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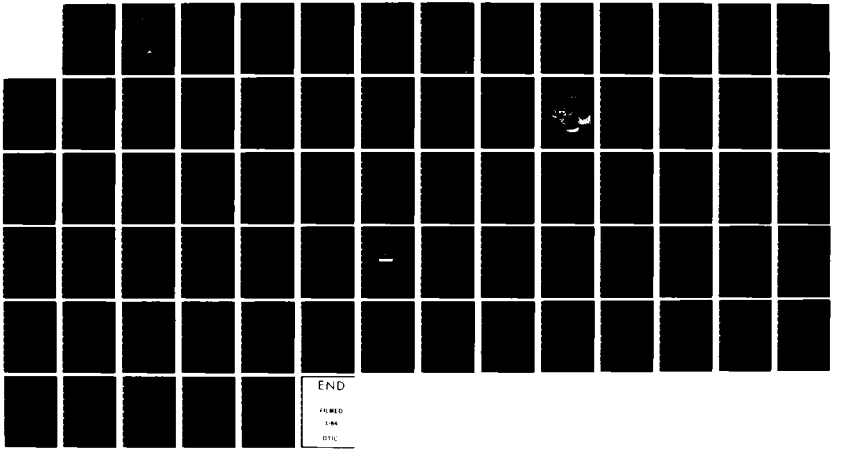

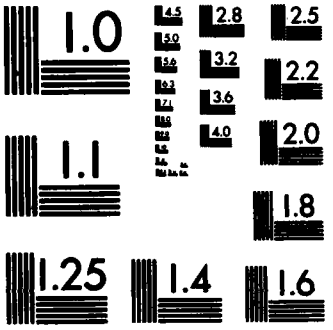

Review 2-83

AEROMEDICAL REVIEW

INFECTION CONTROL IN AIR FORCE DENTAL CLINICS (Second Edition)

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November 1983

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NOTICES

This review was submitted by personnel of the Dental Investigation Service, Clinical Sciences Division, USAF School of Aerospace Medicine, Aerospace Medical Division, AFSC, Brooks Air Force Base, Texas, under job order DSB38101.

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The Office of Public Affairs has reviewed this report, and it is releasable to the National Technical Information Service, where it will be available to the general public, including foreign nationals.

This report has been reviewed and is approved for publication.

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This report is an expansion of USAFSAM Aeromedical Review 3-80, "Infection Control in Air Force Dental Clinics."

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The rationale and procedures for preventing cross-contamination in Air Force dental facilities are discussed, including dental instruments and DTR furnishings; instrument preparation; sterilization--materials, methods, and monitoring; storage and shelf life; and treatment of specific equipment. Special applications for prosthodontics and dental radiology are outlined. Personal protection is stressed and current procedures for communicable disease reporting are given. Appendixes summarize some topics discussed in the text and provide special information on hepatitis as well as sources for infection control supplies and periodicals.

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CONTENTS

Page

INFECTION CONTROL IN AIR FORCE DENTAL CLINICS

INTRODUCTION

The purpose of this report is to provide Air Force dental personnel with the rationale and procedures for preventing cross-contaminations. The guidelines presented here, although not directive in nature, have been endorsed by the Assistant Surgeon General for Dental Services and may be helpful in establishing local infection control programs that meet American Dental Association recommendations and Joint Council on Accreditation of Hospitals standards.

The dental profession has been the leader in prevention for many years, and infection control is a natural extension of this philosophy. Just as we strive to prevent dental diseases, so should we practice dentistry in a manner that will minimize the transmission of pathogens from patient to patient, from our patients to us, and from us to our patients.

Some people may question the need for aseptic techniques in dentistry. After all, the mouth is certainly not sterile, and dentistry has had few significant problems from an epidemiological standpoint. But consider the following statistics. Among the general population, active carriers of the hepatitis B virus number 1 in 200; of *Streptococcus pyogenes* (strep throat), 1 in 10; and of *Staphylococcus aureus*, 1 in 5. These and other pathogens can be spread via airborne particles and by blood or saliva. Long incubation periods may camouflage the exact source of some infections, and patients do not normally associate a disease with a prior dental appointment. For the sake of our patients' health, as well as our own, we have the responsibility for using aseptic techniques whenever possible. Advances in antibiotic therapy have made infections relatively easy to treat, but we can't become complacent. We should aim towards preventing cross-infections rather than managing them after they have occurred.

Cross-infections due to dental procedures are largely preventable if common sense and sound principles prevail. The infection control measures described herein are not directive but can be used to develop local programs to submit to the Hospital/Clinic Infection Control Committee for review and endorsement.

Users are invited to send comments, suggested improvements, or inquiries concerning this Aeromedical Review to the Chief, Dental Consultation, USAFSAM/NGD, Brooks AFB TX 78235, Autovon 240-3502.

RESPONSIBILITIES

According to Air Force Regulation 162-1, the base dental surgeon is responsible for issuing and ensuring compliance with "Dental Operating Instructions," one of which should deal with infection control.

The base dental surgeon also should appoint a dental officer to coordinate infection control efforts and conduct training sessions to indoctrinate new personnel and refresh those already trained. This officer should be a member of the Hospital/Clinic Infection Control Committee.

DEFINITIONS OF TERMS

Antiseptic -- a substance that will inhibit the growth and development of microorganisms without necessarily killing them.

Asepsis -- a pathogen-free condition.

Dental Item Classification

Critical items -- objects that enter the skin or mucous membrane and present the greatest risk of infection, e.g., scalpel blades, injection needles, periodontal knives, and suture needles. Require high-level disinfection.

Semicritical items -- objects that frequently contact mucous membranes or broken skin, e.g., mouth mirrors, dental handpieces, high-volume evacuation tips, and rubber dam clamps. Require high- to intermediate-level disinfection.

Noncritical items -- objects that don't ordinarily contact mucous membranes or broken skin, e.g., lamp handles, x-ray tube heads, and cabinet tops. (The term "noncritical" does not imply nonimportance; it refers only to contact with mucous membranes or broken skin.) Require intermediate- to low-level disinfection.

Disinfection -- the destruction or inhibition of most pathogenic bacteria while they are in their active growth phase and the inactivation of some viruses. In most cases this process does not kill spores and cannot be routinely verified. Levels of disinfection are based upon the biocidal activity of an agent against vegetative bacteria, tubercle bacilli, bacterial spores, fungi, and viruses:

High level -- biocidal against all classes of microbes. (This term is synonymous with sterilization.) Used for all critical and some semicritical items, depending on item.

Intermediate level -- will not kill spores but is biocidal against all other classes. Used for semicritical and noncritical items, depending on item.

Low level -- not effective against tubercle bacilli, bacterial spores, and certain nonlipid small viruses. Used only for noncritical items.

Sanitization -- a process whose purpose is to remove gross debris and reduce the number of microorganisms.

Sterilization -- the process by which all forms of life within an environment are totally destroyed, including viruses and spores. Sterilization can be monitored and verified.

INSTRUMENT PREPARATION (SANITIZATION)

Instruments must be meticulously cleaned prior to sterilization (or disinfection). Blood, saliva, and other debris can act as a barrier and can overchallenge all practical methods of sterilization. Instrument preparation is a two-step process.

Preliminary Cleaning

Wearing mask, protective eyewear, and heavy rubber gloves, rinse instruments in cold running water immediately after their use. Then wipe with a gauze soaked in isopropyl alcohol or plain water to remove gross debris.

Scrubbing

As soon as possible after preliminary cleaning, scrub instruments by one of the following methods:

Manual

Wearing mask, eyewear, and heavy rubber gloves, scrub instruments with a brush and a low-sudsing alkaline detergent. Do not use regular hand soap or a highly abrasive cleaner. When possible, dismantle instruments and use pipe cleaners to clean hard-to-reach areas. Rinse and dry instruments completely.

Ultrasonic

Ultrasonic cleaners produce high-energy sound waves that create billions of microscopic bubbles on the surface of items to be cleaned. These bubbles implode (collapse), exerting pressure and generating heat. This results in a "scrubbing" action that is safer and more efficient than the manual method.

To use an ultrasonic cleaner, fill its tank one-half to three-fourths full with a solution of a low-sudsing automatic-dishwasher detergent (2 tablespoons in water), a general-purpose ultrasonic cleaning solution, or a disinfectant solution. Place instruments in the basket provided, rinse under running water, and insert the basket into the tank. Very small items can be placed in an auxiliary beaker containing any cleaning or disinfectant solution desired. Place this beaker in the main tank so that the beaker's solution level is just below that of the tank.

Operate the unit for 5-10 minutes with the lid in place to reduce aerosolization. Remove the basket or beaker with the instruments and rinse under

running water. Dry the instruments thoroughly with a clean towel or dip them in an isopropyl alcohol bath.

Change solutions when visibly dirty. Empty the tank and wipe its inner surfaces (plus cover) with a gauze soaked in an appropriate disinfectant. Caution: Allow the unit to cool before emptying. Store unit empty, with lid in place, and refill the tank the next duty day with fresh solution.

Inspection

Check instruments to be sure they are clean and dry before placing them in a sterilizer. Water evaporation during sterilization will cool instruments and prevent the killing of spores; it will also cause spots of rust in any sterilizer. Check instruments for signs of rust or cracks and proper opening and closing, and follow local policy regarding lubrication, sharpening, repairing, and replacement or disposal.

HEAT STERILIZATION

To prevent cross-contaminations, sterilize all instruments that will withstand sterilizing conditions. Heat is the most practical and dependable method and, when feasible, is preferred over chemical means.

Methods

Keep the operating instructions supplied by the manufacturer of the sterilizer in the vicinity of the unit and follow them closely. The operating times, temperatures, and pressures for the various heat-sterilization methods are summarized as follows:

Method	Temperature	Time*	Pressure
Steam autoclave	121°C (250°F)	30 min	15 psi
	132°C (270°F)	7 min	30 psi
Unsaturated chemical vapor	132°C (270°F)	20 min	20 psi
Dry heat	160°C (320°F)	1-2 hr	none
Heat transfer	232°C (450°F)	25 sec	none

*Time after appropriate temperature and pressure are reached.

Steam Autoclave

Steam under pressure is an acceptable method of sterilization except for cutting edges made of carbon steel. Steam will rust these instruments.

The high temperature of the steam, not the pressure, kills the microorganisms. Steam condenses on the surface of cool instruments until they

reach the temperature of the steam. Although the exact mechanism is not fully understood, moist heat probably kills bacteria by causing the denaturation and coagulation of a critical protein in the genetic structure of the cell.

Unsaturated Chemical Vapor

The Chemiclave is the primary sterilizer used in Air Force dental clinics because it is less corrosive than steam, does not dull sharpened instruments, and increases instrument life expectancy.

Chemiclaves use Vapo-Steril Solution, a mixture of formaldehyde, alcohols, ketone, acetone, and water. It is sold only by the manufacturer and is the only solution that should be used. (In an emergency, as a last resort if Vapo-Steril Solution is not available, distilled water may be used. See Appendix C.) In addition, Vapo-Steril Solution should be used only once; the condensate should be discarded. The solution contains a small amount of distilled water (9.25%) because bacteria are destroyed at lower temperatures when water is present; above 15% water, however, carbon-steel instruments will rust and corrode. Bacterial death occurs in much the same manner as for the steam autoclave. Solution enters a preheated chamber and condenses on its contents. As the pressure rises, the condensed solution vaporizes and begins the killing action.

Chemiclaves should be cleaned weekly and according to the manufacturer's following recommendations: Preheat 5 minutes with door closed; turn unit off; and use Scotch Brite 3M general-purpose pad soaked with Harvey Metal Cleaner to rub inside chamber and door. Wait 10 minutes and repeat. Rinse with water and wipe with clean dry cloth. When the sterilizer is not in use, leave door closed, but not latched, to increase the life of the rubber door gasket.

Chemiclaves are available in three sizes. Model 5000 measures 13" W x 10½" H x 19½" D and has a 6" x 11" chamber. Model 6000 is larger -- 19¼" W x 16¼" H x 26¼" D -- with a chamber measuring 10" x 16". Model 5500 has just been introduced and measures 15½" W x 11" H x 23" D with an 8" x 13¼" chamber.

The one drawback of the Chemiclave is the residual vapor that escapes when the chamber door is opened after the cycle is completed. Although nontoxic, nonmutagenic, and completely safe, its odor can be objectionable. To reduce the effects of these vapors, (1) place units in well-ventilated areas; (2) clean the inside of the chamber and door routinely; (3) allow the unit to cool down before opening the door so that more vapors will condense; and (4) open the door at arm's length and avoid approaching the unit for 10 seconds. Do not smoke or permit open flames within 2 feet of the Chemiclave.

An additional way to reduce the vapors is to install a Chemipurge. This unit is activated after a regular cycle, after depressurization, and before the door is opened. The Chemipurge pumps air into the chamber, diluting the remaining vapors and forcing them out through the condensing coils into the closed condensate reservoir and finally through a formaldehyde-specific chemical filter. Thus, when the door is opened, less vapors escape. According to the manufacturer, this filter should be replaced every 3-4 months.

Chemipurges are available either motorized or nonmotorized. The nonmotorized Chemipurge must be connected to a compressed air outlet that supplies 30 psi. Either type can be factory installed on all new Chemiclaves. The following Chemiclaves should be retrofit at the factory: serial numbers A6-1355--A6-1831 (model 6000) and A5-9715--A5-10449 (model 5000). Chemiclaves with higher serial numbers can be fitted with a Chemipurge in the field; those with lower serial numbers would require extensive modification. See Appendix I for complete price information.

Dry Heat

Dry heat is an approved method of sterilization that, like unsaturated chemical vapor (Chemiclave), will sterilize instruments without rust or corrosion. It can, however, destroy the temper of metal instruments and also melt solder joints. Because of the high heat involved, do not place plastic and rubber items in these units. Dry heat kills bacteria by an oxidation process, and due to the absence of water, it requires more time than most methods. The actual time needed to reach sterilizing temperature will vary with the size and arrangement of the load, the type of wrapping material, and the efficiency of the unit. Dry-heat sterilizers require a warm-up period before timing is started. Furthermore, if the door is opened in mid-cycle and the temperature of the chamber drops below 160°C, timing will need to be started again.

Heat Transfer

A sterilizer containing glass beads or salt can be used at chairside to quickly resterilize small instruments. It is used primarily during endodontic procedures to sterilize individual files, reamers, and other small instruments previously sterilized but subsequently contaminated. Although convenient, this method should be used only as a back-up to one of the other methods, because temperatures can vary widely in different parts of the well.

Sterilization Wraps

Most instruments should be packaged and sealed before sterilization so that sterility will be maintained during storage. Depending upon intended use, instruments can be wrapped individually, in sets, in trays, or in packs. Tape and heat sealing are the most common methods used to seal packages. When tape is used, its length should be 2½ times the width of the tubing or paper envelope. This allows the tape to be sealed upon itself and insures that the pack will remain intact.

Wrap instruments loosely to allow the sterilizing agent to circulate freely throughout the pack. Insure that scissors, hemostats, and hinged instruments are in the open position so that the sterilizing agent can reach all parts. When wrapping in an easily punctured material, cover the tips of sharp instruments with a 2 x 2 gauze or cotton roll.

The most common wrapping materials are paper, plastic, nylon, and cloth. Aluminum foil and glass or metal containers can also be used in some instances. The size of the pack and the method of sterilization will generally determine the best wrapping material. For example, some materials will melt in a dry-heat sterilizer, and others will prevent the passage of vapors in a chemical-vapor sterilizer or of steam in a steam autoclave. See Table 1.

