INFECTION CONTROL
RECOMMENDATIONS FOR THE DENTURIST'S CLINIC AND LABORATORY
DENTURIST ASSOCIATION OF CANADA

INTRODUCTION

Infection control involves taking steps to prevent the spread of infectious agents to you and your patients. Although it is not difficult, developing a good infection control plan in the denturist setting does require that you understand:

1. how to prevent transmission of infectious diseases,
2. management if exposure occurs and
3. recommendations for your infection control plan

OCCUPATIONAL EXPOSURE

Your day-to-day tasks may put you at risk of an occupational exposure, which can be divided into three basic areas:

1. Infectious Hazards
2. Chemical Hazards and
3. Physical Hazards

In addition, all three of these hazards may be present in dental waste.
Each area carries with it a host of government regulations and professional standards.

1. Infectious Hazards

Infectious diseases are a very real risk in the denturist setting and must be taken seriously. The standard that impacts denturists the greatest is specific to preventing the transmission of bloodborne diseases.

2. Chemical Hazards

Chemicals are used in every denturist clinic; some are hazardous and others are not. Your occupational exposure to chemicals in the denturist clinic is limited by the use of chemical exposure control; specific policies, procedures and equipment designed to make your working environment as safe as possible.

3. Physical Hazards

The design of your clinic and the equipment you use presents certain physical hazards. Are your electric wall outlets grounded? Do you have a fire escape plan? These and many other examples represent physical hazards that are governed by federal, provincial and municipal regulations. Another physical hazard, although remote, can occur with the use of x-ray devices that creates a potential for exposure to ionizing radiation during the film exposure process.

4. Waste Management

What you throw away at the office each day may expose others to hazardous chemicals, sharp instruments, or infectious agents. Proper waste management is therefore an integral part of your infection control plan. Federal, provincial and municipal authorities govern the environmentally safe transportation and disposal of waste after it leaves your office, as determined by medical, hazardous and toxic waste regulations and tracking acts.

PREVENTION OF TRANSMISSION OF INFECTIOUS DISEASES

How diseases are transmitted from one person to another determines the procedures used for infection control in the denturist's clinic. Microorganisms such as bacteria, viruses and fungi are found throughout the body and can be carried by blood, saliva or other body fluids. In the denturist setting, exposure incidents result from contact with blood, body fluids or other potentially infectious materials that can occur through direct contact, indirect contact and/or spatter and aerosols.

Disease transmission can occur from:

1. **Patient to denturist:**
   a. through breaks in the skin
   b. injury exposure
   c. through mucous membrane
2. **Denturist to patient:**
   a. denturist's hands have lesions or are bleeding into the patient's mouth
   b. bleeding on items used in the patient's mouth
   c. respiratory contamination

3. **Patient to patient:**
   a. improper handwashing and gloving
   b. improperly cleaned and sterilized instruments
   c. improperly cleaned and disinfected operatory surfaces
4. **Denturist clinic to community:**
   a. improper waste management
   b. wearing contaminated clothing out of the clinic

MANAGEMENT OF EXPOSURE TO BLOODBORNE PATHOGENS

It is generally accepted that the denturist is far more at risk from hepatitis B virus, or HBV, than from the human immunodeficiency virus that causes AIDS. However, because of increasing acceptance of the HBV vaccine among practicing denturists in recent years, the risk of HBV infection is generally limited to those who have not been vaccinated. Patients with hepatitis B or who are HBV carriers can be treated safety or with minimal risk of transmission of disease in the denturist's clinic when infection control procedures are used. HIV appears to be much more difficult to transmit than HBV but there is confidence that the same procedures will prevent transmission of HIV in the denturist's clinic.

Health care facilities, including denturist clinics, are responsible for ensuring that percutaneous exposures are minimized through preventative procedures and are appropriately managed when they do occur.

Management of exposure includes:

* general wound care and cleaning;
* counselling of the exposed worker regarding bloodborne pathogens;
* source patient testing if possible for HBV, HCV and HIV (consent of the source person is required);
* documentation of the incident with a review of the cause to determine if such exposures can be prevented in the future;
* post exposure assessment and prophylaxis for the health care worker if indicated;
* baseline and follow-up serology of the health care worker if indicated.

A person who is competent in the management of exposure to bloodborne pathogens should carry out the post exposure assessment. Transmission of hepatitis B carries the greatest risk for the nonimmune health care worker. Those who have not been immunized should begin a vaccine series at the first assessment. Hepatitis B immune globulin (HBIG) should be given **within 72 hours** if the source patient is positive for hepatitis B surface antigen. Workers who have completed the vaccine series and who have not been documented to have mounted an adequate antibody response should be tested following an exposure to ensure they are immune. Those who have responded to the vaccine can be considered immune. Workers exposed to hepatitis B that do not have immunity at the time of exposure and who have not previously displayed a response to hepatitis B immunization should receive a dose of HBIG and another series of the vaccine.

