Because of the difficulty evaluating some products, manufacturers' documentation should be the determining factor when marking package expiration dates on the sterilized packs. If the manufacturer demonstrates acceptable data that extends shelf life beyond the typical suggested shelf life in this manual, document that information in a written format and attach that plan to this document and any sterilization document used by the dental facility.

### 2-4. Phase III—Storage and care of sterile instruments and materials

The disinfection and sterilization process is of little value unless proper attention is directed to the safekeeping of sterile instruments and materials.

a. Storage areas should be dustproof, dry, well ventilated, and easily accessible for routine dental use. Sufficient space in drawers or racks should be available to allow for rotation of bags and packs so the oldest items through the sterilization cycle are the first used.

b. Sterile materials should be stored at least 8 to 10 inches from the floor, at least 18 inches from the ceiling, and at least 2 inches from outside walls.

c. Items should be positioned so that packaged items are not crushed, bent, compressed, or punctured.

d. Items must not be stored in any location where they can become wet.

e. Outside shipping containers and corrugated cartons should not be used as containers in sterile storage areas.

f. Open-shelved storage may be used in an environmentally controlled area with limited access and restricted traffic. Closed-shelf storage will be used if conditions for open-shelf storage are not met.

g. Wrapped sterilized materials should be positioned in storage areas so the label and dating entry are readily visible and easily inventoried. Wrapped materials will not be opened until required for operational use.

### 2-5. Factors contributing to failures

Common causes of failure in disinfection and sterilization are—

a. Inadequate preparatory steps before the disinfection and sterilization processes are attempted.

b. Improper packaging, loading, and placement of instruments or materials in the disinfection and sterilization containers.

c. Failure to time the periods of cycle exposure correctly.

d. Lack of attention to the orderly, step-by-step sequence in the operational techniques.

e. Failure to understand the limitations, capabilities, and requirements of the disinfection and sterilization sequence needed to attain an absolute goal.

f. Inadequate attention to details and controls on storage and dating of materials processed in a sterilization cycle.

### 2-6. Consideration for proper sterilization

The following factors should be considered:

a. Intelligent, painstaking efforts and professional discipline.

b. Cleanliness of the material's surface being processed.

c. Composition and nature of item subjected to the procedure.

d. Physical and chemical factors in the surrounding environment or medium being treated.

e. Time the material is exposed to a disinfection or sterilization agent.

f. Shelf life, use life, and reuse life of a disinfectant.

g. Concentration and type of contaminant.

h. Concentration and temperature of the solution or gas (chemical agent).

i. Steam temperature and pressure.

j. An adequate drying cycle.

k. A clear understanding and observation of the procedure by the users.

l. Rinsing of instruments sterilized by liquid in sterile water.

m. Drying of chemically sterilized instruments in sterile towels.

n. Proper storage of sterilized instruments.

## Chapter 3 Infection Control in Dental Clinic Laboratories and Area Dental Laboratories

### 3-1. General precautions

a. The dental laboratory production area must be isolated from possible transmission of pathogens or be properly prepared to prevent cross contamination from patients and DHCWs or to patients and other workers. Dental laboratory technicians, along with all DHCWs, must have the tasks they perform properly evaluated for exposure risk from bloodborne pathogens (exposure determination) according to 29 CFR 1910.1030 (Occupational Exposure to Bloodborne Pathogens, Final Rule).

b. Dental laboratories must operate using one of two general techniques to manage infection control. The laboratory can be maintained as an isolated area and require all prostheses, impressions, and other laboratory work to be disinfected before entering the laboratory (clean dental laboratory). The second method requires a receiving area to isolate, evaluate, and decontaminate all materials entering the laboratory (standard dental laboratory). Both methods are effective and the choice would be dependent on physical plant, laboratory location, and personnel distribution. The greatest necessity is effective communication between the laboratory and the user/client concerning the requirements that are necessary for case submission and the proper steps to ensure proper disinfection of materials both entering and leaving the laboratory.

c. Universal precautions will be observed in the dental laboratory at all times. The use of universal precautions has eliminated the need for special handling of cases from "high risk" patients. All patients are treated as though they are capable of transmitting a bloodborne disease. In the dental laboratory the concern relates to blood and OPIM (fluids) from a patient. Treating all body fluids as potentially infectious is a method of infection control known as body substance isolation (BSI). Universal precautions include—

(1) HBV immunization.