TABLE 1. COMPATIBILITY OF WRAPPING MATERIAL AND STERILIZER

Material	Steam autoclave	Chemical vapor	Dry heat
Cloth	yes	no[a]	may char
Paper	yes	yes	may char
Nylon or plastic tubing	yes	yes	no
Paper-plastic combination	yes	yes	no
Aluminum foil	no[b]	no[b]	yes[b]
Glass container	yes	yes	yes
Metal tray	yes	yes	yes

[a] Dye can cause residue buildup on chamber walls.
[b] Have lid off and container on its side.

When plastic or nylon sterilization tubing is used, the pack should be 20% longer than the longest instrument. The extra length allows the inside air to expand. Clear nylon tubing is relatively puncture resistant and permits rapid identification of contents. When cloth is used, wrap instruments in a double thickness.

Sterilization Monitoring

Failure to follow manufacturer's instructions, improper packaging or wrapping, overloading, or sterilizer malfunctions can all prevent sterilization. Routine testing--using biological spore monitors and chemical indicators--is necessary to insure that instruments have been exposed to proper temperatures, time, and pressure.

Biological Spore Monitors

Because they are more resistant to destruction by heat than are vegetative bacteria and viruses, bacterial spores are used to verify the effectiveness of sterilizers. Spore tests provide the only means of determining whether or not sterilization has taken place. Monitors are placed inside the "most challenging" or inaccessible pack in the load being tested.

Bacillus stearothermophilus spores are more resistant to steam and chemical vapors and are used to monitor these types of sterilizers. *B. subtilis* spores are more resistant to dry heat and should therefore be used to test

that type of sterilizer (also used to monitor ethylene oxide gas sterilizers, rarely used in dental clinics). The form of spore testing to use usually depends upon the method of sterilization being monitored. See Table 2.

TABLE 2. COMPATIBILITY OF BIOLOGICAL SPORE MONITOR AND STERILIZER

Form	Brand name	Steam autoclave[a]	Chemical vapor[a]	Dry heat[b]
Polypropylene vial	Attest 1242	yes	yes	no
Glassine envelope	Steri-Spor	yes	yes	yes
	Spor-Test	yes	yes	no[c]
	Spore-O-Chex	yes	yes	yes
	Ster-L-Test	yes	yes	yes
	Spordi	yes	yes	yes
Ampule	Kilit	yes	no	no
	Chemspor	yes	no	no
	Proof	yes	no	no

[a]Compatible with *B. stearothermophilus* spore testing.
[b]Compatible with *B. subtilis* spore testing.
[c]Contains *B. stearothermophilus*, but not *B. subtilis* (the exception to the rule).

Polypropylene Vial. (Attest 1242 Biological Spore Indicator) This is the recommended method for monitoring steam autoclaves and Chemiclaves. (It should not be used in a dry-heat sterilizer: this vial would not only melt, it also contains the wrong bacillus species for a dry-heat sterilizer.) The spore tested is *B. stearothermophilus*. The vial has filter paper on the lid which allows steam or chemical vapor to penetrate to the spore strip in the bottom of the vial. The culture medium is contained in a glass ampule within the vial.

The advantage to the Attest system is that the results can be analyzed in the dental clinic with an Attest Incubator No. 106 (brown printing), thus the delay of sending tests to a laboratory is avoided. After the sterilization cycle is complete, squeeze the vial to crush the ampule (or a crusher is available at no cost from 3M); then incubate the vial at 56°C according to instructions. If the culture medium has changed from purple to yellow after 24-48 hours, sterilization has not taken place. Incubate a control--a crushed vial (from the same lot as the test vial) that has not been in a sterilizer--with each test to insure that spores are still viable.

Note: Attest 1244 Biological Spore Indicators and Attest Incubator No. 107 are for ethylene oxide gas sterilizers, not the Chemiclave. The 1244 will melt in a dry-heat sterilizer.

Glassine Envelopes. Place glassine envelope with enclosed spore strips through a normal sterilizing cycle. Deliver intact envelope to the medical laboratory, indicating on the envelope the type of sterilizer used and the bacillus species to be incubated. The lab technician aseptically removes the strips and incubates them for 7 days. Results are returned to the dental clinic.

Ampule. (Kilit, Chemspor, Proof) These ampules contain *B. stearothermophilus* suspended in a culture medium; the Proof also contains *B. subtilis*. They should be incubated for 7 days either at a laboratory or in the dental clinic. The Kilit and Chemspor ampules should be used only in a steam autoclave; the Proof can also be used in an ethylene oxide gas sterilizer. In a dry-heat sterilizer they may explode, and in a Chemiclave the vapors will not penetrate the ampule.

Chemical Indicators

Chemical indicators provide a quick visual check to verify that instruments have been through a sterilizing cycle. In general, these indicators change color after exposure to sterilizing temperatures. They do not guarantee that sterilization has taken place but, when used in conjunction with biological spore monitors, can help to monitor sterilization.

Two basic types--external and internal--are available. External chemical indicators ("autoclave tape" or "sterilizing bags" with heat-sensitive printing) identify at a glance which instruments have been processed. They show only that the outside of the pack was exposed to sterilizing temperatures, but not for *how long or under what pressure.*

For an added check, place internal chemical indicators (in the form of strips, cards, or labels) inside of every pack or tray. These indicators react to a time/temperature/sterilizing-agent combination; they reflect conditions of the critical area inside the pack and will alert the user to possible malfunctions. If internal indicators are not available, a piece of autoclave tape will suffice as a short-term substitute. See Table 3.

TABLE 3. COMPATIBILITY OF CHEMICAL INDICATOR AND STERILIZER

Indicator	Steam autoclave	Chemical vapor	Dry heat
Chemitest	yes	yes	yes[a]
3M brand autoclave tape	yes	yes	no
Incheque internal	yes	yes	no[b]
Tape, sealing, sterilization	yes	yes	yes[b]
T-T-S	yes	yes	no
Steam Clox	yes	yes	no
Steril Chex	yes	yes	no
Sterilometer	yes	yes	no
Dry-heat indicator labels	no	no	yes

[a] At or below 320°F.
[b] May char.

Frequency of Testing

Place both external and internal chemical indicators on and in every pack that is processed. Monitor all steam autoclaves, chemical-vapor sterilizers, and dry-heat sterilizers with a spore test weekly. When using an ethylene oxide gas sterilizer, monitor each load with a spore test.

Record Keeping

Complete records on each sterilizer are recommended, especially if spore monitoring is done in-house. Suggested items to record include the sterilizer number or location, date of testing, time and temperature conditions (if available), item or items sterilized, operator, and test results. Such information can be kept in a simple bound notebook. Detailed records will provide a history on each sterilizer, quickly indicate possible malfunctions, and identify operators who may need further training. The records may also have a medical-legal application.

Loading Procedures

Just as instruments should be loosely wrapped to allow unimpeded access of the sterilizing agent, packs should be loosely arranged in the sterilizing chamber. Overloading must be avoided so that centrally located packs can be sterilized. Leaving a space between packs will assure adequate circulation. Your hospital's central sterilization service can provide more guidance.

Storage and Shelf Life

Sterile instrument packs should be stored in a closed cabinet or drawer, away from aerosols and dust, and handled as little as possible before being used. Packs suspected of being contaminated must be rewrapped and sterilized. Unwrapped instruments, of course, are most susceptible to recontamination. If instruments are stored unwrapped, a set of transfer forceps may be used to remove and place instruments; reaching into drawers with unwashed hands can compromise adjacent instruments. This method of storage is discouraged. Even wrapped instruments can be contaminated if the wrapping material is torn or punctured. Drawers may be lined with paper and should be disinfected periodically.

Table 4 shows the shelf life for instruments wrapped with different materials, assuming ideal storage conditions. The proper expiration date should be placed (pencil markings only) on the outside of each pack before it is loaded into the sterilizer. Rotate packs so that older ones are used first. (The shelf life of metal instrument trays with loose-fitting lids is not fully clear. They are probably best sterilized as needed and should be used that same day.)

TABLE 4. SHELF LIFE OF INSTRUMENTS IN STERILE PACKS

Wrapper	Shelf life[a]
Unwrapped	0
Paper envelope (tape sealed)	30 days
Cloth (double thickness)	30 days
Nylon, plastic, or plastic-paper combination (tape sealed)	3-4 months
Nylon, plastic (heat sealed)	6 months

[a]Shelf life shown assumes storage conditions of proper humidity and protection from dust and aerosols. No item should be considered sterile for longer than 6 months.

CHEMICAL STERILIZATION/DISINFECTION

Disinfection falls somewhere in between sanitization--the removal of organic material from objects--and sterilization--the complete destruction of all forms of microbial life. Although the weak link in the chain of asepsis, disinfection is important.

The ideal disinfectant should (1) be lethal to all pathogens; (2) kill rapidly; (3) not be harmful to objects being treated; (4) be nontoxic to human tissue; (5) not be affected by the presence of organic material; (6) be stable and have a reasonable shelf life; (7) be simple to use; (8) be cost effective; (9) be odorless; (10) have a low surface tension; and (11) be approved by the ADA Council on Dental Therapeutics.

Of course, the "ideal" does not exist. Most chemical disinfectants will not kill the hepatitis virus, the tubercle bacillus, or bacterial spores. In fact, the wrong concentration of certain disinfectants may even support the growth of microorganisms. Disinfectants can be absorbed and deactivated by organic debris. Some will rust or corrode metal instruments. In general, solutions will deteriorate rapidly, and high surface tensions will prevent their penetration into hinges and narrow crevices. Also, chemical disinfection tends to be time consuming, expensive, and impossible to verify easily. Despite these drawbacks, the concept of "cold sterilization" has persisted, and attempts are made to sterilize instruments using procedures not designed to do so.

Although heat sterilization is the preferred method, at times it is just not possible. Certain instruments, counter tops, chair controls, etc., cannot be placed in a sterilizer. Here we must depend on chemical disinfection. The level of disinfection (high, intermediate, low) depends on the strength of the agent, the nature of the contaminant, and the contact time.

Most chemicals will not achieve sterilization. The two exceptions are ethylene oxide gas and glutaraldehyde.

Chemical Sterilization

Ethylene Oxide

For several reasons ethylene oxide is the most reliable agent for chemical sterilization. It will sterilize many objects that are heat labile and will do so without rust or corrosion. Like heat sterilization, it can be verified with biological spore monitors (e.g., Attest 1244 Biological Indicator and Attest Incubator No. 107). Unlike with other methods, every load should be monitored with spores.

However, certain disadvantages preclude routine use of ethylene oxide in dental clinics. It is very slow acting (4-6 hours), and plastic and rubber items will retain the gas and must be aerated 1-4 days before being used in the oral cavity. This makes turnaround time quite lengthy.

Glutaraldehyde

Three types of glutaraldehyde are available: alkaline (Cidex, Cidex 7, and Sporicidin), neutral (Glutarex), and acidic (Sonacide and Wavicide). They possess a wide range of biocidal activity and destroy microorganisms by damaging their proteins and nucleic acids. Most formulations contain 2% active agent and come in two containers. One contains the glutaraldehyde, and the other has the buffer solution. When the proper amounts of each are mixed, the solution is activated.

Unlike with ethylene oxide, glutaraldehyde sterilization cannot be routinely verified. Unless instruments are used immediately (after rinsing), recontamination is likely. Glutaraldehyde is caustic to eyes and skin; forceps or rubber gloves must be used for handling instruments that have been immersed in glutaraldehyde.

When heated to 60°C (140°F), acidic glutaraldehydes will sterilize instruments in 1 hour. The need for heating frequently makes the use of these chemicals impractical. Two-percent alkaline and neutral glutaraldehydes can be used at room temperature to sterilize heat-sensitive items, but some formulations cannot be used on carbon-steel instruments. Immersion for 6 3/4 to 10 hours in a fresh solution of alkaline or neutral glutaraldehyde will achieve sterilization. The solution will deteriorate with time and, depending on the formulation, has a maximum shelf life of 14, 28, or 30 days. (See Appendix F.) When a fresh solution is prepared, the expiration date should be placed on the side of the container.

Chemical Disinfection

Many different chemical disinfectants are available, with varying degrees of effectiveness. The ADA Council on Dental Therapeutics recommends only four: glutaraldehyde, formaldehyde, chlorine, and iodophor compounds. These and others are discussed next.

Glutaraldehyde

The types of glutaraldehyde used for disinfection are the same as for sterilization, but the usage differs. For an intermediate level of disinfection (just below sterilization), a 10- to 30-minute immersion in glutaraldehyde is required. While Cidex, Cidex 7, Glutarex, Sonacide, and Wavicide must be used full strength for both sterilization and disinfection, Sporicidin can be diluted 1:16 with water and still retain its disinfectant properties for 30 days.

Formaldehyde

Formaldehyde is a flammable, colorless gas with a pungent, suffocating odor. It is volatile and irritating to skin and oral tissues. Its biocidal mechanism is the same as that of the glutaraldehydes, but its disadvantages preclude its usefulness as a routine disinfectant.

Sodium Hypochlorite (Chlorine)

Sodium hypochlorite is thought to oxidize microbial enzymes and cell-wall components. The most economical source for sodium hypochlorite is common household bleach. A 1% solution (1 part bleach to 5 parts water) yields 10,000 ppm of available chlorine which will achieve an intermediate level of disinfection after 10-30 minutes. Chlorine tends to be unstable, and a fresh solution should be prepared daily. It can harm eyes, skin, colored clothing, and metals and has a strong odor.

Iodophors

Iodophor compounds (e.g., Betadine and Wescodyne) contain 0.05-1% iodine and surface-active agents, usually detergents, which carry and release free iodine. The antimicrobial activity of the iodophors is greater than that of iodine alone; and because the vapor pressure of iodine is reduced in the iodophors, its odor is not as offensive. In addition, iodophors do not stain as readily as iodine, especially when the surface treated is wiped, after an appropriate contact time, with a gauze wet with water, 70% alcohol, or 1% sodium hypochlorite.

Intermediate levels of disinfection can be achieved after 10-30 minutes of contact. Some iodophors (e.g., Betadine) are also effective when diluted with 70% isopropyl alcohol (1 part iodophor to 20 parts alcohol), and some iodophors (e.g., Wescodyne) can be diluted 1:200 with water; however, the slight staining that occurs with Wescodyne cannot be wiped off as easily.

Disinfectants Not Recommended

The Council on Dental Therapeutics has identified certain products commonly used as disinfectants that are not recommended for disinfection in a dental office. These are alcohols alone, phenolic compounds, and quaternary ammonium compounds.

Alcohol. Through the denaturation of cellular proteins, alcohol is bacteriocidal against vegetative forms. A 70-90% solution (so diluted with a small amount of water) is more effective than the concentrated form. The problem with alcohol is (1) rapid evaporation with no residual effect; (2) lack of sporicidal or virucidal (hepatitis) activity; and (3) rapid inactivation by organic material. For these reasons, the Council does not recommend the use of alcohol alone.

Phenols. In high concentrations, phenols are protoplasmic poisons; in low concentrations, they inactivate essential enzyme systems. In disinfectants, phenols are usually combined with a detergent. Phenols are not sporicidal and have a questionable virucidal activity; therefore, they are unacceptable for DTR disinfection.

Quaternary Ammonium Compounds. Benzalkonium chlorides and other "quats" have been used as disinfectants because they are safe, inexpensive, and have a low surface tension. They cause a breakdown in bacterial cell membranes which alters cellular permeability. As a group, however, these compounds have some serious deficiencies. Being positively charged, they will adsorb not only to bacteria but also to wool, glass, cotton, and proteins and thus become inactivated; also, negatively charged items like common cleaners, soaps, and metallic ions will neutralize them. Quats have been shown to support the growth of gram-negative organisms and are ineffective against spore formers and the hepatitis B virus. They have no place in dentistry.