Exposure to HIV-Infected blood is uncommon in the denturist setting and the risk of transmission is low. However, issues surrounding transmission of this pathogen tend to result in the greatest amount of anxiety following exposure to blood. Exposure is considered significant if it involves blood or sterile body fluids. HIV does not transgress intact skin. Thus blood or sterile body fluid must penetrate the skin or come into contact with mucous membranes or broken skin. The risk of transmission increases with depth of exposure, degree of contamination of the penetrating device and level of virus in the source blood. Antiviral prophylaxis for one month following workplace exposure to HIV provides a 5-fold reduction in the risk of transmission. Drug toxicity generally limits the use of this approach to incidents where the source patient is known to be positive or is at high risk of infection.

Antiviral drugs should be initiated **within 2 hours of the exposure**, if possible. Rapid screening (within 24 hours) of source patients is possible in most populated areas. Workers with documented exposure to HIV require 6 months of follow-up to rule out infection.

Unfortunately, no vaccines or prophylactic drug treatments prevent the transmission of hepatitis C. For those who have had significant exposure, base-line liver enzymes should be recorded and hepatitis C serology should be carried out with repeat testing at 6 weeks, 3 months and 6 months. People whose liver enzymes become elevated or have a positive antibody test should be urgently referred to a specialist with expertise in managing hepatitis C. *(Journal of the Canadian Dental Association, November 2000, Vol. 66, No.10)*

INFECTION CONTROL RECOMMENDATIONS FOR THE DENTURIST:

A) UNIVERSAL PRECAUTIONS

A thorough medical history should be obtained for all patients at the first visit and updated and reviewed at subsequent visits. However, since not all patients with infectious diseases can be identified by medical history, physical examination, or readily available laboratory tests, the Center for Disease Control (CDC) introduced the concept of universal precautions. This term refers to a method of infection control in which all human blood and certain human body fluids (saliva in dentistry) are treated as if known to be infectious for HIV, HBV and other bloodborne pathogens. Universal precautions means that the same infection control procedures are used for any patients.

B) PERSONAL PROTECTION

Personal protection involves two basic considerations:

1. Immunologic protection and
2. Barrier protection

1. Immunologic Protection

Immunization is the process by which resistance to an infectious disease is induced or augmented. The human body can produce immunity to particular diseases or conditions; when no immunity exists for a disease, immunization is provided through vaccination. Immunization to prevent and control cross infection is an important aspect for the denturist. Immunization against the following is recommended for adults who are not already immune:

1. Hepatitis B virus
2. Measles
3. Polio
4. Mumps
5. Rubella

Receipt of an annual influenza vaccine is also recommended. Varicella zoster vaccine is indicated for denturists who do not have either reliable history of varicella or serologic evidence of immunity.

Tuberculosis testing is available to determine whether an individual has or has been exposed to tuberculosis. TB skin tests do not differentiate between active disease and prior exposure. One must rely on identifying symptoms. BCG (Bacille Calmette Guerin) vaccination should be considered only for denturists in areas where multi-drug tuberculosis is prevalent, a strong likelihood of infection exists, and where comprehensive infection control precautions have failed to prevent TB transmission to denturists.

Immunizations are not available for protection against all diseases. A second line of defence is to create physical barriers between you and disease-producing organisms or hazardous substances. These barriers are called Personal Protective Equipment (PPE) and in the denturist setting include gloves, masks or face shields, eyewear and protective clothing (gowns, laboratory coats, uniforms etc.)

2. Barrier Protection

GLOVES

Gloves should be worn whenever there is the potential for contact with blood, saliva, mucous membranes, hazardous wastes or chemical agents.

There are several types of gloves on the market, and in the course of your job, you may use different gloves for different tasks. These include:

Examination/Treatment Gloves

1. **Latex gloves**: The standard clinical treatment glove worn for most operatory and patient treatment procedures. Latex gloves should never be worn by anyone, or used on any patient, who is latex allergic.
2. **Synthetic gloves**: With the advancement of infection control technology new materials are being developed and are available for those healthcare workers who are sensitive or have a reaction to latex gloves. Examples include: nitrile, vinyl, neoprene, and others.
3. **Overgloves**: Polyvinyl or copolymer overgloves (food handler's gloves) may be worn over your latex or vinyl procedure gloves to prevent cross-contamination while performing a second task for the same patient. For example: retrieving additional items from a drawer during a procedure or making a chart entry while treating a patient. These gloves should not be used over procedure gloves while treating a second patient, or as a substitute for procedure gloves. Overgloves should not be used for more than one patient.