(2) Meticulous personal hygiene including proper hand washing.

(3) Eye protection.

(4) Mask and gloves when necessary.

(5) Protective clothing when necessary.

(6) Proper control measures in the receiving, distribution, and shipping areas.

(7) No eating, drinking, or smoking in the laboratory.

d. Chemical disinfectants and other materials must meet all appropriate EPA and ADA programs for acceptance and all employees must be properly trained to handle these materials.

### 3-2. Standard dental laboratory infection control

#### a. Receiving area.

(1) A receiving area must be established to handle all items entering the laboratory. This receiving area should have running water and hand-washing facilities. This area and counter surface should be covered with impervious paper if possible, and cleaned and disinfected on a regular basis determined by the use level of the area. No item can enter the production area without being properly disinfected. (See para 3-4 for proper methods of disinfection.)

(2) The receiving area technician must use all proper PPE to include a gown or coat that will remain in the contaminated work area, glasses with solid side shields or a face shield and face mask for protection from splatter, and gloves (disposable latex or reusable nitrile latex) for handling contaminated items. All items will be handled in an aseptic manner and transferred to the production area after the proper disinfection steps have been completed. (See para 3-4 for proper methods of disinfection.)

(3) Disposable trays, impression material, and other waste generated in the receiving area will be disposed of according to 29 CFR 1910.1030 (Final Rule, OSHA Bloodborne Pathogens Standard), AR 40-5, State laws, and local Army medical activity and DENCOM policies. Unless waste falls into the category of RMW, these materials may be disposed of in the standard waste containers. RMW definitions are also controlled by the State and/or area of the waste-producing facility. Under most circumstances, very small amounts of RMW will be generated in the dental laboratory. All disposables that can be considered as a sharps item (orthodontic wire, disposable blades, burs, etc.) must be disposed of in proper containers designated as a "sharps" disposal container. All reusable items must be considered contaminated until such items are properly processed for reuse. If packing material has been contaminated and cannot be disinfected, it should be discarded.

#### b. Shipment area.

(1) The area designated for final inspection, cleaning and/or disinfection, and shipping must be properly managed for all items leaving the dental laboratory. The cleaning and/or disinfection of all items leaving the laboratory is essential to preclude any contamination from technician or the laboratory from reaching the DHCW or patient. The level of contamination would be determined by laboratory policy and procedures. Most dental laboratory operations do not expose cases to bloodborne pathogens, therefore no special handling is needed during this stage. If some type of contamination by a possible bloodborne pathogen occurs during the production cycle, proper hospital-level disinfection procedures will be used.

(2) This area cannot be the same as the receiving area unless it has been properly cleaned and disinfected after all cases have been received. Technicians must wear proper PPE for the chemicals used at this station. After inspection and cleaning and/or disinfection (see para 3-4), all cases must be rinsed to remove chemical residue, and packed according to local policies and regulations. Cases should be placed in plastic bags to prevent possible contamination from shipping materials. The shipping area must be cleaned and disinfected at least once a day. Because of handling during shipment, each case will be disinfected at the clinic level before being placed in a patient's mouth.

(3) All case pans must be cleaned before they are returned to use for new cases.

#### c. Production area.

(1) The production area is managed according to standard safety requirements. The items and materials in the production area have been disinfected and no special handling is needed. Laboratory staff must monitor use and entrance into this area to ensure no contaminated item or person is allowed. Some equipment and tools need

special attention in all production areas of the dental laboratory and are discussed in paragraph 3-5.