ASEPSIS IN THE DENTAL TREATMENT ROOM

Equipment and instruments found in a dental treatment room are constructed of many different materials--stainless steel, plastic, vinyl, glass, formica, fabric, aluminum, and fiberglass. Each poses peculiar problems when considering asepsis because some parts are not easily cleaned and some materials are adversely affected by liquid disinfectants.

Smooth, hard, easy-to-clean surfaces are ideal to maintain, but some items are designed with hard-to-get-at areas, fabric-covered cords, knurled buttons, deep grooves and furrows, or stippled covers--all of which complicate cleaning. Equipment design, both material and form, can create a formidable challenge and should be considered when purchasing new equipment.

Instruments and Equipment

Dental Handpieces

Handpieces are the weakest link in the chain of infection control. They are especially subject to heavy viral and bacterial contamination. Handpieces are now being manufactured to withstand heat sterilization, and this should be a major factor to consider when selecting new ones.

The following procedures are recommended:

a. Heat sterilize (if material permits) high-speed and low-speed handpieces and attachments after every use. (Table of Allowances, TA 981, allows 3 high-speed and 3 low-speed handpieces per DTR.) Follow manufacturer's directions regarding cleaning and lubrication both before and after sterilization. Replace or convert nonsterilizable handpieces as soon as possible.

b. Scrub heat-labile handpieces at the sink with an acceptable disinfectant (e.g., undiluted iodophor or a 1:20 iodophor solution diluted with 70% alcohol), then rinse with water. Run the handpiece to protect the turbine and to flush the water line. After rinsing, dry and lubricate the handpiece.

c. If their hoses are too short to reach the sink, disinfect heat-labile handpieces twice, with separate gauze sponges soaked in an acceptable disinfectant. Then wrap in a gauze soaked in the same solution until ready for use. (Residual iodine can be removed with an alcohol-soaked gauze.)

d. Remove burs from the handpiece after use (before sterilization or disinfection).

Three-Way Syringe and High-Volume Evacuation Tips

Saliva and debris retracted into 3-way syringe tips may contaminate other patients unless tips are removed and sterilized after each patient. All new syringes should have interchangeable, quick-disconnect tips; some present syringes can be converted to accept this type. Each DTR should have at least three sterilizable 3-way syringe tips and three high-volume evacuation tips.

The following procedures are recommended:

a. Clean and sterilize 3-way syringe and high-volume evacuation tips after every patient.

b. If syringe tips cannot be removed, use the scrubbing method discussed under handpieces.

c. After each use, discard heat-labile-plastic high-volume evacuation tips or immerse them in an accepted disinfectant (e.g., 2% glutaraldehyde or 1% sodium hypochlorite for 10-30 minutes).

Dental Unit and Chair

The dental unit and chair cannot be disinfected quickly because of the contact time required for liquid chemicals. Also, the design and/or material used in construction may cause difficulties. Using disposable covers reduces the number of surfaces to disinfect. Most are inexpensive, easy to use, and offer excellent protection from direct contact and aerosol contamination. They can be very easily molded or taped in place.

The following procedures are recommended:

a. Cover the operating light handle with a 4" x 4" piece of aluminum foil or plastic wrap. Change after each patient.

b. To prevent the transfer of mites, bacteria, etc., use paper or plastic headrest covers. Change after each patient.

c. Cover the 3-way syringe and handle, HVE handle, saliva ejector coupling, unit switches and handles, and chair adjustment controls with a see-through plastic cover (e.g., Saran wrap). Contact with chair adjustment buttons can be eliminated altogether by using a foot-operated control. Foot controls should be included in all new equipment purchases.

d. Cover the bracket tray with a single paper liner. Better yet, place a patient napkin under the liner so that instruments can be bundled up and removed en masse for cleaning.

e. If covers are not used, disinfect the above-mentioned areas with an acceptable disinfectant. See Figure 1.

Miscellaneous Items and Materials in the DTR

Stainless-Steel Instruments. Sterilize in a chemical-vapor or steam-autoclave sterilizer after each use. Dry heat is an acceptable alternative.

Carbon-Steel Instruments. Sterilize in a chemical-vapor sterilizer after each use. Dry heat is an alternative but requires much more time, may destroy the instrument's temper, and can melt solder joints. INSTRUMENTS MUST BE THOROUGHLY DRY REGARDLESS OF THE METHOD USED, OR RUSTING WILL OCCUR.

Anesthetic Cartridges. Sterilize only cartridges to be used in an operating room. (These can be sterilized in a steam autoclave.) For regular DTR use, wipe the diaphragm with a gauze soaked in 70% alcohol. Do not store anesthetic cartridges in alcohol because it can diffuse through the diaphragm and alter the anesthetic solution. Use individual-dose carpules and discard after use.

Cloth (Muslin) Drapes; Cotton and Gauze Supplies. Sterilize in a steam-autoclave sterilizer when sterility is needed. After their initial seal is broken, store bulk packages of gauze pads, cotton rolls, and cotton pellets in a covered container. With sterile forceps, dispense only enough supplies for immediate use; do not put contaminated instruments or hands into bulk-storage containers.

Rubber Products. These items are probably best sterilized in ethylene oxide and then aerated; however, hard-rubber bite blocks can be placed in a steam autoclave. Rubber prophy cups should be used once and then discarded.

Glassware. Sterilize in a chemical-vapor or dry-heat sterilizer. Steam autoclaving is an acceptable alternative if the autoclave has a drying cycle or is vented rapidly and the door is opened about ½" for 10-15 minutes at the end of the cycle.

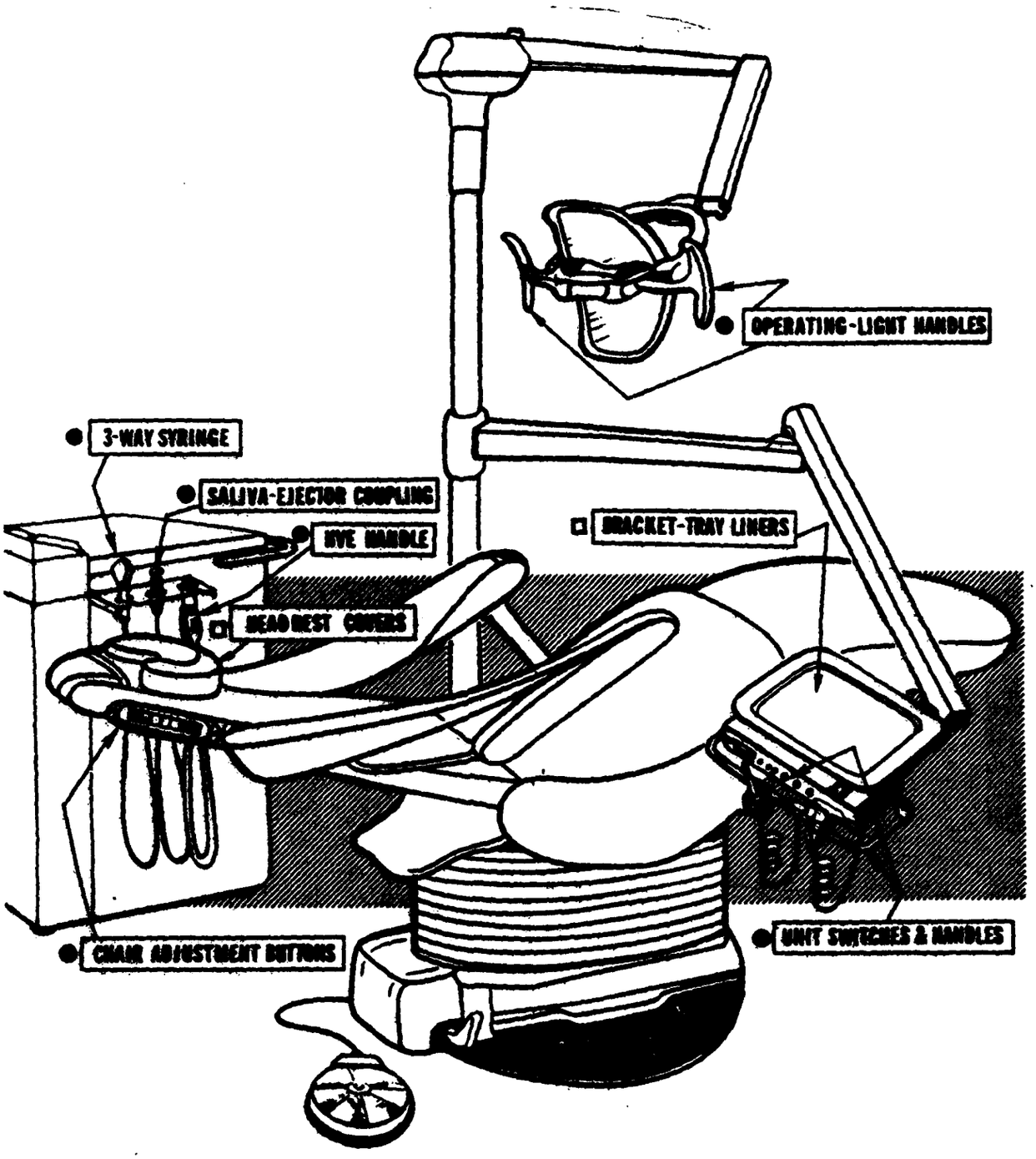

Figure 1. Dental-unit areas that need to be disinfected or covered.

Powders. Sterilize in dry heat when sterility is required.

Burs and Diamonds. After each use, sterilize in a chemical-vapor sterilizer. Dry heat is an acceptable alternative. Clean and thoroughly dry burs and diamonds and place them in a sterilizable bur block for easy handling.

Heat-labile Plastics. To sterilize, place instruments in 2% glutaraldehyde for 6 3/4 to 10 hours or in an ethylene oxide gas sterilizer. To disinfect, soak instruments in 2% glutaraldehyde for 10 to 30 minutes, 1% sodium hypochlorite for 10 to 30 minutes (unless the item is part metal), or wipe with a gauze soaked in a 1:20 iodophor/alcohol solution.

Nitrous Oxide Mask. The Brown mask (recommended) can be sterilized in a steam-autoclave or chemical-vapor sterilizer. Remove breathing tubes before sterilization and clean them with alcohol.

Floors and Walls. Clean periodically with a detergent solution.

Dental-Unit Water Supplies and Lines

Potable water supplies (water suitable for human consumption) may contain up to 50 colony-forming units (cfu) per milliliter. Water in dental units has been shown to contain anywhere from 3,000 to 1,000,000 cfu/ml. Microbial contamination comes basically from two sources: (1) retraction (suck-back) of bacterial saliva and water through the dental handpiece and (2) the latent growth of bacteria in the water lines.

Just a few years ago dental units were designed to prevent dripping from the handpiece by retracting water up into the handpiece and beyond when the rheostat was released. However, such a unit also retracts bacterial saliva from the patient's mouth, thereby contaminating the handpiece and its water supply. Thus, the next patient is "inoculated" with the previous patient's bacterial saliva. A proposed ADA/ANSI specification would limit retraction to the handpiece itself.

A bigger problem exists in the water lines proper. Although incoming water is chlorinated, the chlorine loses its potency as the water lies stagnant in the narrow-bore tubing contained in the dental unit; as a result, bacteria proliferate. These are predominately pseudomonas and klebsiella, which under the right circumstances can be pathogenic to man.

The following procedures are recommended:

a. Test for suck-back by operating the high-speed handpiece with its head dipped in water containing one drop of disclosing solution. Stop the handpiece and detach it. With the coupling over a piece of white paper, activate the rheostat. If the red dye is discharged, water retraction is excessive. To remedy the situation, install antiretraction valves in the water line to the handpiece.

b. Several suggestions have been proposed to combat the bacterial growth in water lines: flushing the system with a disinfectant; in-line bacterial

filters; UV radiation of incoming water; resin ion exchange; and a sterile-water delivery system. The latter has real application during surgical procedures or when treating certain highly susceptible patients. The system consists of a pressure vessel that holds one or two bags of sterile water. When pressurized, water is forced out of the bag and through the water lines to the handpiece, 3-way syringe, and ultrasonic scaler. The only problem is that sterile water pumped through contaminated lines results in contaminated water. The Dental Investigation Service and others are evaluating methods to disinfect the system so that the water remains sterile.

c. In the meantime, to reduce the bacterial counts of dental unit water, flush the system at the beginning of the day by running water through the handpiece line, the 3-way syringe line, and the ultrasonic scaler line for 6 minutes after a weekend or a long period of inactivity, or 2 minutes after an overnight period. After flushing, install a sterile handpiece, 3-way syringe, and ultrasonic scaler tip.

d. For surgical procedures, use a sterile bulb syringe (or a large sterile syringe and needle) and water to cool burs and irrigate wounds.

Disposal of Septic Materials

The responsibility for preventing cross-contamination does not end with sterilizing and disinfecting dental instruments. It also extends to the materials we normally throw away--e.g., patient napkins, gauze pads, cotton rolls--which often are contaminated with blood and serve as potential sources of infection. They must be disposed of in a manner that will protect persons who are responsible for the general housekeeping duties. These individuals are usually not trained to handle biohazardous wastes and are not aware of the potential for disease transmission.

The following procedures are recommended:

a. After treating a patient with an infectious disease (e.g., hepatitis, herpes, tuberculosis), the first step is to sterilize all reusable and disposable items before attempting to clean them. After sterilization, cycle them through normal instrument preparation procedures as required or discard them. This will minimize the potential infection of dental personnel and protect the janitorial staff from unnecessary exposure to pathogens.

b. Discard needles, suture needles, and scalpel blades into the same receptacle. Empty these receptacles and dispose of the contaminated items according to local policy. (One method is to place these items in a used alginate can and pour dental stone over them. This virtually eliminates further contact.)

c. Double-bag disposable items (such as cotton, rubber dams, paper products), label them CONTAMINATED TRASH, and place them with the regular trash to be disposed of according to applicable local and State laws.

d. Place reusable linen items such as towels, drapes, and gowns in a biodegradable bag and put that bag into a regular plastic bag. Label the bundle

CONTAMINATED for pickup with the regular linen. This procedure allows the laundry personnel to place the biodegradable bag with its contents directly into the washing machine, thus avoiding contact with the infectious agents.

GUIDELINES FOR SPECIAL AREAS

Prosthodontics and Orthodontics

Many prosthodontic patients are at high risk to both transmit and acquire disease. The method of handling prosthodontic and orthodontic devices allows ample opportunity for cross-contamination to occur, not only from patient to patient but also from patient to dentist and/or dental lab technician, and vice versa.

Infection control in prosthodontics or orthodontics can be divided into two different but related areas: the DTR and the dental laboratory. Each area has unique problems that require special consideration.

Much of the support equipment used in prosthodontics and orthodontics has been ignored in the past. These include shade guides, indelible pencils, facebows, torches, wax pencils, orthodontic pliers, and the like. Prostheses themselves carry a multitude of bacteria from dental plaque, blood, or saliva. The pumice pan offers perhaps the greatest potential for cross-contamination. Furthermore, an individual technician will simultaneously work on prostheses from different patients.

The philosophy of infection control in these two specialties, as it is elsewhere, is to reduce microorganism transfer by breaking the chain of infection at critical transfer points.

DTR Asepsis

Covers. Cover items such as facebows, articulators, and torch handles with clear plastic to prevent direct contact. An acceptable alternative is disinfection with an accepted disinfectant.

Shade Guides. Disinfect with an accepted disinfectant.

Unit-Dose Concept. Use the unit-dose concept (dispense only what is needed for that patient) when setting out temporary denture adhesive, petroleum jelly, impression materials, waxes, indelible pencils, pressure indicator paste, orthodontic brackets and wires, etc. Avoid reentry into jars, tubes, and other forms of bulk storage.