Surgical Gloves

1. **Sterile Surgical Gloves**: These are used for certain invasive (surgical) dental procedures at the discretion of the provider. Sealed in single sterile packages, they require special handling procedures.

Housekeeping Gloves

1. **Heavy Duty/Utility/Nitrile Rubber gloves**: These general purpose gloves are used for cleaning operatories, reprocessing instruments, handling sharps, handling chemicals, and other nonpatient, housekeeping tasks. These gloves can be used more than once, but must be changed if worn or damaged. They should be washed and disinfected between uses and sterilized according to the manufacturer's directions. Hands must be washed and dried after glove removal. If workers share the same gloves undergloves should be worn to prevent cross-contamination.

POINTS TO REMEMBER:

1. treatment gloves are single use items and must be changed between every patient.
2. Latex gloves must never be washed with soap for any reason, due to the potential breaking down of the material and the eventual deterioration of the glove.
3. Denturists may need to change gloves while treating a single patient.
4. Manufactured gloves may come with talc or cornstarch on the inside surfaces. The use of powder-free gloves may be advisable for all workers. Some individuals have a sensitivity to the powders used inside of some gloves and/or may be allergic to latex proteins that leach from powdered latex gloves and adhere to the powder. The residual powder from the glove is easily spread to clothing and into the air and may pose a risk of a respiratory reaction in allergic patients and/or workers.
5. To remove the gloves, grasp the end of the cuff and turn the glove inside out; grasp the second glove by the cuff and turn it inside out over the first glove.
6. The shelf life of latex gloves can be affected by temperature, humidity and light. They should be stored in a dark constant environment of moderate temperature and low humidity.
7. Gloves are available in extra-small, small, medium and large, as well as in specific hand sizes. They are also available in right, left or ambidextrous and should fit snugly but comfortably on the hand without being tight. Gloves that do not fit appropriately can increase the risk of hand muscle injury for the user.
8. Do not use oil-based hand creams and lotions with latex gloves unless they have been shown to reduce latex-related problems.
9. Hypoallergenic latex gloves do not reduce the risk of latex allergy. However, they may reduce the reactions to chemical additives in the latex.
10. After removing your gloves, wash hands with soap and water and dry thoroughly.

LATEX ALLERGY

Latex allergy can result from repeated exposures to proteins in natural rubber latex through skin contact or inhalation. Reactions usually begin within minutes of exposure to latex, but they can occur hours later and can produce various symptoms including skin rash and inflammation, respiratory irritation, asthma, and in rare cases anaphylactic shock. The amount of exposure needed to sensitize individuals to natural rubber latex is not known, but reductions in exposure to latex proteins have been reported to be associated with decreased sensitization and symptoms. People at increased risk for developing latex allergy include workers with ongoing latex exposure, persons with a tendency to have multiple allergic conditions, and persons with spina bifida. Latex allergy is also associated with allergies to certain foods such as avocados, potatoes, bananas, tomatoes, chestnuts, kiwi fruit, and papaya.

In addition to being the appropriate size, gloves must not be irritating to your skin. Some individuals may have sensitivities or even allergies to chemicals used in glove manufacturing, the powder used inside the glove, or to the naturally occurring latex proteins in latex gloves.

Reactions may range from irritant contact dermatitis to an actual allergic response. **Not all reactions are due to latex exposure.** It is important to have any reaction definitively diagnosed by a qualified physician, such as an allergist.

Not only gloves but also other dental products may contain latex, such as dental dams and straps on face masks. It is important to identify all latex containing products so they can be replaced with non-latex containing materials or avoided when a patient or employee is truly latex allergic.

PROTECTIVE EYEWEAR

Denturists should wear protective eyewear or an appropriate face shield during treatment procedures, in the dental laboratory or in the sterilization and disinfection area when mixing and pouring chemicals.

1. Protective eyewear must be made of high-impact plastic and designed to provide complete coverage over and around the eyes, including solid (not vented) side shields.
2. Face shields are recommended if side shields are not used.
3. Protective eyewear with side shields is placed before client treatment and removed with gloves in place after treatment is completed.

4. The eyewear can remain in place but should not be touched with ungloved hands.
5. Protective eyewear should be disinfected after use.
6. Protective eyewear should also be provided for each patient and disinfected after use.