(2) If inadvertent contamination occurs in the production area, the contaminated items must be properly disinfected before work continues.

### 3-3. Clean dental laboratory

a. *Receiving area.* The dental laboratory managed under an isolated concept needs no special precautions in the receiving area. All disinfection procedures are done in the clinic by the DHCW before any material or item is shipped or delivered to the laboratory. All laboratory users must be aware that only biologically clean items may enter the laboratory. All laboratory users/clients should stamp or annotate on the work authorization: "This case was properly disinfected before shipment." The U.S. Army Area Dental Laboratories will operate under this concept. (See para 3-4 for clinical disinfection techniques.)

b. *Shipping area.* The shipping area in this laboratory is run in the identical manner as the standard dental laboratory. (See para 3-2b.)

c. *Production area.* The production area in this laboratory is run in the identical manner as the standard dental laboratory. (See para 3-2c.)

### 3-4. Clinical and laboratory disinfection (materials and techniques)

a. Impressions must be handled as follows:

(1) Reversible and irreversible hydrocolloid material must be handled carefully to prevent distortion. The impression should be gently scrubbed with a camel-hair brush (artist's brush NSN 8020-00-619-8929) and an antimicrobial (for example, chlorhexidine gluconate) detergent to remove bioburden. Scrubbing gently with dental stone sprinkled into the impression will remove stubborn materials. The impressions should be thoroughly soaked by spraying with or dipping in a hospital-level disinfectant. Iodophors, sodium hypochlorite (0.5 percent), 2 percent acid glutaraldehyde, or chlorine dioxide products are acceptable. The contact time recommended by the manufacturer must be observed. The impressions should be loosely wrapped in a plastic bag to prevent evaporation of the disinfectant during the contact period. The impression should be rinsed, handled in an aseptic manner, and transferred to the production area of the laboratory.

(2) Silicone (vinyl polysiloxane) or rubber-based impression material may be handled in the same manner as paragraph (1) above. These materials are much more stable and can also be immersed in any hospital-level disinfectant except neutral glutaraldehyde for the contact time recommended by the manufacturer.

(3) Polyether impression material may be handled in the same manner as in paragraph (1) above.

*Note.* Polyether materials cannot be immersed in a disinfectant solution.

b. Prostheses, intertreatment prosthodontic materials (occlusion rims, interim prostheses, occlusal registrations, etc.), and non-sterilizable equipment, such as some facebow components, must be cleaned with soap and water and disinfected with a hospital-level disinfectant. If ultrasonic cleaners are used for cleaning or disinfecting, care must be taken not to overheat the material or disinfectant in the ultrasonic cleaner. Soaking these items in the disinfectant in a separate container or bag is the preferred method. It is important to remember that most immersion disinfectants can only be used once before they should be discarded. This makes individual-size units the most cost effective method of handling. After the recommended contact time, the item is rinsed and handled in an aseptic manner for transfer to the laboratory production area. Iodophors, chlorine solutions, glutaraldehydes, or phenols are all acceptable for this step. Care must be taken not to exceed manufacturers' recommendations for contact time on metal components as corrosion could occur if not handled correctly. If the disinfection occurs prior to patient contact, the item must be rinsed properly before being placed in a patient's mouth. Items should never be shipped or stored in chemical disinfectants.

c. Casts are the most difficult prosthodontic item to disinfect without causing damage. It is preferable to disinfect the impression so the cast will not have to be disinfected. However, inadvertent contamination or no indication of decontamination may make cast disinfection necessary. Casts may be set on their ends to facilitate drainage and sprayed with an iodophor or chlorine product, then rinsed and handled in an aseptic manner for transfer to the production area. If the cast is being disinfected for shipping, it should be allowed to dry before wrapping for shipment.

d. Articulators, case pans, and other equipment that make no patient contact but require cleaning and disinfection should be evaluated based on their construction. Most can be disinfected by spraying with a hospital-level disinfectant, rinsing, drying, and lubricating (items with moving parts). Prevention of contamination by barrier protection and careful handling is preferable to using chemical agents on delicate equipment.

e. Any item that will withstand standard heat sterilization should be sterilized before reuse.