Pressure Indicator Paste. Use tongue blades to dispense pressure indicator paste, and disposable brushes to apply paste to dentures. Discard both after use.

Items To Sterilize. Sterilize items such as occlusal plane guides, acrylic burs, indelible pencils, Boley gauges, and orthodontic pliers and instruments in a chemical-vapor sterilizer.

Substitution. When feasible, replace heat-labile items (e.g., a plastic ruler) with items that will withstand heat sterilization (e.g., a metal ruler). Do not use plastic grips on orthodontic pliers.

Trays. Establish tray setups with some of the more commonly used items so that everything can be sterilized at the same time and a complete set is available for each patient.

Impression Trays. Scrub in soapy water and place in 4" nylon tubing. Sterilize in a steam autoclave or chemical-vapor sterilizer. Place two heat seals 1" apart at the top of the bag and punch a hole beside the outer seal. Bags can then be hung in a cabinet without compromising sterility.

Laboratory Asepsis

Impressions. Before pouring, rinse impressions under gently running water to mechanically remove debris. The use of disinfectants has been suggested, but further research is needed to assess their effects on the material's integrity.

Prostheses. Before starting work on a prosthesis in the lab, disinfect it by scrubbing it with a surgical scrub brush, running water, and undiluted iodophor. If the prosthesis is nonmetal, an acceptable alternative is a 2-3-minute soak in a 1:5 or 1:10 solution of sodium hypochlorite and water. The prosthesis must be free of organic debris before immersion. Follow the same procedure when returning the prosthesis to the dentist for insertion into the patient's mouth.

Pumice

a. Use separate pumice pans, burs, and rag wheels for new and used prostheses.

b. Disinfect pans used for new prostheses weekly, and those for used prostheses daily, with an acceptable disinfectant. As an alternative, line the pan with a plastic bag which can be discarded at the end of the day.

c. Mix pumice with a liquid disinfectant (5 parts sodium hypochlorite to 100 parts distilled water to 3 parts green soap) to inhibit bacterial growth. Wear masks, eye protection, and gloves for maximum protection.

d. As an alternative to a "community" pumice pan, use the unit-dose concept. Line the pan and discard the pumice and liner after use.

e. To prepare rag wheels for sterilization, wash them and place them individually in 4" nylon tubing. Seal the tubing and sterilize in a steam autoclave.

f. Bristle brushes are somewhat heat-labile. Rinse brushes and soak in 2% glutaraldehyde for the manufacturer's recommended sterilization time. Rinse again before use.

Laboratory Attachments. In a chemical-vapor sterilizer, sterilize burs and attachments (e.g., chucks) used on new prostheses weekly and those for used prostheses daily.

Grinding. Use an evacuation system when grinding on metals. Ask Bioenvironmental Engineering (BEE) to monitor all systems on a yearly basis.

Dust Respirators. To protect against inhaling harmful particles, wear an efficient and lightweight dust respirator (3M Brand Toxic-Dust Respirator #9900 or Dust Respirator #8710).

Eye Safety. Always wear safety glasses and use the eye shield provided when operating a lathe. An emergency eyewash station should be placed in all laboratories.

Compound Heater Liners and Inserts. Empty and disinfect liners and inserts after each use. Store empty.

Ultrasonic Cleaner. Keep covered at all times to reduce aerosolization. Change solutions when visibly dirty.

Slurry Water. Make from fresh-set stone that has never been poured against an impression.

Shell and Sand Blaster. Check filter routinely and change as needed. Dry all items before blasting.

Wax Patterns. Never use your tongue to polish a wax pattern.

Radiology and the Darkroom

The radiology section offers a vital service in delivering quality dental care to our patients. Without it, diagnosis of dental disease would be most difficult. However, this is the clinic area most apt to be overlooked when asepsis is considered. Most of the effort has been directed at dental-instrument sterilization and surface disinfection in the DTR.

While the insertion, placement, and removal of radiographic packets do not usually cause bleeding, items used are covered with the patient's saliva. A number of pathogens can be transmitted via saliva, including hepatitis B, herpes simplex, herpes zoster, respiratory viruses, tubercle bacillus, *Staphylococcus aureus*, and *Streptococcus pyogenes*. Furthermore, contaminated items are routinely transported out of the radiology area to other parts of the clinic.

The ADA Council on Dental Materials, Instruments, and Equipment issued a set of recommendations for reducing the chances of cross-contamination in the darkroom. Their guidelines are devoted to the handling of x-ray packets,

including wearing disposable gloves during exposure and subsequent handling, ejecting exposed films without touching them, and discarding packets and gloves in a disposable towel. These precautions should be given consideration, especially when treating a patient with a communicable disease.

The following procedures are recommended:

a. For disinfection, immerse all parts (arms, aiming devices, and bite blocks) of radiographic positioning devices (XCP) in 2% glutaraldehyde for 10-30 minutes.

b. For sterilization, immerse all parts of radiographic positioning devices (XCP) in 2% glutaraldehyde for 6 3/4 or 10 hours (depending on product used).

c. Wash hands after each patient.

PERSONAL PROTECTION

Much of this report has been devoted to the sterilization and/or disinfection of instruments and surfaces to prevent cross-contamination. Just as important is the prevention of disease transmission from patient to dentist and vice versa. It has been said that "Infection of patients by dentists is inexcusable, infection of dentists by patients is unnecessary." This section discusses the health hazards inherent in modern dentistry and ways to protect against them.

The oral cavity contains one of the greatest and most varied microbial populations in the entire body. Without thinking too much about it, we place our hands into this environment many times daily. Furthermore, every time we use a high-speed handpiece, we position ourselves in the path of an aerosol cloud containing up to seven times more microorganisms than that of a sneeze or cough. Dental aerosols may contain *Mycobacterium tuberculosis, Streptococcus pyogenes, Staphylococcus aureus*, the herpes simplex virus, and many other pathogens. Studies have shown that herpetic whitlow (a viral infection of the finger) and hepatitis B are occupational hazards in dentistry.

Dental procedures generate aerosol particles that range from 1.3 to 7.0 μm. Particles of this size can remain airborne for many hours after a dental procedure has been completed. If inhaled, particles smaller than 5 μm can bypass the body's protective filtering system and penetrate directly to the terminal bronchioles and alveoli of the lungs. Here their effects can be harmful and cumulative.

To reduce the potential risk to the dental staff and to our patients, we should routinely take steps to (1) reduce the levels of microorganisms in dental aerosols; (2) minimize the amount of aerosols generated; and (3) protect exposed persons from what is generated.

Reducing Microbial Levels in Dental Aerosols

In the section "Asepsis in the Dental Treatment Room" we discussed reducing microbial levels by flushing water lines daily, installing antiretraction

valves when needed, and using sterile handpieces and 3-way syringes. In addition to these procedures, have patients brush their teeth or rinse with a mouthwash before treatment is begun; this will reduce the concentration of oral flora. Three 10-second rinses will reduce microbial counts by 90%.

Reducing Aerosol Production

a. Use high-volume evacuation to capture aerosols as they are produced.

b. Clean cavity preparations with water only rather than a combined air-water spray. Dry with cotton pledgets or a gentle stream of air.

c. Use a rubber dam routinely to place a barrier between the operator and the patient's mouth.

d. Polish restorations with rubber cups instead of bristle brushes.

Protection Against Aerosols

Face Masks

When engaging in patient treatment of any kind, all dental personnel should wear face masks. A mask offers two-way protection--for the wearer and the patient.

Wearing a new mask for each patient is ideal, but the same mask may be worn for multiple patients if the patient population is a relatively healthy one. If a mask becomes saturated, however, it is ineffective and should be discarded. Also discard a mask that is worn while treating a patient with any type of illness.

Face masks should be worn only in the DTR. A properly worn mask covers the mouth and nose and is completely secured to prevent venting. A mask is either on or off; it is not meant to dangle from the neck nor to be worn on the forehead while the wearer walks around the clinic.

A high-filtration efficiency mask should be worn to filter out the 1-μm and larger pathogens contained in dental aerosols. Both tie-on surgical masks on the stock table have a 96%+ filtration efficiency against 1-μm particles. The rigid turtleshell mask has on the average only a 35-40% efficiency against the same size particles; however, if a rubber dam and high-volume evacuation are used to minimize the aerosol, this mask is acceptable.

To preclude the possibility of irritation or an allergic reaction, choose a fiberglass-free mask. Also, disposable masks are preferred over reusable cloth ones (and required when treating ill patients).

Eye Protection

A dentist relies very heavily on vision, and a serious eye injury could end a career. An unprotected eye is very prone to injury from aerosols,

splatter, and foreign objects such as tooth fragments, amalgam, and calculus. Also, a patient in the supine position is vulnerable to eye injury from sharp instruments, caustic chemicals, and aerosols.

All dental personnel should wear shatter-resistant protective eyewear (preferably with side shields) in the DTR and in the dental laboratory. Patients also should be provided with protective eyewear. At the very least, those who wear shatterproof corrective lenses should be asked to leave them in place during treatment. Tinted lenses afford protection from the glare of the dental operating light.

If an eye injury does occur, prompt action is required (within 60 seconds). An emergency eye-wash station should be placed in the dental laboratory and anywhere caustic chemicals are used. All eye irrigation should be done with a sterile saline solution. Acids are fairly easily neutralized; alkaline solutions are not. The application of an anesthetic solution will relieve pain and apprehension, but a dental anesthetic should NOT be used. The agent of choice is a solution such as Ophtaine, made by Squibb: one drop causes anesthesia in 13 seconds and lasts for 15 minutes. This allows ample time for copious irrigation with saline. If a foreign body is embedded, gently cover the eye and escort the patient to the hospital emergency room.

Gloves

Gloves are worn to help maintain sterility during dental procedures, especially surgery, and to protect the wearer by keeping microorganisms out of cuts, abrasions, and breaks in the skin. However, even the best of gloves can be two-edged swords. They do offer some protection, but at the same time, bacteria multiply rapidly under the gloves. Also, micro defects and gross tears can allow irritating agents to seep under the glove. For these reasons, hand antisepsis is extremely important when gloves are worn.

The following procedures are recommended:

a. Wear presterilized gloves when performing any surgical procedure. Corn starch is the only FDA-approved powder for use in gloves. If a patient is hypersensitive to corn starch, thoroughly wipe the powder off the gloves with one or two damp gauze pads or rinse it off with sterile water after gloving.

b. Disposable gloves should be worn when a patient has lesions adjacent to the mouth or lips or on intraoral mucosa, the operator's hands have small wounds or cuts (a small cut on a finger may be covered with a finger cot), and when cleaning and scaling procedures produce bleeding that will reach the operator's hands.

Gowns

If possible, wear a clean gown daily. Launder soiled gowns separately from other items of apparel or turn into the hospital laundry service. Do

not wear gowns outside the dental clinic; they may be contaminated from bacterial aerosols. Consider supplying all dental personnel with sufficient quantities of gowns.

Eating in the DTR

Because bacterial aerosol particles can remain airborne long after a procedure is completed, the DTR is no place for eating, drinking, or smoking.

HANDWASHING

A nosocomial infection is one that originates or takes place in a hospital, but the term can also be applied to the dental setting. The clinical significance of handwashing was first recognized by Semmelweis in 1847, and today it is considered the most important procedure in preventing nosocomial infections because many of these may be caused by organisms transmitted via the hands of health care personnel. (Occult blood from patients has been retained under the fingernails of dentists for 5 days or more.)

The skin harbors two types of flora: resident and transient. Resident organisms survive and multiply on the skin, can be cultured repeatedly, are of low virulence, and are not easily removed. Conversely, transient bacteria do not survive and multiply on the skin, can be cultured for only a short time, and are not firmly attached to the skin.

The purpose of most handwashing is to remove the transient organisms (acquired by contact with patients or contaminated surfaces). Groups such as the Centers for Disease Control and the American Hospital Association have pointed out that the mechanical actions of rubbing the hands together and rinsing them under running water are the most important aspects in the removal of transient organisms. So technique is very important.

For routine handwashing, either an antiseptic agent or soap and water may be used. Antiseptics are useful when contamination is heavy, but they offer no great advantage under ordinary circumstances. When used routinely, certain antiseptics may produce dryness, redness, and in some cases an allergic reaction. Dermatitis will discourage handwashing, and dermatitic skin will harbor even more bacteria; therefore, routine handwashing should be done with soap or an antiseptic agent that is not harmful to the skin. The choice is usually a personal one.

At the beginning of the day, before surgical procedures, or when patients are infectious, antiseptics should be used. Several studies have compared the antimicrobial action of 3% hexachlorophene (pHisoHex), 0.75% povidone-iodine (Betadine), and 4% chlorhexidine gluconate (Hibiclens). Results have shown that chlorhexidine gluconate combines the broad spectrum of povidone-iodine with the prolonged activity of hexachlorophene. It gives the best immediate and prolonged reductions in resident and transient flora, yet its potential for dermal reactions is low. It seems to satisfy the objectives of a surgical scrub very well while being gentle enough to use routinely.

General Procedures

a. Keep fingernails closely trimmed.

b. Choose a handwashing agent that is kind to the hands and use it routinely. If dermatitis is a problem, alternate or change handwashing agents, wear gloves, or apply an emolient hand lotion. Lotions, however, can support bacterial growth, so they should be applied only during off-duty hours.

c. Use liquid agents; bar soap can sit in pools of water that support bacterial growth.

d. If a liquid-soap dispenser is used, have it emptied and cleaned before each refill.

e. Wash hands when coming on duty, when they are soiled, between patients, before patient contact, after using the toilet, after blowing or wiping your nose, before eating, and at the end of the day. To avoid direct contact and recontamination of hands, turn faucets off with foot or knee controls (if available) or with a paper towel.

f. Limit the use of brushes for routine handwashing. They can drive surface bacteria into the deeper dermal layers, from which they will soon re-emerge.

Surgical Scrubbing

a. Remove jewelry from hands and wrists.

b. Adjust water temperature and wet hands.

c. Clean under fingernails with a clean plastic or orange-wood stick.

d. Scrub fingers, hands, and forearms 5-10 minutes with a sterile brush or sponge, using an antiseptic agent such as Hibiclens or Betadine.

e. Rinse under running water, starting with the fingers and letting the water run off at the elbows. Keep hands above the elbows.

f. Dry hands with sterile towel.

g. Glove in an aseptic manner.

Routine Handwashing

At Beginning of Day

a. Remove all rings.

b. Adjust water temperature and wet hands.

c. Clean fingernails.

d. Apply an antiseptic solution (such as Hibiclens or Betadine) according to manufacturer's directions and scrub hands and nails with a sterile brush for 2 minutes.

e. Rinse hands under running water.

f. Apply solution again and lather hands by rubbing them together vigorously for 10 seconds.

g. Rinse hands under running water.

h. Dry hands with clean paper towel.

Between Patients, Before Lunch, After Break in Routine, and Before Leaving Dental Clinic

Repeat "Beginning of Day" steps f through h, using agent of choice.

Faucet Aerators

The Centers for Disease Control suggests that faucet aerators be removed and cleaned periodically because they may harbor microorganisms that could compromise handwashing procedures.

COMMUNICABLE DISEASE REPORTING

Dentists and their auxiliaries are exposed to a variety of pathogens; and exposure to hepatitis, tuberculosis, herpes, venereal diseases, and others can occur with no warning. Patients who know they have a communicable disease may not realize the importance of informing the dental team or they may not volunteer this information because of embarrassment.