FACE MASKS

The use of an approved face mask will protect the denturist from microladen-aerosolized droplets during various dental and laboratory procedures. It prevents you from inhaling and exhaling potentially infectious materials to and from the patient. The mask is an effective barrier until it becomes wet. The porosity of masks changes when soaked with moisture, reducing its filtration ability and may actually "wick" or draw moisture to them.

1. The best masks are those that have a bacterial filtration efficiency or BFE of at least 95% to small particles that directly contact the mask.
2. A proper fit is required for both comfort and barrier efficiency.
3. Masks should be changed with each patient or when they become wet. There are no specific "recommended " time frames for mask changing, however by using logic in considering the patient situation, you may then judge when a mask needs to be changed.
4. If a plastic face shield is worn, the appropriate facemask should also be worn
5. The masks should be donned before the gloves for ease of placement.
6. The mask is adjusted to facial configurations for proper adaptation.
7. A mask should not be allowed to hang below the denturist's chin after use; complete removal of the mask is recommended.

UNIFORMS

Exposed areas of your body have the potential to be contaminated during a dental procedure. When selecting clinical attire, it is important to select clothing that will be an appropriate barrier for the procedure being performed. While each denturist clinic must determine what is appropriate attire for their specific procedures or office setting, keep in mind that clinic attire should be protective, sensible, comfortable and practical.

POINTS TO REMEMBER

1. Long-sleeved or short-sleeved uniforms or clinic jackets are used; each type has positive and negative features.
2. Changing the gown or uniform or wearing protective cover over the uniform when an aerosol spray is generated is recommended.
3. All clinical attire should be made of synthetic material so that contaminants are not easily absorbed into the material.
4. It is recommended that clinic attire be washed separately from any household or street laundry.
5. Clinical attire should be removed each day when all clinical activities are completed.
6. Clinical attire is not considered general attire that is worn on a daily basis.
7. Disposable attire is available in the form of laboratory coats, bibs, aprons, tops and pants. After use, disposables must be discarded and handled as potentially infectious waste.
8. Neckties and scarves have the potential for being a safety hazard and should not be worn if at all possible.
9. Jewelry, such as necklaces, bracelets, earrings, and rings, is not appropriate when working in a dental environment.

HAND WASHING

Hands must always be washed at the start of each day, before gloving, after removal of gloves, and after touching inanimate objects likely to be contaminated by body fluids from patients. For many routine dental procedures, such as examinations and nonsurgical procedures, handwashing with plain soap appears to be adequate, since soap and water will remove transient microorganisms acquired directly or indirectly from patient contact. For surgical procedures, an antimicrobial surgical hand scrub should be used. Handwashing facilities should be designed to avoid cross-contamination at the scrub sink from water valve handles and soap dispensers.

Precautions should be taken to avoid hand injuries during procedures. If an injury with a sharp item occurs or gloves are torn, cut, or punctured, gloves should be removed as soon as is compatible with the patient's safety. Hands should be washed thoroughly and regloved before completing the dental procedure.

C) INSTRUMENT REPROCESSING : "CLEANING, PACKAGING, STERILIZATION & DISINFECTION"

Instrument reprocessing is a major component of any infection control program. While preparing instruments for sterilization, there is a potential for an exposure incident or injury. And if you are using improperly sterilized instruments, you and your patients are at risk from cross-contamination. It is important to establish an aseptic environment for the health and safety of you and your patients. Instrument reprocessing involves the following steps:

1. Handling contaminated instruments
2. Instrument cleaning
3. Packaging and labelling

4. Sterilization, disinfection and monitoring procedures and
5. Storage of packaged sterile items

1. HANDLING CONTAMINATED INSTRUMENTS

Needles, scalpel blades, and other sharp instruments should be handled carefully to prevent injuries. Disposable syringes, scalpel blades, and other sharps items should be discarded into puncture-resistant biohazard (sharps) containers that are easily accessible.

2. INSTRUMENT CLEANING

There are three methods generally used to clean instruments: Ultrasonic cleaning, hand scrubbing and thermal disinfection (instrument washers).

Hand scrubbing is the least acceptable method due to increased hand contact with instruments and an increased risk for a sharps exposure. Ultrasonic cleaning and thermal disinfection are the preferred methods for cleaning, as they reduce hand contact with contaminated instruments, and thereby reduce the potential for an exposure incident.

a. Hand scrubbing

If your clinic does not use an ultrasonic cleaning or thermal disinfection, instruments may be cleaned by hand. Because of the risks involved in hand scrubbing, special precautions must be observed to reduce the chance of an exposure incident.