### **3-5. Laboratory equipment and infection control**

No matter how well infection control is practiced, some equipment should receive special attention even in the "clean" laboratory. This will place one more barrier in the path of possible cross contamination and provide less chance of introducing a laboratory contamination during the production cycle.

a. Polishing lathes (pumice and dry) should be handled as follows:

(1) The pumice solution should be made by suspending the pumice in tincture of green soap or other surfactant and adding an effective disinfectant solution to the mix. Iodophors or chlorine dioxide products are both acceptable. If the laboratory production area is properly isolated as outlined, no need exists for having separate pans for new and existing prostheses. The pumice must be changed daily and the machine must be cleaned and disinfected daily. If a pumice/polishing machine is available outside the production area for DHCWs to use and no disinfection procedures are followed before contact with contaminated prostheses, then a unit dose concept of pumice dispensing is preferred. Disposable trays or liners should be considered in the latter case. This unit must be cleaned and disinfected daily.

(2) All brushes, rag wheels, and other laboratory tools should be sterilized or disinfected daily. Wet rag wheels should be stored in a disinfectant solution when not in use. If a pumice/polishing machine is available outside the production area for DHCWs to use and no disinfection procedures are followed before contact with contaminated prostheses, then a unit-dose concept of accessory packaging should be available.

b. Pressure pots must be cleaned and disinfected daily. Pots that maintain warm water environments are especially susceptible to microorganism colonization.

c. Bench tops and work surfaces in receiving and shipping areas in "standard dental laboratories" should be cleaned and disinfected at the end of the work day or if inadvertent contamination occurs. Surface disinfection protocols are the same in the dental laboratory as in the dental clinic.

### **3-6. Special considerations and exceptions**

a. Severely contaminated prosthetic devices may have copious amounts of calculus and other tenacious bio burden. The first step is to remove this material so effective decontamination can occur. Stone and plaster removal solution in a beaker or plastic bag for soaking and placing in an ultrasonic cleaner will remove most of the material. Follow this step with cleaning in a detergent and then disinfect with the procedures discussed in paragraph 3-4.

b. Some items may not be able to withstand disinfection procedures prior to entrance into the laboratory production area (that is, staining and glazing porcelain, etc.) and exceptions to the basic principle of disinfecting first may be made. The procedure must be followed closely and proper cleaning and disinfecting must be done

on equipment and areas that become contaminated during the process. Again, close communication with laboratory staff is essential.

### **3-7. Summary**

Whatever laboratory infection control methods are employed, it is important to have excellent communication and cooperation between the laboratory and the user/client. The safety of the technician and patient is only ensured by confidence that both professionals used the proper procedures in the correct manner. Whenever a question exists as to the possible contamination of an item entering the laboratory system, the item should be treated as contaminated until processed by prescribed methods.

## Appendix A References

### Section I Required Publications

#### AR 25-400-2

The Modern Army Recordkeeping System (MARKS)

#### AR 40-5

Preventive Medicine

#### AR 40-68

Quality Assurance Administration

#### FM 8-38

Centralized Materiel Service/Section

#### TB 38-750-2

Maintenance Management Procedures for Medical Equipment

#### TM 8-6500-001-10-PMCS

Operator's Manual, Preventive Maintenance Checks and Services for Reportable Medical Equipment (Consolidated)

### Section II Related Publications

#### American Dental Association

Infection Control Recommendations, *Supplement to the Journal of the American Dental Association (JADA)*, August 1992. (ADA publications may be obtained from the AMERICAN DENTAL ASSOCIATION, 211 EAST CHICAGO AVENUE, CHICAGO IL 60611.)