Before dental personnel can take proper precautions to protect themselves, they must be informed. When a patient is identified as having a communicable disease that can be spread via blood, saliva, aerosol, or direct contact, the hospital/clinic Environmental Health Section will determine if the individual had a recent dental appointment or has one in the near future. In either case, the patient will be advised that the Base Dental Surgeon will be notified in order to protect dental personnel. Environmental Health will also direct the patient to contact the dental clinic and cancel routine appointments until the contagious stage has passed.

When a communicable disease is diagnosed, a copy of AF Form 570, Notification of Patient's Medical Status, should be sent to the Base Dental Surgeon. The statement "THIS PATIENT HAS BEEN IDENTIFIED AS HAVING A COMMUNICABLE DISEASE" should be printed or typed on the form, and the completed form should be placed in the patient's dental record until Environmental Health advises

otherwise. The dental officer can then ascertain the specific disease by reviewing the patient's medical record. Precautions will be essentially the same for most diseases.

If Environmental Health determines that a patient has had a dental appointment during the contagious stage but prior to diagnosis, this should be indicated on the AF Form 570 so that appropriate treatment (if needed) can be initiated for dental personnel. If the patient had no contact with dental personnel during the contagious period, then no report is needed.

If Environmental Health can project a specific time frame of the contagious stage, this also will be printed on AF Form 570, and the form should be removed from the patient's dental record at the end of that time. Otherwise, Environmental Health will notify the Base Dental Surgeon when the contagious stage has passed.

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APPENDIX A

HEPATITIS: AN OCCUPATIONAL HAZARD

Hepatitis Glossary

HAV	Hepatitis A virus
HBV	Hepatitis B virus, also called the Dane particle
NANB	Non-A, non-B hepatitis virus
HBsAg	Hepatitis B surface antigen, envelope protein of HBV; presence confirms diagnosis; may or may not be infectious
anti-HBs	antibody of HBsAg; presence in asymptomatic patient denotes a previous infection; in symptomatic patient, recovery; and in both instances, immunity to future infection
HBcAg	Hepatitis B core antigen; inner protein of HBV
anti-HBc	antibody to HBcAg; presence confirms diagnosis
HBeAg	Hepatitis B "e" antigen; presence indicates most infectious period
anti-HBe	antibody to HBeAg; signals recovery and resolution
ISG	Immune serum globulin; prepared from plasma pools of randomly selected donors; not very effective against HBV
HBIG	Hepatitis B immune globulin; ISG with a high antibody titer; should be administered after exposure to HBV; considerably more effective than ISG
HEPTAVAX-B	vaccine for HBV; derived from surface antigen of human carriers; induces neutralizing antibody; manufacturer (Merck Sharp & Dohme) states over 90% effective

INTRODUCTION

Although hepatitis was first recognized in the late 18th century, not until during World War II were researchers able to firmly establish two distinct types: HAV and HBV. In 1966 Blumberg and others discovered the Australian antigen (the Dane particle) and found it to be specific to HBV. More recent studies show that additional viruses exist: non-A, non-B (NANB). Despite the fact that we know more about hepatitis now than ever before, we still have much to learn.

Viral hepatitis, especially HBV, is a disease of major public health significance. Cases reported yearly have more than tripled since 1954, to more than 150,000. Surveys show that between 2% and 5% of the general population have been exposed to the disease (there are about one million carriers). The true incidence is probably higher than reported because (1) subclinical cases are more prevalent than clinical cases requiring treatment; (2) confusion with other infections alters diagnosis; and (3) reporting of new cases is not standardized. An American Dental Association survey shows that 13.6% of general practitioners and an alarming 30% of oral surgeons have been exposed to the disease.

Although the hepatitis virus is not a supervirus, it does present certain problems. HBV is hard to study because it cannot be cultured in a laboratory. HBV can survive 4 hours at 60°C and even longer at room temperature, and it can be spread in as little as 10^{-5} to 10^{-6} ml of blood. Saliva also can be a primary vehicle for transmission.

Hepatitis A and B are the most important types of hepatitis, and more is known about them than NANB. Hepatitis B poses the greatest threat to the dental health team. Table A-1 compares the characteristics of HAV and HBV.

TABLE A-1. CHARACTERISTICS OF HEPATITIS A AND HEPATITIS B

Features	HAV	HBV
Incubation period	2-6 weeks	6-26 weeks
Type of onset	Acute	Insidious
Polyarthralgia	Rare	Common
Rashes	Occasional	Common
Modes of transmision		
Oral-fecal	Usual	Infrequent
Parenteral	Infrequent	Usual
Others		Intimate contact
Sequellae		
Carrier	No	10%
Chronic hepatitis	Infrequent	An important cause of chronic active HBV
Carcinoma of the liver	Rare	Possible
Epidemiology		
Sporadic cases	Mainly children	Males predominate
Outbreaks	Food-water	Contaminated blood products

TRANSMISSION

The rest of this discussion primarily concerns HBV. HBV can be transmitted by direct injection of infected blood (needle-stick); transfer of infected serum or plasma through skin cuts or mucosal surfaces; introduction of infected secretions (saliva) into mucosal surfaces; or indirectly via vectors

or inanimate surfaces. To varying degrees, all modes of transmission can occur in the dental office via blood, saliva, and aerosols.

DIAGNOSIS

Although clinical symptoms can be of some help, diagnosis is usually made by serological testing for the presence or absence of antigens or antibodies for HBV. (See Figure A-1.) The detection of hepatitis B surface antigen (HBsAg) is presumptive evidence that the patient has HBV, and the detection of antibody to HBsAg (anti-HBs) indicates previous infection as well as immunity to further infection.

In the serum of an infected patient, HBsAg is associated with spherical particles (22 nm), tubular forms, and the Dane particle. HBsAg comprises the envelope protein of the 42-nm particle and is an indicator of the presence of HBV. The Dane particle is also composed of HBcAg, which is the inner capsid protein.

Course of the Disease

To properly deal with hepatitis patients, dentists should be familiar with the clinical and serological stages.

In a typical case, symptoms of a nonspecific nature (anorexia, fatigue, and abdominal discomfort) appear anywhere from 6-26 weeks after exposure. This is the anicteric (*without jaundice*) *phase*. HBsAg is detectable at about 4-6 weeks, so the patient is infective before any clinical symptoms appear. If the case is subclinical, as most are, the patient is especially dangerous to others.

If the case is a clinically apparent one, jaundice, dark urine, light stools, and liver tenderness may occur 2 days to 2 weeks after the anicteric phase. This is the icteric (jaundiced) phase. At this point, HBsAg begins to disappear from the serum, liver chemistries become abnormal, and anti-HBs levels rise. This signals the start of recovery. Although HBsAg disappears early, anti-HBc levels rise before anti-HBs levels do and remain for a longer period of time. This phenomenon provides another serologic test.

If, however, HBsAg persists in the serum, one of two states exist. Either the patient is becoming a carrier or is developing chronic active hepatitis. Five percent of hepatitis victims become carriers and may remain so for from 1 month to 20 years.

To summarize the serologic tests and their meaning (see Figure A-2 also):

(1) Presence of HBsAg and/or anti-HBs and/or anti-HBc confirms the diagnosis of HBV.

(2) Presence of HBsAg means that the patient is probably infective.

(3) Persistence of HBsAg for 2-3 months indicates the patient is either becoming a carrier or is developing chronic active hepatitis.

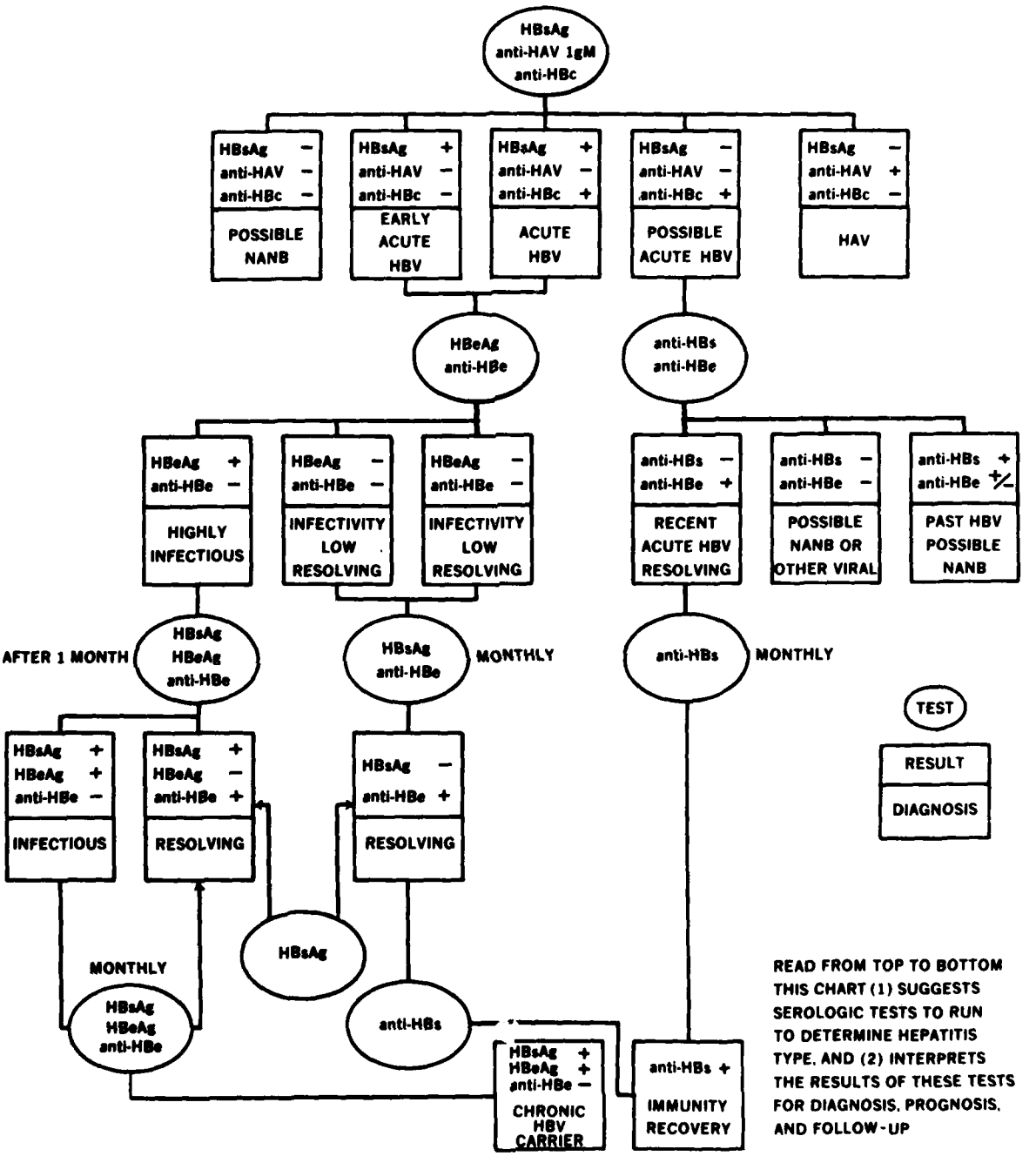
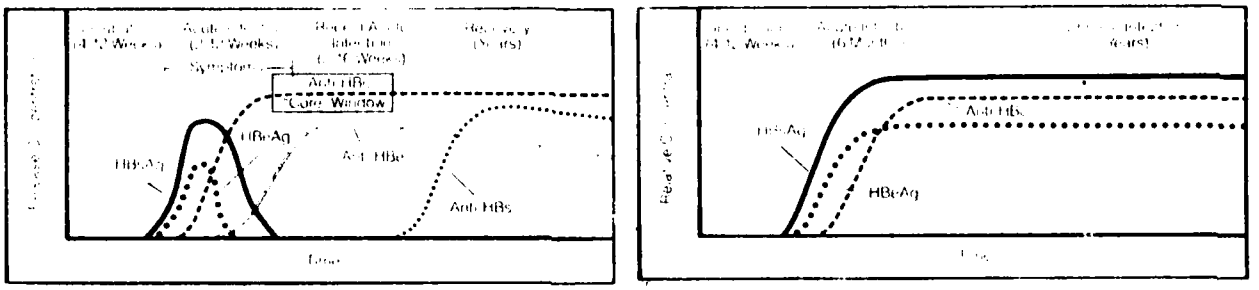


Figure A-1. Hepatitis differential diagnosis and prognosis.

(4) Appearance of anti-HBs indicates recovery; also, in an asymptomatic patient it indicates prior exposure to HBV and present immunity.

(5) The "e" antigen (HBeAg) and its antibody (anti-HBe) are discussed in the next section.



(a) (b)

Figure A-2. (a) Typical profile of HBV serologic markers.
(b) HBV chronic carrier serological profile: no seroconversion.

In Case of Exposure

Perhaps the subclinical, undiagnosed, symptom-free carrier poses the greatest threat to the dental team, although even symptomatic patients may withhold information because of embarrassment or ignorance. Taken at face value, health histories are notoriously unreliable.

Dental personnel should routinely take proper precautions and follow approved aseptic techniques. Assume that all patients are potential carriers, but be aware that certain groups of individuals are high-risk patients: patients on hemodialysis; institutionalized persons; patients with Down's syndrome; patients receiving frequent transfusions; hemophiliacs; percutaneous drug abusers; male homosexuals; relatives of persons with hepatitis; physicians, dentists, and other health care providers; and patients with a history of hepatitis.

Knowing which patients are carriers and which health care providers are immune is important. The detection of HBsAg in the serum of dental personnel is reason for concern, but its mere presence does not mean that all such persons should be banned from practice. Not all HBsAg-positive persons spread the disease. Another antigen, the "e" antigen, may hold the true key to infectivity. Figure A-1 indicates its significance.

The presence of anti-HBs confers immunity, so dental personnel who are anti-HBs positive can safely treat patients who have hepatitis. Dentists may want to consider periodic testing to determine their own status. Radioimmunoassay and reversed passive hemagglutination are recommended for screening; they are 100 times more sensitive than immunodiffusion.

A dental-team member who suspects exposure to the virus should take certain steps. An anti-HBs test is recommended if the member's status is unknown; however, this may not be practical if test results cannot be obtained quickly. If there is reason to doubt a patient's condition, have the patient's serum tested for HBsAg.

Cost will vary depending upon the volume of testing done at the testing laboratory. For example, costs (2000 tests) at the Epidemiology Division of the USAF School of Aerospace Medicine were:

	Negative	Positive
HBsAg	$1.95	$3.90
anti-HBc	$2.31	$4.62
anti-HBs	$1.95	$3.90

The cost at hospitals/clinics may be as much as one-third more.

Based upon the results of these tests (or previously documented evidence of HBV), an exposed person may require the administration of HBIG, which is immune serum globulin (ISG) with a high antibody titer and affords greater protection than ISG by affecting antibody conversion. Two doses are required--one as soon as possible (preferably within 24 hours after exposure) and the second in 25-30 days.

Merck Sharp & Dohme has developed a vaccine for HBV called HEPTAVAX-B. It is derived from surface antigen of human carriers and works by inducing neutralizing antibody. It is over 90% effective and may even be partially effective when given after exposure. Early predictions suggest that immunity will last for 5 years, at which time a booster might be needed. The initial vaccination calls for three 1.0-ml doses--at days 0, 30, and 180. The Centers for Disease Control suggests that high-risk groups (oral surgeons and dentists are included) be screened for anti-HBs; persons not having the antibody would be eligible to receive the vaccine. Due to limited quantities (and high cost), the program would be voluntary and recipients would be prioritized at the base clinic/hospital. Cost for a triad of doses is about $100.