POINTS TO REMEMBER

1. Wear appropriate barriers, including eyewear, mask and puncture-resistant gloves.
2. Clean only two to three instruments at a time.
3. Scrub instruments low in the sink under running water, using a long-handled or wide-surfaced brush and a detergent that is noncorrosive.
4. Inspect all instruments for remaining debris and if necessary, scrub again.
5. Dry instruments by allowing them to air dry or by carefully patting with several thickness of towelling; don't rub.

b. Ultrasonic cleaning

Using a detergent solution and sonic-action, ultrasonic cleaners break up and loosen debris on instruments. To maintain efficiency, ultrasonic cleaners must undergo scheduled maintenance and function tests, according to the manufacturer's directions.

POINTS TO REMEMBER

1. Always follow the manufacturer's directions for use, solutions and maintenance. The manufacturer will indicate how much solution to put into the tank, as well as cycle times for loose instruments versus cassettes.
2. Test cleaning solution for effectiveness: for most units, immerse a strip of aluminum foil, which is at least 2" wide and 3" long, in the cleaner for exactly 20 seconds. Hold the foil to light to check for small holes. If none exist, the cleaner isn't working. This is called a function test.
3. Don't overload the tank and always keep the cover on the tank while running. The number of items the tank can safely hold will vary with size of the tank, and whether instruments are loose or in a cassette.
4. Only use solutions formulated for use in the ultrasonic bath. Other chemicals such as disinfectants may create the potential for hazardous fumes.
5. Rinse instruments or cassettes both before and after the cycle and once the cycle is complete, allow the instruments to air-dry or pat them dry with towelling.

c. Thermal disinfection/Instrument washers

A thermal disinfection device or "instrument washer," looks like a dishwasher and works on the same principle. This instrument washer operates at much higher temperatures than a dishwasher and achieves intermediate-level disinfection. It is, however, not a sterilizer and critical and semicritical items still need to be packaged and sterilized. An additional benefit of the instrument washer is that instruments are dry when the cycle is completed, immediately ready to be packaged for sterilization.

3. Packaging of reusable instruments

Clean instruments do not mean ***sterile*** instruments. Clean simply means free of gross debris. Instruments must be packaged and sterilized before being used on a patient. Packaging serves two purposes:

1. Proper storage: The packaging provides a barrier for instruments after sterilization.
2. Record keeping: All packaged instruments should be labelled with the date of sterilization, the sterilizer used, and the type of instruments they contain unless the packaging is see through.

POINTS TO REMEMBER

1. Packaging paper becomes less flexible after a sterilization cycle. The force of a pen after sterilization could possibly pierce the packaging. All labelling should be done before sterilization.
2. Hinged instruments should be packaged in the open position.
3. Sharp instruments within a package can pierce packaging when handled. To prevent this, place unit doses of gauze in each package, prior to sterilization. If gauze is placed around the sharp ends of the instruments, it may prevent piercing the packaging.
4. A system, which simplifies the entire reprocessing cycle, including packaging, is the use of cassettes during the treatment, holding, cleaning, sterilization and storage of instruments. A cassette is a lockable container designed to hold all or part of the instruments required for a specific clinical procedure, and is made out of either metal or hard resin/plastic. Instruments remain in the cassette during treatment, with clinicians working out of the cassette. After a procedure is completed, the denturist should check to see that the instruments are properly seated in the cassette, which is then closed and locked in the operatory, transported to the reprocessing area, and placed directly into an ultrasonic cleaner.
5. After appropriate cleaning, the cassette is then closed, covered with barrier wrap, labelled and sterilized. After sterilization, the packaged cassette is stored until needed. The cassette barrier wrap may also be used as a tray cover during treatment.

4. Sterilization and disinfection

The prevention of cross-contamination or the spread of microorganisms from one source to another is of primary concern in the practice of denturism. This is accomplished by a combination of sanitization, disinfection, and sterilization.

Sanitization is synonymous with cleaning or reducing the level of organic and inorganic contaminants from a surface. **Disinfection** is a process that destroys microorganisms but may not kill spores. **Sterilization** is a process by which all forms of life, including bacterial spores, are destroyed.