#### American Dental Association

OSHA's Bloodborne Pathogens Standard, Questions and Answers, *Supplement to the Journal of the American Dental Association (JADA)*, February 1992.

#### American Dental Association

Statement Regarding Dental Handpieces, 15 May 1992.

#### Centers for Disease Control and Prevention

Guidelines for Preventing the Transmission of Tuberculosis in Health-Care Settings, with Special Focus on HIV-Related Issues, *Morbidity and Mortality Weekly Report (MMWR)*, 39:RR-17, 1990. (CDC publications may be obtained from the CENTERS FOR DISEASE CONTROL AND PREVENTION, 1600 CLIFTON ROAD, ATLANTA GA 30333.)

#### Centers for Disease Control and Prevention

Recommendations for Preventing Transmission of Human Immunodeficiency Virus and Hepatitis B Virus to Patients During Exposure-Prone Invasive Procedures, *Morbidity and Mortality Weekly Report (MMWR)*, 40:1-9, 1991.

#### Centers for Disease Control and Prevention

Recommended Infection-Control Practices for Dentistry, 1993, *Morbidity and Mortality Weekly Report (MMWR)*, 42:RR-8, 1993.

#### Centers for Disease Control and Prevention

Update: Universal Precautions for Prevention of Transmission of Human Immunodeficiency Virus, Hepatitis B Virus, and other Bloodborne Pathogens in Health Care Settings, *Morbidity and Mortality Weekly Report (MMWR)*, 37 (no. 24):377-386, 1988.

#### Cottone, J.A., Terezhalmay, G., and Molinari, J.A.

*Practical Infection Control in Dentistry*, Lea and Febiger, Philadelphia, 1991.

**Joint Commission on Accreditation of Healthcare Organizations**  
*Accreditation Manual for Hospitals*. (This publication may be obtained from the JOINT COMMISSION ON ACCREDITATION OF HEALTHCARE ORGANIZATIONS, 875 N MICHIGAN AVENUE, CHICAGO IL 60611.)

#### National Association of Dental Laboratories

*Guide for Infection Control*, 1991.

#### TB MED 6

Occupational Health and Safety in Dental Clinics

#### TC 8-20-1

Dental Specialist

#### U.S. Department of Labor, Occupational Safety and Health Administration

Air Contaminants, 29 CFR 1910.1000, 1991. (OSHA publications may be obtained from the SUPERINTENDENT OF DOCUMENTS, GOVERNMENT PRINTING OFFICE, WASHINGTON DC 20402.)

#### U.S. Department of Labor, Occupational Safety and Health Administration

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### Section III Prescribed Forms

This section contains no entries.

### Section IV Referenced Forms

#### DA Form 4106

Quality Assurance/Risk Management Document

## Glossary

### Section I Abbreviations

#### ADA

American Dental Association

#### BSI

body substance isolation

#### C

Centigrade

#### CDC

Centers for Disease Control and Prevention

#### CI

chemical indicator

#### DENCOM

U.S. Army Dental Command

#### DHCW

dental health care worker

#### EO

ethylene oxide

#### EPA

Environmental Protection Agency

#### F

Fahrenheit

#### HAZCOM

hazard communication

#### HCW

health care worker

#### JCAHO

Joint Commission on Accreditation of  
Healthcare Organizations

#### OPIM

other potentially infectious materials

#### OSHA

Occupational Safety and Health Administra-  
tion

#### PPE

personal protective equipment

#### psi

pounds per square inch

#### RMW

regulated medical waste

#### SOP

standing operating procedure

### Section II Terms

#### Antiseptic

Chemical agent applied to tissue to inhibit  
growth of microorganisms.

#### Asepsis

A pathogen-free condition.