All bases with blood bank facilities can test for HBsAg. However, the availability of most additional tests will be limited to regional hospitals. Having smaller facilities forward their specimens to USAFSAM/EK, Brooks AFB TX 78235, may be more cost effective. Turnaround time for negative results is 3-5 working days. An additional 3-5 days is required to confirm positive results. These times do not include shipment time.

APPENDIX B

PRECAUTIONS REQUIRED WHEN TREATING PATIENTS WITH COMMUNICABLE DISEASES

Patients with communicable diseases can pose a dilemma when dental treatment is required. Although entitled to the best care possible, they are often viewed with a certain amount of trepidation; and care has been denied solely on their potential to transmit disease. This need not be the case if certain precautions are taken.

If possible, a patient with active symptoms should receive only emergency care. Routine care should be postponed until symptoms have subsided. Patients known to be carriers and those past the active phase should be treated using the following precautions to protect the dental team and others from accidental exposure.

1. If possible, reserve one DTR for the treatment of patients with hepatitis and other communicable diseases. This may not be possible in every clinic.

Before the patient arrives--

2. Give this patient the last appointment of the day. This will allow ample time for cleanup afterwards.

3. Place a plastic drape (the kind used by painters as a drop cloth is ideal) over the bracket table, handpiece holder, and 3-way syringe holder.

4. Wrap both lamp handles with aluminum foil or plastic wrap.

5. Wrap handle of 3-way syringe, handle of high-volume evacuation nozzle, and all handpieces with plastic wrap (e.g., Saran wrap).

6. Cover chair, especially controlling buttons, with a plastic drape.

7. Wrap x-ray packets with plastic wrap (or plan to disinfect after patient contact for 30 minutes with gauzes soaked in an acceptable disinfectant; keep wet the entire time). Also wrap x-ray tube head with plastic.

8. Using the unit-dose concept, lay out all materials that can be dispensed prior to seating patient.

During the visit--

9. Since the patient-to-dentist route accounts for much of the hepatitis transmission, for your own protection

   a. Wear a cloth gown that can be sterilized or a disposable paper gown.

b. Wear protective eyewear.

c. Wear 1-2 pairs of gloves and 1-2 surgical masks.

d. Use a rubber dam whenever possible to reduce bacterial splatter.

e. If possible, avoid high-risk injury-causing procedures.

10. Operate chair controls through plastic or use foot controls.

11. Avoid touching undraped surfaces.

12. Use sterile instruments.

13. Don't break the chain of asepsis--avoid touching your nose, eyes, glasses, hair, pants, the telephone, records, pencils, etc., until after degloving and washing your hands.

After the patient leaves--

14. Wrap all instruments loosely in bib napkin and place in sterilizer. DO NOT HANDLE CONTAMINATED INSTRUMENTS UNTIL THEY HAVE BEEN STERILIZED. After their sterilization, recycle instruments through normal preparation.

15. Disinfect any touched surface for 30 minutes with an acceptable disinfectant. Keep surface wet the entire time.

16. Disinfect eye glasses with an acceptable disinfectant.

17. Wash hands and face with an antiseptic agent.

18. Follow guidelines listed in "Disposal of Septic Materials" section when discarding disposable items and recycling towels, drapes, and gowns.

APPENDIX C

CHEMICLAVE OPERATING INSTRUCTIONS

1. Place safety and operating instruction labels on top of Chemiclave.

2. Position unit in a well-ventilated area and with front panel facing a wall, away from the patient treatment area.

3. Do not permit open flames, smoking materials, electrical or mechanical items that may spark or arc, or any other ignition source within 2 feet of the Chemiclave.

4. Turn power swith on. The "Power" and "Temperature" lights will glow. When the "Temperature" light goes out, the Chemiclave has been preheated and is ready for use.

5. If the "Solution" light illuminates, the solution reservoir needs refilling. Chemiclave 5000: Before refilling solution reservoir, dispose of exhausted solution by removing condensate tray (see Figure C-1a) and discarding contents. Chemiclave 6000: Install drain tubing, open condensate tank drain by rotating locking cam, and push valve slide to discharge contents (see Figure C-1b and c). Do not reuse condensate. Instructions for Chemiclave 5500 are not yet available.

6. With control knob in the "Depressurize" position, fill the solution reservoir (opening on top of the unit) only with fresh Vapo-Steril solution. (Chemiclave 5000: 500 ml; each cycle uses 15.7 ml and refilling is required after 30 cycles. Chemiclave 6000: 1000 ml; each cycle uses 63 ml and refilling is required after 15 cycles. Chemiclave 5500: 830 ml; each cycle uses 30 ml and refilling is required after 27 cycles.) After filling reservoir, replace cap. Alternate. If Vapo-Steril supplies are unavailable, distilled water may be used as a last resort. Put the distilled water in a small container (16 cm^3, model 5000; 64 cm^3, model 6000, 50 cm^3, model 5500) and place this container, along with the instrument load, into the chamber of the Chemiclave. (Distilled water must not be put into the solution reservoir because water will not flow through the Vapo-Steril valve due to the difference in surface tension.)

7. Place instruments in the instrument tray lined with a Harvey tray liner or equal. Close and latch the door. Never cycle unit with door open, and do not cycle successively.

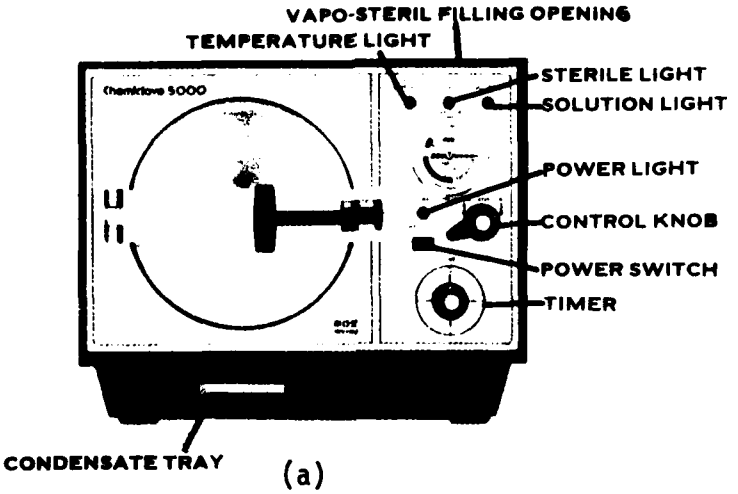
8. Turn the control knob to "Pressurize." This automatically sets the 20-minute cycle, but timing does not begin until the chamber pressure reaches 20 psi.

9. At the end of the cycle, a buzzer will sound and the "Sterile" light will glow. Turn the control knob to "Depressurize." After the pressure gauge

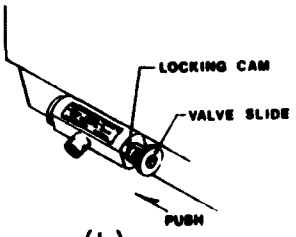
reads zero and the unit has cooled a bit, open the door slightly (at arm's length) and stand back for 10-30 seconds, then open the door fully. (If unit is equipped with a Chemipurge, activate Chemipurge after depressurization but before door is opened.

10. Remove contents.

11. When Chemiclave is not in use, leave door closed but not latched.



(a)



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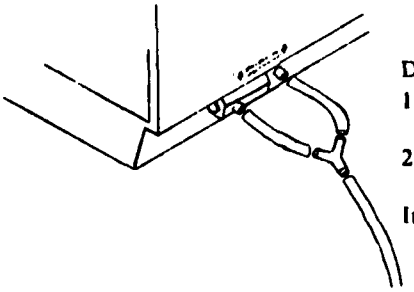

DRAIN TUBING INSTALLATION

1. Attach short (2) and long (1) tubings to the "Y" connector.
2. Attach short tubings to the drain and vent outlets.

Installation is complete.

(c)

Figure C-1. Disposal of exhausted Vapo-Steril solution in Chemiclave 5000 (a) and Chemiclave 6000 (b and c).

APPENDIX D

CHEMICLAVE MAINTENANCE

1. Clean Chemiclave weekly.

   a. Preheat for 5 minutes with door closed; turn unit off, and rub the inside chamber and door with a Scotch Brite 3M general-purpose pad soaked in Harvey metal cleaner.

   b. Repeat procedure after 10 minutes.

   c. Rinse thoroughly with water and wipe with a clean cloth or paper towel.

2. Inspect the door gasket periodically for wear and leakage. Replace when necessary. (Approximate life expectancy for model 5000 is 250 cycles; for model 6000, 350 cycles; information for model 5500 not yet available.)

3. Replace the Chemipurge formaldehyde filter and the sterile inlet filter when they become discolored. The formaldehyde filter has a useful life of at least 3 months in the model 6000 and at least 4 months in the model 5000. (Information for model 5500 not yet available.) The sterile inlet filter has an indefinite life unless contaminated with oil.

4. Adjust the door if necessary due to wear. Use wrench-end of tray handle and place wrench over nut between door and bridge. To tighten door, turn the nut clockwise; to loosen, counterclockwise. The door is properly adjusted when it can be opened by using only index and middle fingers, and closed using only thumb pressure.

APPENDIX E

STERILIZATION MONITORING

Steam autoclaves, chemical-vapor sterilizers, and dry-heat sterilizers should be monitored with a spore test weekly. Ethylene oxide gas sterilizers: monitor every load.

Chemiclave or Steam Autoclave

Although glassine envelopes containing spore strips can be used with either of these sterilizers and certain ampules can be used with the steam autoclave, the Attest 1242 polypropylene vial is the recommended method for both and is the one discussed below.

1. Determine the most demanding pack in the load.
2. Place an Attest 1242 biological spore indicator inside this pack.
3. Position suitable chemical indicators (inside and outside) for every pack, not only for this cycle but for every cycle.
4. Place the pack with the Attest indicator in the center of the load or in the least accessible region of the sterilizer.
5. Operate the sterilizer according to manufacturer's instructions.
6. After allowing the pack to cool for 10 minutes, retrieve the Attest vial and activate it by squeezing the flexible plastic vial. This crushes the glass ampule and releases the growth medium. (A special Attest crusher is available at no cost from 3M.)
7. Incubate the vial at 56°C in the Attest No. 106 incubator and check for bacterial growth after 24 and 48 hours.
8. If the color of the culture medium changes from purple to yellow, sterilization has not occurred.
9. With each test, incubate a control that has not been placed in a sterilizer to insure that spores are viable.
10. Keep detailed records of all testing, including controls.

Dry-heat Sterilizers

1. Follow steps 1-5 above using the stock-listed spore strip (NSN 6530-00-477-6720) or equivalent.

2. On the outside of the envelope, indicate which type of sterilizer was used and the bacillus species to be incubated (*Bacillus subtilis*). Deliver intact envelope to the laboratory for incubation.

3. Results are usually returned in 7-10 days.

4. Incubate controls and keep detailed records of results.

APPENDIX F

ADA-RECOMMENDED DISINFECTANTS

Chemical[a]	Dilution	Contact time	Activity level[b]	Shelf life
Glutaraldehyde, 2%				
Cidex	None	10-30 min	Intermediate	14 days
	None	10 hr	High	14 days
Cidex 7	None	10-30 min	Intermediate	28 days
	None	10 hr	High	28 days
Glutarex	None	10-30 min	Intermediate	28 days
	None	10 hr	High	28 days
Sporicidin	1:16 with water	10-30 min	Intermediate	30 days
	None	6 3/4 hr	High	30 days
Chlorine, 1%	1:5 with water	10-30 min	Intermediate	1 day
Iodophor, 1%				
Betadine	1:20 with 70% alcohol[c]	10-30 min	Intermediate	
Wescodyne[d]	1:200 with water	10-30 min	Intermediate	

[a] Alcohol alone, phenols, and quaternary ammonium compounds are not recommended.

[b] Intermediate--effective against vegetative bacteria, tubercle bacilli, fungi, and viruses, but not spores.
High--biocidal against all classes (synonymous with sterilization).

[c] 70% isopropyl alcohol may be used and can be prepared by diluting 99% pure isopropyl alcohol (NSN 6505-00-299-8095) 7:3 with distilled water (90%--9:1--is also acceptable). Ethyl alcohol may also be used.

[d] Wescodyne and Wescodyne-G are essentially the same product.

APPENDIX G

STERILIZATION/DISINFECTION OF EQUIPMENT

1 = method(s) of choice
2 = secondary alternatives

	Chemiclave	Steam Autoclave	Dry Heat	Heat Transfer	Ethylene Oxide	Glutaraldehyde	Sodium Hypochlorite	Iodophor	Alcohol	Cover	Foot Control	Unit Dose	Dispose
Anesthetic cartridges[a]									1				
Articulator								1		1			
Bracket table										1			
Bristle brushes (laboratory)						1							
Burs	1		2										
Cavitron tips	1	1											
Chair control buttons								2		1	1		
Cloth drapes		1											
Cotton supplies		1											
Counter tops						1	1	1					
Diamonds	1		2										
Endodontic kits	1		1										
Endodontic instruments (chairside)				1									
Eye protection (reusable)								1					
Facebow								1		1			
Glassware	1	2	1										
Hand instruments (carbon-steel edge)	1		2										
Hand instruments (noncarbon-steel edge)	1	1	2										
Handpiece (high speed, heat sterilizable)	1	1											
Handpiece (high speed, heat labile)					1			1					
Handpiece (slow speed, heat sterilizable)	1	1											
Handpiece (slow speed, heat labile)					1			1					
Headrest								1		1			
HVE tip (metal)	1	1	2										
HVE tip (plastic, reusable)						1	1						1
Impression material												1	
Impression trays (metal)	1	1											
Indelible pencils	2											1	
Large instrument packs		1											
Light handles								1		1			

[a]Rubber diaphragm only; do not immerse. If sterility is required, use a steam autoclave.

	Chemiclave	Steam autoclave	Dry heat	Heat transfer	Ethylene oxide	Glutaraldehyde	Sodium hypochlorite	Iodophor	Alcohol	Cover	Foot control	Unit dose	Dispose
Matrix bands	2	2	2										1
Matrix retainers	1	1											
Needles, anesthetic													1
Nitrous oxide mask (Brown mask)[b]	1	1							2				
Orthodontic pliers, etc.	1												
Periodontal curettes	1												
Petroleum jelly												1	
Plastics					1	1	1	1					
Powders			1										
Pressure-indicator paste												1	
Prophy cups					2								1
Prophy angles (heat sterilizable)	1	1											
Prophy angles (heat labile)					1			1					
Prostheses (nonmetallic)							1	1					
Prostheses (metallic)								1					
Pumice[c]							1					1	
Pumice pans								1		1			
Radiographic positioning devices (XCP)						1							
Rag wheels		1											
Rubber-dam clamps	1	1											
Rubber-dam forceps	1	1						2					
Rubber-dam frame	1	1											
Shade guides						1	1						
Sharpening stones		1											
Surgical instruments (forceps, elevators, etc.)	1	1											
Syringes, anesthetic	1	1											
Three-way syringe tips	1	1						2					
Torch handles								1		1			

[b]Mask and connectors are sterilizable. Breathing tubes must be removed and cleaned with alcohol.

[c]Mix pumice with 5 parts sodium hypochlorite to 100 parts distilled water to 3 parts green soap.

APPENDIX H

AMERICAN HEART ASSOCIATION RECOMMENDATIONS FOR ANTIBIOTIC PROPHYLAXIS

Regimen A

1. Parenteral-Oral Combined

Adults--Aqueous crystalline penicillin G (1,000,000 units IM) mixed with procaine penicillin G (600,000 units IM), given 30 minutes to 1 hour prior to the procedure. After procedure, penicillin V, 500 mg orally every 6 hours for 8 doses.