To determine the method of sterilization or disinfection that must be used to decontaminate instruments or equipment, one must determine if the item is critical, semicritical, or noncritical according to CDC/Spalding Classification of Inanimate Objects. Dental instruments and equipment may be classified as follows:

1. **Critical Items**: Sterilization Required or Disposal. Items that penetrate or touch broken skin or mucous membranes. (e.g., hypodermic needles, scalpels, surgical instruments, and dental explorers)
2. **Semicritical Items**: Sterilization or High Level Disinfection Required. Items that frequently contact mucous membranes and are often contaminated by oral secretions and blood, but that do not enter the tissue or vascular system. (e.g., shade guides, facebows, jaw relationship records, impressions, and prosthetic devices)
3. **Noncritical Items**: Cleaning & Tuberculocidal Intermediate-Level Disinfection Required. Items do not touch mucous membranes or broken skin. (e.g., receiving areas, case pans and articulators)

Sterilization is the process by which all forms of microorganisms, including viruses, bacteria, fungi, and spores, are destroyed. Suitable mechanical methods of sterilization include the use of:

1. Steam under pressure - Small office sterilizers (Autoclave) or cassette (Statim)
2. Dry heat - Oven (Static-Air type) or Rapid heat transfer (Forced-Air type)
3. Unsaturated chemical vapour - Harvey Chemiclave
4. Ethylene oxide gas (only for instruments that can be thoroughly cleaned and dried).

Immersion in a cold chemical sterilant solution, instead of the use of physical means of sterilization, is not recommended for several reasons:

*Sterilization by chemical solutions cannot be efficiently monitored biologically.
*Instruments sterilized by chemical solutions must be handled aseptically, rinsed in sterile water and dried with sterile towels.
*Instruments sterilized by chemical solutions are not wrapped and therefore must be used immediately or stored in a sterile container.

Disinfection is generally less lethal to pathogenic organisms than sterilization. In Canada, disinfectants for use in dental practice have a drug identification number (DIN) issued by Health Canada, which is shown on the label. The product label also presents the main set of information that the manufacturer is legally required to provide, and the label contents are monitored before issuance of the DIN.

The ideal surface disinfectant:

1. offers rapid, broad spectrum microbial kill;
2. offers residual activity;
3. offers antimicrobial activity in the presence of bioburden such as blood or sputum;

4. offers minimal toxicity;
5. has compatibility with the environmental surfaces to be treated;
6. is non-staining;
7. is hypoallergenic;
8. has an effective shelf life;
9. is unaffected by hard water;
10. is odourless;
11. is inexpensive and
12. is simple to use.

No single disinfectant product currently marketed meets all of these criteria. To select a surface disinfectant for the denturist clinic, consider the chart listed at the end of this handbook.

There are three levels of disinfection: low, intermediate, and high.

1. **Low-level disinfection (LLD)** is the least effective disinfection process. Low-level disinfectants kill vegetative bacteria but do not kill bacterial spores or *mycobacterium tuberculosis*.
2. **Intermediate-level disinfection (ILD)** is the disinfection process that kills *mycobacterium tuberculosis*. If you use a process that kills *mycobacterium tuberculosis*, you will also kill organisms that are easier to kill, such as the ones that cause hepatitis B and HIV.
3. **High-level disinfection (HLD)** is a disinfection process that kills some, but not necessarily all, bacterial spores. This powerful process will also kill *mycobacterium tuberculosis* as well as other bacteria, fungi and viruses.

Environmental surface disinfectants are supplied as concentrates, premixed solutions, sprays, foams, impregnated wipes, and tablets. Pump-sprays, however, are considered the best vehicle for delivering cleaning/disinfecting agents to contaminated surfaces. The pump concentrates sprayed liquid on the surface rather than aerosolizing it. This allows the chemical to penetrate into crevices.

Although the choice of disinfectant product lies with the denturist, select a disinfectant with inherent cleaning ability. Cleaning is a critical first step in the disinfection process. Using a combination cleaner-disinfectant can save time and money and limit the number of products in the practice's inventory.

MONITORING STERILIZATION

It is critical to your infection control plant to ensure that complete sterilization occurs. However, you cannot tell that an instrument is
truly sterilized simply by looking at it. Some sterilizers have recording devices that provide written documentation after the cycle is complete but this does not verify sterilization, but that sterilization parameters have been reached.

Chemical indicators are heat-sensitive chemical that display a definite colour or physical change once the inside of the sterilizer has reached a certain temperature. They do not guarantee that sterilization has occurred. Rapid change indicators are used to show that a specific temperature was reached. Slow change indicators show a specific combination of time and temperature. Chemical indicators provide an immediate, visual feedback of sterilizing conditions but do not verify sterility, and therefore, are not replacements for biological monitoring.

Biological monitoring is the only method to verify sterilization. Biological monitoring uses "biological indicators" that are either paper strips or glass vials containing non-pathogenic highly resistant bacterial endospores. When these strips or vials are processed through a successful sterilization cycle, the test dose of endospores is killed. There are two bacterial endospores used as biological indicators:

1. *Bacillus stearothermophilus* for autoclaves and unsaturated chemical vapour.
2. *Bacillus subtilis* for dry heat ovens, rapid heat transfer and ethylene oxide units.