#### Aseptic technique

a. The concept central to any program of  
infection control. Essentially, before, during,  
and after patient treatment—clean, sterile,  
and disinfected, and aseptic materials *should not*  
*contact contaminated materials*. When this  
occurs, the barrier of infection control is bro-  
ken and the possibility for a condition of  
cross contamination is more likely, if not ac-  
tual. Examples of breaks in aseptic technique  
are—

(1) Contaminated hands or gloves touching  
clean, sterile, or disinfected materials. Al-  
ways use clean, sterile gloves to touch clean  
materials especially when setting up for pa-  
tient care. If gloves become contaminated,  
change them before handling clean, sterile  
materials or use clean, sterile pick-up instru-  
ments. It is obvious during patient treatment  
that gloves and instruments will be contami-  
nated by the patient's oral cavity, but such  
contaminants should not be allowed to con-  
tact materials used on other patients or break  
universal precaution barriers. Don't put a  
gloved hand in *your* mouth, for example.  
Don't use soiled, gloved hands to write up  
dental records or answer the telephone.

(2) "Clean" materials touching unclean  
surfaces.

(a) Place instruments on clean, disinfected  
surfaces, sterile towels, or paper barriers.

(b) Do not attach sterilized handpieces to  
non-disinfected hoses or unit handpiece  
holders.

(c) Cover or disinfect light handles or  
operatory lights.

(d) Adjust chair controls with glove wrap-  
per paper (sterile side) or cover chair controls  
with plastic materials or surface disinfect be-  
tween patients.

b. Aseptic technique is the conscious per-  
formance of multiple tasks that maintain the  
"aseptic to aseptic" relationship of contact  
and protects both patients and health care  
workers. DON'T BREAK THE BARRIER.

#### Barriers

Items of equipment and infection control  
techniques designed to interrupt potential in-  
fection and protect patients and HCWs. Masks,  
glasses/face shields, gowns, drapes, covers,  
disinfecting processes, and sterilization  
are examples of barriers. Autoclave  
bags, not touching records or pens and pen-  
cils while gloved, etc., are also barriers.

#### Blood

Human blood, human blood components, and  
products made from human blood.

#### Bloodborne pathogens

Pathogenic microorganisms that are present  
in human blood and can cause disease in  
humans. These include, but are not limited  
to, HBV and HIV.

#### Body substance isolation (BSI)

A consistent approach to infection control in

preventing the transmission of potentially in-  
fectious agents from body substances. All hu-  
man blood and body fluids are treated as if  
known to be infectious for HIV, HBV, and  
other bloodborne pathogens. PPE is worn as  
appropriate for any actual or reasonably an-  
ticipated contact with blood and OPIM.

#### Contaminated

The presence or the reasonably anticipated  
presence of blood or OPIM on an item or  
surface.

#### Contaminated laundry

Laundry which has been soiled with blood or  
OPIM or may contain sharps.

#### Contaminated sharps

Any contaminated object that can penetrate  
the skin including, but not limited to, nee-  
dles, scalpels, broken glass, broken capillary  
tubes, and exposed ends of dental wires.

#### Debridement

A process which removes gross debris or re-  
sidues and reduces the number of microorgan-  
isms on nonliving material.

#### Decontamination

The use of physical or chemical means to  
remove, inactivate, or destroy bloodborne  
pathogens on a surface or item to the point  
where they are no longer capable of transmit-  
ting infectious particles and the surface or  
item is rendered safe for handling, use, or  
disposal.

#### Dental assistant

An individual who assists the primary dental  
care provider in the treatment of patients.

#### Dental hygienist

An individual specially trained to perform  
dental hygiene procedures for the dental pa-  
tient under the supervision of a dental officer.  
This may include taking of impressions and  
the exposing of dental intraoral radiographs.

#### Dental therapy assistant

An individual specially trained to perform  
certain reversible dental procedures directly  
for the dental patient while under the super-  
vision of a licensed dental officer or dentist.  
This may involve dental hygiene procedures  
as well as the placement of dental restora-  
tions.