Children--Aqueous crystalline penicillin G (30,000 units/kg IM) mixed with procaine penicillin G (600,000 units IM), given 30 minutes to 1 hour prior to the procedure. After procedure, penicillin V, 500 mg (250 mg for children weighing less than 60 lb [27 kg]) orally every 6 hours for 8 doses.

2. Oral

Adults--Penicillin V, 2.0 g given 30 minutes to 1 hour prior to the procedure. After procedure, 500 mg every 6 hours for 8 doses.

Children--Penicillin V, 2.0 g (1.0 g for children weighing less than 60 lb) given 30 minutes to 1 hour prior to the procedure. After procedure, 500 mg (250 mg for children weighing less than 60 lb) every 6 hours for 8 doses.

3. Patients Allergic to Penicillin

Vancomycin (see Regimen B) or erythromycin (as follows):

Adults--Erythromycin, 1.0 g orally 90 minutes to 2 hours prior to the procedure. After procedure, 500 mg orally every 6 hours for 8 doses.

Children--Erythromycin, 20 mg/kg orally 90 minutes to 2 hours prior to the procedure. After procedure, 10 mg/kg every 6 hours for 8 doses.

Regimen B

1. Parenteral-Oral Combined

Adults--Aqueous crystalline penicillin G (1,000,000 units IM) mixed with procaine penicillin G (600,000 units IM) plus streptomycin (1.0 g IM), given 30 minutes to 1 hour prior to the procedure. After procedure, penicillin V, 500 mg orally every 6 hours for 8 doses.

Children--Aqueous crystalline penicillin G (30,000 units/kg IM) mixed with procaine penicillin G (600,000 units IM) plus streptomycin (20 mg/kg IM), given 30 minutes to 1 hour prior to the procedure. After procedure, penicillin V, 500 mg (250 mg for children weighing less than 60 lb) orally every 6 hours for 8 doses.

2. Patients Allergic to Penicillin

Adults--Vancomycin, 1.0 g IV, with infusion started 30 minutes to 1 hour prior to the procedure. After procedure, erythromycin, 500 mg orally every 6 hours for 8 doses.

Children-- Vancomycin, 20 mg/kg IV, with infusion started 30 minutes to 1 hour prior to the procedure. After procedure, erythromycin, 10 mg/kg orally every 6 hours for 8 doses. (Total dose for children should not exceed 44 mg/kg in any 24-hour period.)

Special Cases

Patients receiving continuous oral penicillin for secondary prevention of rheumatic fever occasionally have alpha hemolytic streptococci (which are relatively resistant to penicillin) in the oral cavity. The doses of penicillin recommended in Regimen A are apt to control these organisms, but the dentist may choose a dose from Regimen B or may choose erythromycin as recommended for patients allergic to penicillin.

For patients with a history of congenital heart disease, rheumatic or other acquired valvular disease, idiopathic hypertrophic subaortic stenosis, or mitral valve prolapse syndrome with mitral insufficiency, either Regimen A or Regimen B can be used when dental procedures are apt to cause bleeding.

For patients with prosthetic heart valves, Regimen B should be used when dental procedures are apt to cause bleeding.

If there is any doubt as to the patient's medical condition, his/her physician should be consulted.

APPENDIX I

RESOURCE LIST: SOURCES AND PRICES

The following is a list of catalog numbers or National Stock Numbers (NSNs), prices, and sources for many of the supply and equipment items that may be used in an infection control program. No source or manufacturer is listed for items with an NSN; when a source is given for a commercially available item, it is listed as a two- or three-letter abbreviation (e.g., MDT). The manufacturer's complete name, address, and phone number (if available) can be found at the end of the resource list. "Not Avail" under the price category indicates the price was not available at the time of publication. The price of some items can be lowered by purchasing in bulk. Prices are subject to change.

Item	Catalog or NSN	Price	Mfr
Sterilizers and Accessories			
Chemiclave			
Chemiclave 6000	6530-01-132-5426	$1621.75	
Chemiclave 5000	6530-00-111-7249	711.75	
Chemiclave 5500	50-20	Not Avail	MDT
Chemipurge[a]			MDT
nonmotorized	2-30-0200-01	126.75	
motorized	2-30-0201-01	256.75	
Chemipurge formaldehyde filter			MDT
Package of one	2-30-0202-01	9.75	
Package of four	2-30-0203-01	35.75	
Chemipurge sterile inlet filter	2-30-0204-01	7.80	MDT
Chamber tray - 6000	2-31-6002-01	27.30	MDT
- 5000	2-31-5002-01	13.65	
tray handle - 6000	2-31-6003-01	9.10	MDT
- 5000	2-31-5003-01	4.55	

[a]Field installation possible on Chemiclave 5000, #A5-10450 and after, and Chemiclave 6000, #A6-1831 and after. Factory installation required on all other models. Installation cost for Chemiclave 5000, #A5-9715 to 10449, is $55; for Chemiclave 6000, #A6-1355-1831, $25. Older models require extensive modification, and conversion fee is $145. These prices do not include the cost of the Chemipurge itself.

Item	Catalog or NSN	Price	Mfr
Chamber tray liners - 6000	2-31-6004-01	8.45/250	MDT
- 5000	2-31-5004-01	8.45/500	
Harvey metal polish (1 qt)	2-32-0102-01	5.20	MDT
Harvey metal cleaner (1 qt)	2-32-0101-01	3.90	MDT
Vapo-Steril solution (4 gal)	6850-00-148-9776	11.70/gal	
Chemiclave safety & operating instructions (labels)		Free	MDT
Chemiclave 5000 handle	2-50-0045-03	3.23	MDT
Steam Autoclave			
Sterilizer, surgical dressing 24" x 16" x 16" chamber	6530-00-065-5243		
Dry Heat			
Model 75	35001	239.90	COL
Model 150	35002	352.40	
Model 400	35010	488.25	
Sterilizer, surgical instruments	6530-00-962-9965	166.28	
Heat Transfer			
Bead sterilizer	6530-00-145-0287	81.01	
Biological Spore Monitors			
ATTEST Biological Indicators			3M
100/box; 4 boxes/case	1242	96.73/box	
25/box; 4 boxes/case	1242P	36.65/box	
ATTEST Biological Incubator (for 1242 and 1242P)	106	52.92	3M
Spor-Test Biological Indicator Strips			MDT
Box of 12	2-30-2020-01	16.25	
Box of 100	2-30-2040-01	36.40	
Box of 500	2-30-2050-01	161.85	
Kilit Ampules			BBL
Package of 10	12018	6.55	
Package of 100	12019	58.15	

Item	Catalog or NSN	Price	Mfr
Kilit Sporestrips No. 1			BBL
Package of 10	12020	15.00	
Package of 100	12021	129.25	
STER-L-TEST			LOR
Package of 125	1912	3.75	
Chemspor Chemical/Biological			
Sterility Indicator (case of 100)	NA018		AMS
1-11 cases		103.00/case	
12-23 cases		98.00/case	
24+ cases		93.00/case	
Spordi Strips (case of 100)	NA101		AMS
1-11 cases		61.00/case	
12-23 cases		58.00/case	
24+ cases		55.00/case	
Proof (case of 100)	NA052		AMS
1-11 cases		136.00/case	
12-23 cases		129.00/case	
24+ cases		123.00/case	
Proof Incubator	NA053		AMS
1-11 units		79.00/unit	
12-23 units		75.00/unit	
24+ units		71.50/unit	
Sterilization Test Strip,			
Biological Spore (box of 25)	6530-00-477-6720	19.40	
Spore-O-Chex	00190	Not Avail	ATI

Chemical Indicators

Chemitest Indicator Tape			
(1" x 2160")	2-30-3040-01	7.80	MDT
Chemitest Indicator Strips			
(5" x 3/4") - box of 250	2-30-3050-01	7.80	MDT
Chemitest Indicator Tabs			
(1/2" sq) - box of 250	2-30-3060-01	7.15	MDT
3M Brand Autoclave Steam			
Indicator Tape, 60 yds	1222		3M
1/2" - 72 rolls/case			
1-9 cases		1.68/roll	
10 cases		1.53/roll	

Item	Catalog or NSN	Price	Mfr
3/4" - 48 rolls/case			
1-9 cases		2.00/roll	
10 cases		1.80/roll	
1" - 36 rolls/case			
1-9 cases		2.59/roll	
10 cases		2.29/roll	
1 1/2" - 24 rolls/case			
1-9 cases		3.89/roll	
10 cases		3.42/roll	
2" - 20 rolls/case			
1-9 cases		5.17/roll	
10 cases		4.59/roll	
INCHEQUE Internal Steam Indicator, 1 9/16" strip, 20 rolls/case	1201		3M
1-9 cases		5.89/roll	
10 cases		4.90/roll	
Autoclave Indicator Tape			LOR
1/2" x 500'	1910	1.91/roll	
1/2" x 60 yd	1911	3.19/roll	
Tape, Sealing, Sterilization Indicator			
1/2" x 60 yd	6530-00-299-9822	.67	
1" x 60 yd	6530-00-299-9821	1.14	
T-T-S labels (box of 125)	1912	3.75	LOR
Steam Clox	00101	Not Avail	ATI
Reusable containers for Steam Clox	81101	Not Avail	ATI
Steril-Chex/250°	00105	Not Avail	ATI
Sterilometer	00111	Not Avail	ATI
Steri Label	00160	Not Avail	ATI
Dry-Heat Indicator Labels	00170	Not Avail	ATI

Sterilization Wraps

Chemitest Indicator Bags			MDT
Tray size (5" x 2" x 15 1/2"), box of 150	2-30-3000-01	18.85	
Instrument size (2 1/2" x 1 1/2" x 10 1/2"), box of 250	2-30-3010-01	16.90	
Chemitest See-Thru Ind Bags			MDT
Tray size (5" x 15"),box of 150	2-30-3020-01	21.45	
Instrument size (3" x 12"), box of 250	2-30-3030-01	25.35	

Item	Catalog or NSN	Price	Mfr
Visi-Peel Sterilizing Pouches			CHA
3" x 5", box of 1000	10-110	30.57	
2 5/8" x 8", box of 1000	10-109	32.46	
3 1/2" x 9", box of 1000	10-108	41.93	
4 1/2" x 10", box of 1000	10-106	58.75	
5 1/4" x 10", box of 1000	10-086	65.17	
5 1/4" x 15", box of 500	10-105	49.36	
6" x 7 3/4", box of 1000	10-085	61.94	
7" x 12", box of 1000	10-104	97.29	
8" x 13", box of 1000	10-103	103.67	
10" x 12", box of 500	10-083	73.73	
12" x 15", box of 500	10-102	81.19	
16" x 16", box of 500	10-100	111.13	
Visi-Peel Sterilizing Tubing			CHA
2" x 100', 10 rolls/box	10-072	31.54/box	
3" x 100', 10 rolls/box	10-073	42.02/box	
4" x 100', 10 rolls/box	10-074	56.06/box	
6" x 100', 10 rolls/box	10-076	78.88/box	
9" x 100', 5 rolls/box	10-079	53.60/box	
12" x 100', 5 rolls/box	10-082	68.36/box	
Nyclave			LOR
2" x 100'	1901	4.91	
3" x 100'	1902	6.71	
6" x 100'	1903	13.43	
Envelope, Sterilization, Paper, Self-sealing, 3 5/8" x 1 5/8", box of 500	6530-00-299-8370	4.80	
Envelope, Sterilization, Paper, Self-sealing, 8" x 2 3/4", box of 500	6530-00-754-0421	8.63	
Tubing, Sterilization			
2" x 500'	6530-00-104-7533	Not Avail	
4" x 500'	6530-00-104-7534	Not Avail	
6" x 500'	6530-00-104-7530	Not Avail	
8" x 500'	6530-00-104-6794	Not Avail	
10" x 500'	6530-00-104-7531	Not Avail	
18" x 500'	6530-00-104-7532	Not Avail	
Ultrasonic Cleaners			
Vibraclean 200	2-02-20	419.25	MDT
Vibraclean 100	2-01-20	354.25	
Buffalo Model 733, 110 V	30900	240.00	BUF
Lid for Buffalo 733	30950	12.85	
T-14	309	279.95	L&R
T-14 with timer	311	299.95	

Item	Catalog or NSN	Price	Mfr
2014		379.95	L&R
SS-4		177.75	COL
Health Aids T3.3B		185.30	HSC
Vector 55		238.64	JFJ
Vale 1		425.00	ESM

Handwashing Agents

Hibiclens			STU
1 gal, 4 per case	0575-91		
1-2 cases		22.90/gal	
3-12 cases		20.61/gal	
32 oz, 12 per case	6505-01-045-3255		
1-2 cases		6.24/bottle	
3-12 cases		5.62/bottle	
16 oz, 24 per case	0575-16		
1-2 cases		3.88/bottle	
3-12 cases		3.49/bottle	
8 oz, 24 per case	0575-08		
1-2 cases		3.12/bottle	
3-12 cases		2.81/bottle	
4 oz, 48 per case	0575-04		
1-2 cases		2.21/bottle	
3-12 cases		1.99/bottle	
Derma Scrub			MIN
12 oz, 6 per case, plus dispenser	1678	18.60/case	
1 gal refill, 4 per case	1683	43.80/case	
32 oz, 12 per case plus dispenser	1687	45.60/case	
Wall bracket and pump for 32 oz, 6 per case	1688	18.00/case	
Derma Cidol			MIN
12 oz, 6 per case plus dispenser	1696	19.20/case	
1 gal refill, 4 per case	1697	48.00/case	
32 oz, 12 per case	1698	51.00/case	
pHisoHex			CWL
1 gal	0961-0450-08	16.45	
Safe-N-Sure			CAL
1 liter, 12 per case	12-170		
1 case		60.35	
6 cases		53.10/case	
10 cases		50.67/case	

Item	Catalog or NSN	Price	Mfr
Kindest Kare			CAL
1 liter, 12 per case	11-051		
1 case		60.35	
6 cases		53.10/case	
10 cases		50.67/case	
Betadine Surgical Scrub			PUR
16 oz plus dispenser, 12 per case	0034-2200-88		
1-11 cases		5.26/bottle	
12+ cases		5.11/bottle	
16 oz without dispenser, 12 per case			
1-11 cases		3.82/bottle	
12+ cases		3.74/bottle	
32 oz, 6 per case	0034-2200-90		
1-23 cases		5.43/bottle	
24+ cases		5.28/bottle	
1 gal, 4 per case	0034-2200-01		
1-2 cases		17.50/gal	
3-24 cases		15.03/gal	
25+ cases		14.20/gal	
Betadine Surgi-Prep Sponge Brush			PUR
Case of 144 brushes (single use)	0034-2140-36		
1-9 cases		53.28/case	
10-24 cases		51.84/case	
25-49 cases		49.68/case	
Septic Soap			STA
1 gal	60110		
1-11 gal		13.25/gal	
12-23 gal		12.30/gal	
Formula 1			RCH
1/2 gal		8.54	
Vestal Lotion Soap			VES
1 qt, 12 per case	6240-24		
1-8 cases		49.93/case	
9-16 cases		47.39/case	
8 oz, 24 per case	6240-47		
1-24 cases		40.18/case	
27 oz, 12 per case	6240-60		
1-8 cases		53.00/case	
9-16 cases		50.46/case	