Spore testing is currently not available for high-level disinfection. The CDC recommends that biological monitoring be done on a weekly basis at a minimum. At a minimum you should biologically monitor:

1. Once per week
2. First cycle after a repair
3. For all implantable devices
4. When new packaging material is used and
5. Initial use of a new sterilizer.

If sterilization is not proven to be effective, all the instruments sterilized since the last successful biological monitoring must not be used until they can be adequately repackaged and resterilized. A qualified repair company must correct the identified defect or problem.

Monitoring sterilization is a complicated process. For this reason, many denturists have the incubation done by an independent laboratory, which provides the strips/vials and keeps all the necessary records. For any monitoring performed by an outside service, be sure to receive duplicate records for you own practice's files.

5. Storage of sterilized instruments

If instruments are to be stored after sterilization, they should be wrapped or bagged before sterilization, using a suitable wrap material such as muslin, clear pouches or paper as recommended by the manufacturer of the sterilizer. The wrap or bag should be sealed with appropriate tape. Pins, staples, or paper clips should not be used because these make holes in the wrap that permit entry of microorganisms. After sterilization, the instruments should be stored in the sealed packages until they are used

D) OPERATORY SURFACES

Countertops and dental equipment surfaces such as light handles, cabinet and drawer pulls, tray tables, and chair switches are likely to become contaminated with potentially infectious materials during treatment procedures. These surfaces can be covered or disinfected. Surfaces can be covered with plastic wrap, aluminum foil, or impervious-backed absorbent paper. These protective coverings should be changed between patients and when contaminated.

Alternatively, surfaces can be precleaned to remove organic matter and then disinfected with a disinfectant that is **tuberculocidal** following manufacturer instructions. Housekeeping surfaces including floors, sinks and related objects are not likely to be associated with the transmission of infection. Therefore extraordinary attempts to disinfect these surfaces are not necessary. However, cleaning and the removal of visible soil should be undertaken on a routine basis. Cleaners with germicidal activity may be used.

E) IMPRESSIONS, PROSTHESES, CASTS, WAX RIMS, JAW RELATION RECORDS

Items such as impressions, jaw relation records, casts, prosthetic restorations, and devices that have been in the patient's mouth should be properly disinfected before the denturist processes it in the laboratory. Impressions must be rinsed to remove saliva, blood, and debris and then disinfected. Impressions can be disinfected by immersion in any compatible disinfecting product. Since the compatibility of an impression material with a disinfectant varies, manufacturer recommendations for proper disinfection should be followed.

F) MATERIAL SAFETY DATA SHEETS

A denturist must maintain and file a **material safety data sheet (MSDS)** for every product utilized in the denturist clinic. The manufacturer of each dental product provides the **material safety data sheet**. An **MSDS** lists hazards of the material, precautions for handling, and procedures to follow in emergencies occurring for the use or handling of the product.

G) DISPOSAL OF WASTE MATERIALS

Although most wastes generated in the denturist clinic do not require special consideration, disposal of all infectious waste, including chemicals, must be disposed of according to municipal, provincial or federal regulations.

H) WATERLINE MAINTENANCE

Dental unit waterlines provide for the growth of biofilm, a consortia of microbes, because of the small-diameter long tubing that provides for a large surface area for biofilm attachment. Denturists are encouraged to take steps to reduce any potential risk of dental unit waterline microorganisms causing infection by **purging water lines for 2-3 minutes before the start of each day and for 30 seconds between each patient.** This procedure flushes out some loose biofilm for the lines, but it does not eliminate or destroy the attached biofilm.

I) DENTAL LABORATORY ASEPSIS

In contrast to the dental treatment room, the dental laboratory is often overlooked when planning effective infection control and exposure measures. The following are recommendations for effective infection control in the dental laboratory of the denturist's clinic.

Receiving area. A receiving area should be established separate from the production area. Countertops and work surfaces should be cleaned and then disinfected daily with an appropriate surface disinfectant used according to manufacturer directions.

Incoming cases. Unless the denturist knows that the dental office has disinfected the case, all cases should be disinfected as they are received. Containers should be sterilized or disinfected after each use. Packing materials should be discarded to avoid cross-contamination.

Disposal of waste materials. Solid waste that is soaked or saturated with body fluids should be placed in sturdy impervious bags. The bag should be disposed of following regulations established by municipal, provincial or federal regulations.