#### Disinfectant

Chemical agent applied to surfaces to inhibit  
growth of organisms and, in the case of EPA  
category I, to kill HIV, HBV, and tuberculo-  
sis viruses. The term disinfectant in this doc-  
ument will refer to an EPA- and ADA-  
approved, hospital-level chemical that kills  
mycobacterium tuberculosis, lipophilic  
viruses, and hydrophilic viruses.

#### Disinfection

The destruction or inhibition of most patho-  
genic bacteria while they are in their active  
growth phase and the inactivation of most

viruses. In most cases the disinfecting process does not kill spores and cannot be easily verified.

#### **Engineering controls**

Controls (sharps disposal containers, removal of contaminant at the point of generation, self-sheathing needles, splashguards, etc.) that isolate or remove the bloodborne pathogens hazard from the workplace.

#### **Exposure incident**

A specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or OPIM that results from and/or during the performance of an employee's duties.

#### **Health care workers (HCWs)**

All medical activity/dental activity employees, students, contract employees, and volunteers whose work may involve direct contact with human blood, body fluids, and tissues.

#### **Hepatitis B virus (HBV)**

The virus implicated in the transmission of Hepatitis B.

#### **Human immunodeficiency virus (HIV)**

A human retrovirus specifically implicated in the etiology of acquired immune deficiency syndrome (AIDS) and AIDS-related complex. Formerly known as human T-lymphotropic virus type III (HTLV-III) or AIDS-associated retrovirus (ARV).

#### **Nosocomial transmission**

Pertains to transmission of a disease that originated in the health care setting.

#### **Occupational exposure**

Reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or OPIM that may result from and/or during the performance of an employee's duties.

#### **Other potentially infectious materials (OPIM)**

a. The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

b. Any unfixed tissue or organ (other than intact skin) from a human (living or dead).

c. HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

#### **Personal protective equipment (PPE)**

Specialized clothing or equipment worn by an employee for protection against a hazard. General work clothes (for example, uniforms,

pants, shirts, or blouses) not intended to function as protection against a hazard are not considered to be PPE.

#### **Regulated medical waste (RMW)**

a. Liquid or semi-liquid blood or OPIM; contaminated items that would release blood or OPIM in a liquid or semi-liquid state if compressed; items that are caked with dried blood or OPIM.

b. Waste that is potentially capable of causing disease in humans and may pose a risk to both individual or community health if not handled or treated properly. Consists of the following classes:

- Class I—Culture stock and vaccine
- Class II—Pathological waste
- Class III—Blood and blood products
- Class IV and VII—All used and unused sharps
- Class V—Animal waste
- Class VI—Isolation CDC Risk Group IV Group

#### **Sharps**

Any object that can penetrate the skin including but not limited to needles, scalpels, broken capillary tubes, and dental wires.

#### **Source individual**

Any individual, living or dead, whose blood or OPIM may be a source of occupational exposure to the employee. Examples include, but are not limited to, hospital and clinic patients; human remains; and individuals who donate or sell blood or blood components.

#### **Sterilization**

The process by which all forms of life within an environment are totally destroyed, including viruses and spores. Heat sterilization can be monitored and verified. Sterilization by high-level disinfectant solutions cannot be easily monitored or verified.

#### **Universal precautions**

Systems designed to protect workers and patients. Because the health status of all patients cannot always be completely ensured, basic infection control means that all patients must be treated as if their blood and certain body fluids are potentially infectious for HIV, HBV, and other bloodborne pathogens. The most obvious universal precautions are masks, gloves, glasses/face shields, gowns, and smocks, but they also include the use of autoclave and surface-disinfecting techniques, etc., as well as sharps safety and barrier techniques.

#### **Work practice controls**

Controls that reduce the likelihood of exposure by altering the manner in which a task is

performed (for example, prohibiting recapping of needles by a two-handed technique).

### **Section III**

#### **Special Abbreviations and Terms**

This section contains no entries.

#### **Index**

This section contains no entries.

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