Item	Catalog or NSN	Price	Mfr
Vestal Medicated Lotion Soap			VES
1 qt, 12 per case	6266-24		
1-8 cases		53.00/case	
9-16 cases		50.46/case	
8 oz, 24 per case	6266-47		
1-24 cases		44.10/case	
27 oz, 12 per case	6266-60		
1-8 cases		56.16/case	
9-16 cases		54.46/case	
Vestal Iodine Scrub			VES
1 gal, 4 per case	6365-08		
1-6 cases		60.70/case	
7-12 cases		57.32/case	
8 oz, 12 per case	6365-46		
1-24 cases		20.74/case	
25-49 cases		19.89/case	
Disinfectants			
Sporicidin			
8 oz	6840-01-122-0687		
Cidex			SUR
1 qt, 16 per case	2245	41.20/case	
1 gal	6840-00-926-9117	9.27	
5 gal	6840-01-066-7466	43.48	
Cidex 7			SUR
1 qt, 16 per case	2745	61.44/case	
1 gal	6840-01-071-8980	11.10	
5 gal	2755	68.59	
10" soaking tray (for Cidex)	2010	12.75	SUR
Glutarex			3M
1 qt, 4 per case	0515	3.68/qt	
1 gal, 4 per case	0500	10.00/gal	
2 1/2 gal, 2 per case	0505	24.38/2 1/2 gal	
Isopropyl alcohol, 99%			
5 gal	6505-00-299-8095	12.75	

Item	Catalog or NSN	Price	Mfr
Wescodyne			AMS
1 gal, 6 per case	NJ131		
1-9 cases		74.00/case	
10-24 cases		66.00/case	
Wescodyne-G			
1 gal, 4 per case	6840-00-526-1129	26.76/case	

Tray Systems for Chemiclave 6000

See-Thru System			MDT
See-Thru Sterilization Tray, 7 1/4" x 1 1/2" x 11 1/4"	2-31-6070-01	16.25	
See-Thru Nylon Windows, 250 per box	2-31-6071-01	9.75/box	
Tray Liners for See-Thru Tray, 250 per box	2-31-6030-01	6.50/box	
Instrument Guards	2-31-6028-01	2.60	
Instrument Holders	2-31-6029-01	3.90	
Futura Color-Coded Instrument Trays			COL
Base Tray (black)	35301	4.75	
Lid Cover (bl, gld, red, gray)	35302	4.75	
General Purpose Tray: base tray, lid cover, instrument rest-gen purpose	35201		
One tray		11.70	
6-9 trays		11.25/tray	
10+ trays		10.70/tray	
Operative Tray: base tray, lid cover, instrument rest-oper, medication cups, pellet dispenser acc tray, bur stand	35202		
One tray		22.55	
6-9 trays		21.80/tray	
10+ trays		20.65/tray	
Endodontic Tray: base tray, lid cover, medication cups, pellet dispenser, acc trays (2), reamer stand	35203		
One tray		22.55	
6-9 trays		21.80/tray	
Instrument Tray Rack	35206	26.00	

Item	Catalog or NSN	Price	Mfr
High-Volume Evacuation (HVE) Tips			
Standard Stainless Steel	10-0010-00	4.65	ADE
Short Stainless Steel	11-0160-00	4.65	ADE
Standard Rigid Plastic, gray, box of 12	11-0220-01	19.22/box	ADE
Standard Disposable, white, box of 100	11-0230-01	22.44/box	ADE
SURG-O-VAC, disposable, autoclavable, tapered, box of 25	G-800	6.90/box	LOR
Three-Way Syringe Tips			
Autoclavable Syringe Tip	23-0090-00	8.37	ADE
Syringe Tip Conversion Kit with 5 tips	90-0126-00	23.25	ADE
Syringe-Tip-Only Kit with 5 tips	23-0872-01	19.22	ADE
High-Speed Handpieces (sterilizable)			
#633FG KaVo "CONTACT AIR" (4-tube)	553-0506	266.66	KAV
#625FG KaVo "SUPER TORQUE" (4-tube)	553-0450	266.66	KAV
430-K (4-tube)	58434	240.00	STA
430-SL (4-tube)	58437	246.00	STA
8000 (4-tube)	750014	220.50	MID
8000-i Fiber Optic (5-tube)	750015	252.00	MID
Quiet-Air Standard (4-tube)	464004	220.50	MID
Quiet-Air In-sight (5-tube)	730014	252.00	MID
Low-Speed Handpieces (Shorty System - sterilizable)			
Shorty two-speed air motor only with 4-tube connector (MID 710024)	6520-01-100-5559	356.25	
Shorty single-speed air motor only with 4-tube connector	710027	290.70	MID
Contra-angle sheath and ball-bearing latch-type head (MID 710070 and 720406)	6520-01-086-8930	84.60	
Ball-bearing latch-type head (MID 720406)	6520-01-086-8931	49.80	
Straight attachment for Shorty motor (MID 760000)	6520-01-099-2322	96.00	
Contra-angle sheath and ball-bearing friction grip head (MID 710070 and 720433)	6520-01-115-0417	84.60	

Item	Catalog or NSN	Price	Mfr
Ball-bearing friction grip head (MID 720433)	6520-01-113-7148	49.80	
Spray attachment (MID 230601)	6520-01-086-8928	7.48	
Universal-style adaptor to accept Universal/Doroit-type angles (MID 760020)	6520-01-097-0667	25.20	
Prophy contra-angle head (screw in) (MID 720416)	6520-01-141-7471	24.90	
Miscellaneous			
Antiretraction Valve	AA-10	13.95	ASP
	2625-029	8.55	DEZ
Melt-A-Way Water-Soluble Bags, 100 per case	5-341		MDI
1-5 cases		51.56/case	
6-14 cases		48.03/case	
Dova Disposable Mouth Props			FRE
100		9.95	
200		19.50	
500		45.00	
1000		85.00	
Nyclave Impulse Heat Sealer	1915	74.81	LOR
Nyclave Roll Holder	1920	2.96	
Credo Clave (rust inhibitor for steam autoclave)			LOR
480 ml	1500	6.30	
1/2 gal	1501	13.28	
Brush, Surgical Scrub, U-shaped	6520-00-044-4820	.56	
Brush, Acid Swabbing (disposable PIP brush), one gross/box	7920-00-514-2417	3.45/box	
Holder, Dental Bur (heat sterilizable)	6520-01-049-3597	5.31	
Cover, Dental, Bracket Table			
12" x 8", box of 1000	6520-00-241-2431	8.19	
17 1/2" x 11", box of 1000	6520-00-139-4344	22.06	
Soap, Green, 25 lb	6505-00-141-3000	16.41	
Bag, Plastic (headrest covers), box of 1000	8105-01-096-0670	89.00	

Item	Catalog or NSN	Price	Mfr
Face Masks			
SURGINE II face mask, box of 300	4230	44.55	SUR
Gauze, box of 120	6515-00-299-9597	52.93	
Nonwoven, fabric, cupped, box of 50	6515-00-982-7493	7.17	
Nonwoven, fabric, box of 50	6515-00-782-2621	7.38	
Nonwoven, fabric, pleated, box of 300	6515-01-003-3142	36.09	
Respirators			
Dust, box of 240	9900	340.50	3M
Mercury vapor, box of 100	8707	135.50	3M
Toxic dust, box of 12	4240-00-629-9150	6.37	
Eyewear and Eye Protection			
Eyewear, disposable, box of 100	29	31.70	SPT
Spectacles, protective, dental patient, wrap-around, box of 12			
Clear lenses	6520-01-105-0425	19.00	
Green lenses	6520-01-130-7721	19.00	
Eyewash fountain	799-06-00	51.70	DEN
Eyewear germicidal cleaner, 1 gal	101	10.30	ADC
Gloves, Patient Examining and Treatment			
Nonsterile			
Medium, box of 50	6515-00-477-6722	3.35	
Medium, box of 100	6515-00-051-1950	2.16	
Medium-large, box of 100	6515-00-462-0832	4.79	
Sterile-Lightweight, 36 pr/box		8.50/box	
Size 6	6515-00-782-6471		
Size 6½	6515-00-782-6472		
Size 7	6515-00-782-6473		
Size 7½	6515-00-782-6474		
Size 8	6515-00-782-6475		
Size 8½	6515-00-782-6476		
Finger Cot, Surgical, 144/box			
Large	6515-00-935-1194	1.85	
Medium	6515-00-935-1193	1.51	
Smock, Dental Operating			
Men's, Aqua			
Small	6532-00-926-9976	13.96	
Medium	6532-00-926-9975	13.96	
Large	6532-00-926-9964	13.96	
Extra large	6532-00-159-4881	11.06	

Item	Catalog or NSN	Price	Mfr
Men's, Gold			
Small	6532-01-005-4791	Not Avail	
Medium	6532-01-005-4792	Not Avail	
Large	6532-01-005-4793	Not Avail	
Extra large	6532-01-004-3796	Not Avail	

Manufacturers

ADE A-Dec Inc.; P.O. Box 111, Newburg OR 97132; (503) 538-7478; 1-800-547-1883; VA Contract

AMS AMSCO Medical Products; 2820 West 23rd Street, Erie PA 16512; (814) 452-3100

AOC American Optical Corporation; 448 Plasamour Drive NE, Atlanta GA 30325; 1-800-241-9913

ASP Aseptico, Inc.; P.O. Box 522, Kirkland WA 98033; 1-800-426-5913

ATI Aseptico-Thermo Indicator, Deseret Medical Inc., Parke, Davis & Company; 11471 Vanowen Street, North Hollywood CA 91609; (213) 765-7830 or (213) 877-3117

BBL BBL Microbiology Systems; P.O. Box 243, Cockeysville MD 21030; (301) 666-0100; VA Contract

BUF Buffalo Dental Manufacturing Co., Inc.; 2911 Atlantic Avenue, Brooklyn NY 11207; (212) 227-5400

CAL Calgon Corporation, Commercial Division; 7501 Page Avenue, P.O. Box 147, St. Louis MO 63116; (314) 862-2000; VA Contract

CHA Chaston Medical & Surgical Products; P.O. Box 423, Danville CT 06241; 1-800-243-1172; VA Contract

COL Columbus Dental; 634 Wager Street, Columbus OH 43206; (614) 445-8192; VA Contract

CWL Cook-Waite Laboratories, Inc.; 90 Park Avenue, New York NY 10016; (212) 907-2712

DEN Dentalloy Inc.; 2130 South Ritchey, Santa Ana CA 92705; 1-800-854-8811

DEZ Den-Tal-Ez; Syntex Dental Products, Inc.; P.O. Box 896, Valley Forge PA 19482; (215) 666-9050; VA Contract

ESM Esmadent Chemicals Inc.; P.O. Box 162, Highland Park IL 60035; (314) 433-6116

FRE The Fredericks Company; 26970 Princeton Avenue, P.O. Box 111, Inkster MI 48141

HSC Health Sonics Corp.; 6575 Trinity Ct., P.O. Box 2698, Dublin CA 94566; (415) 828-5803

JFJ J.F. Jelenko & Co, Division of Pennwalt; 99 Business Park Drive, Armonk NY 10504; (914) 273-8600 or 1-800-431-1785

KAV KaVo America; 2200 W. Higgins Road, Suite 320, Hoffman Estates IL 60195. To order, write or call Professional Sales Associates; 5348 Northchester Court, Atlanta GA 30338; (404) 394-9595; VA Contract

L&R L&R Manufacturing Co.; 577 Elm Street, Kearny NJ 07032; (201) 991-5330

LOR Lorvic Corporation; 8810 Frost Ave, St. Louis MO 63134; VA Contract

MDI M.D. Industries, Inc.; 706 Landwehr Road, P.O. Box 219, Northbrook IL 60062; (312) 498-1204

MDT MDT Corporation; 15025 S. Main Street, Gardena CA 90248; (213) 321-4822; VA Contract

MID American Midwest; 901 W. Oakton Street, Des Plaines IL 60018; (312) 640-4800; VA Contract

MIN Minnetonka, Inc.; P.O. Box 1A, Minnetonka MN 55343; (612) 448-4181

PUR Purdue-Frederick Company; 50 Washington Street, Norwalk CT 06856; (203) 853-0123; VA Contract

RCH Richards Laboratories Inc.; Box 424, Columbia City IN 46725

SPT Spotswood Specialty; P.O. Box 250, Lexington KY 40585

STA Star Dental; P.O. Box 960, Valley Forge Corporate Center; Valley Forge PA 19482; (215) 666-9050; VA Contract

STU Stuart Pharmaceuticals; P.O. Box 2376, Wilmington DE 19897; VA Contract

SUR Surgikos, Inc.; P.O. Box 130, Arlington TX 76010; 1-800-433-5009, Ext 5900; VA Contract

3M Medical Products (Contact Sales Office/Distribution Center in your area); VA Contract

ALASKA: 5331 Minnesota Drive, Anchorage AK 99502, (907) 276-2363
CALIFORNIA: 6023 South Garfield Avenue, Los Angeles CA 90040, (213) 726-6300
GEORGIA: 2860 Bankers Industrial Drive, Atlanta GA 30360, (404) 447-7000
HAWAII: 4443 Malaai Street, P.O. Box 30048, Honolulu HI 96820, (808) 422-2721
ILLINOIS: 6850 South Harlem Avenue, Bedford Park, Argo IL 60501, (312) 496-6500
MINNESOTA: 3130 Lexington Avenue South, P.O. Box 33211, Eagan MN 55133, (612) 733-3300
NEW JERSEY: 15 Henderson Drive, P.O. Box 76, West Caldwell NJ 07006, (201) 575-2000
TEXAS: 2121 Santa Ana Avenue, P.O. Box 28158, Dallas TX 75228, (214) 324-8100
WASHINGTON: 100 Andover Park West, Andover Industrial Park, P.O.Box C34350, Seattle WA 98124, (206) 244-7200

VES Vestal Laboratories; Division of Chemed Corporation; 5035 Manchester Avenue; St. Louis MO 63110; (314) 535-1810; VA Contract

APPENDIX J

INFECTION CONTROL PERIODICALS AND PUBLICATIONS

The following magazines, newsletters, and reports deal with infection control. These may be useful in updating existing infection control programs and keeping up with current techniques and advances.

Morbidity and Mortality Weekly Report (MMWR): Reports disease outbreaks, environmental hazards, and public health problems of interest to health care providers. It is prepared by the Centers for Disease Control. Write: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. $20/yr.

Asepsis: The Infection Control Forum: Presents forum discussions on a variety of subjects. Write: Asepsis: The Infection Control Forum, J.R. Druid Associates, Inc., Publications Division, 6 E 43rd St., New York NY 10017. FREE

Infection Control Rounds: Provides information on hospital infection control as it relates to everyday practices of various health care personnel. Write: Microbial Products, Medical Products Division/3M, 3M Center, St. Paul MN 55144. FREE

Infectious Disease Forum: Contains information on infectious disease research, diagnosis, and control. Write: Abbott Laboratories, Diagnostic Division, North Chicago IL 60064. FREE

Integral Asepsis Forum: Each issue deals with a specific topic; e.g., Vol. 2 No. 21 reprinted CDC Guidelines on Infection Control. Write: Airwick Professional Products Division, Airwick Industries Inc., 40 Seaview Drive, Secaucus NJ 07094. FREE

Dental Asepsis Review: Presents an overview of current concepts on all phases of infection control. Each monthly issue deals with a specific topic. Write: Laboratory of Oral Microbiology, Indiana School of Dentistry, 1121 West Michigan Street, Indianapolis IN 46202. $6.00/yr.

Hospital Infection Control: Published monthly by American Health Consultants, Inc., 67 Peachtree Park Drive N.E., Atlanta GA 30309. $78/yr.

Other documents and texts that deal (some in part) with infection control are:

Guidelines for Prevention and Control of Nosocomial Infections: National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Road, Springfield VA 22161. Order No. PB 81-176257.

Accreditation Manual for Hospitals: Joint Commission of Accreditation of Hospitals, 875 North Michigan Avenue, Chicago IL 60611.

Dentists Desk Reference and Accepted Dental Therapeutics: American Dental Association, Chicago IL 60611.

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