Production area. Persons working in the production area should wear a clean uniform or laboratory coat, a face mask, protective eyewear, and disposable gloves. Work surfaces and equipment should be kept free of debris and disinfected daily. Any instruments, attachments, and materials to be used with new prostheses or appliances should be maintained separately from those to be used with prostheses or appliances that have already been inserted in the mouth. Rag wheels can be washed and autoclaved after each case. Brushes and other equipment should be disinfected at least daily. A small amount of pumice should be dispensed in small disposable containers for individual use on each case. The excess should be discarded. A liquid disinfectant (1:20 sodium hypochlorite solution) can serve as a mixing medium for pumice.

Outgoing cases. Each case should be disinfected before it is returned to the dental office. Dentists should be informed about infection control procedures that are used in the denturist's clinic.

PROCESSING IMPRESSIONS AND TRAYS

Impressions should be rinsed under running tap water then immersed in a tuberculocidal disinfectant prepared according to the label instructions for surface or immersion disinfection. After the manufacturer-recommended contact time has elapsed (usually 10 to 30 minutes), the disinfected impression should be thoroughly rinsed under tap water to remove any residual antimicrobial chemicals and gently shaken dry.

Incompatibilities between fabrication materials and surface disinfectants are known to exist. Physical and chemical properties can vary within a given category of material or solution. An in-office "test run" therefore is highly recommended when using new combinations of impression materials and disinfectants.

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

Articulators, case pans, and other equipment that make no patient contact but require cleaning and disinfection should be evaluated based on their construction. Most can be disinfected by sprayed with a tuberculocidal disinfectant, rinsing, and drying.

Prevention of contamination is better than having to use chemical agents on delicate equipment. Any item that will withstand standard heat sterilization should be sterilized before reuse.

Pressure pots should be cleaned and disinfected daily. Pots, which maintain warm water environments, are especially susceptible to microorganism colonization from multiple sources.

Bench tops and work areas should be cleaned at the end of the workday or whenever contamination occurs. Surface disinfection protocols are the same in the dental laboratory as in the denturist clinic.

SPECIAL CONSIDERATIONS AND EXCEPTIONS

Prosthetic devices may have copious amounts of calculus and other tenacious bioburden. The first step is to remove the debris so that effective decontamination becomes possible. The use of stone and plaster removal solution in a beaker or plastic bag for soaking and placing in ultrasonic cleaner will remove a great deal of material. This step is followed by cleaning in a detergent and then disinfection with the procedures discussed in the sections on disinfection.

Some items may not be able to withstand disinfection (i.e., staining porcelain, etc.) and exceptions to the basic principle of disinfecting first may be made. The procedure must be followed closely and proper cleaning and disinfecting must be done on equipment and areas that become contaminated during the process.

SUMMARY ON INFECTION CONTROL RECOMMENDATIONS

The purpose of this handbook is to provide the denturist with adequate knowledge about the components of an infection control program so that they may develop a rational, practical and effective infection control plan suited to their clinic. The denturist is encouraged to continually evaluate their infection control procedures to protect themselves and their patients and to create a safe environment in which to practice as professionals.

"Preventing Respiratory Illnesses Protecting Patients and Staff: Infection Control and Surveillance Guidelines for Febrile Respiratory Illness (FRI) in Non-Outbreak Conditions in Community Settings" released by the Ministry of Health and Long Term Care is available at *www.denturists-cdo.com/fri/index.cfm*

This section of the College of Denturists of Ontario website has been created to post health updates, notices and articles from the Ministry of Health and Long Term Care, as relates to infection control, influenza and Febrile Respiratory Illness. It is expected there will be many postings throughout 2005. Practitioners are advised to visit the site frequently.

DISINFECTANT CHOICES: ADVANTAGES & DISADVANTAGES

ACTIVE INGREDIENT	ADVANTAGES	DISADVANTAGES
CHLORINES sodium hypochlorite diluted in-office, chlorine dioxide, commercial preparations of sodium hypochlorite with added surfactants	• economical • effective in dilute solution • tuberculocidal	• diluted solutions must be prepared daily • rapid, broad-spectrum activity • cannot be reused • corrosive to some metals • may destroy fabrics • may irritate skin and other tissues • chlorine dioxide is a poor cleaner
"synthetic phenols" containing multiple phenolic agents	• broad-spectrum activity • residual activity • effective cleaner and disinfectant • tuberculocidal • compatible with metal, glass, rubber, and plastic	• extended exposure may degrade some plastics or leave etchings on glass • many preparations are limited to one day of use • may leave residual film on surfaces
DUAL/SYNERGIZED QUATERNARY AMMONIUM COMPOUNDS alcohol and multiple quaternary ammonium compounds	• broad-spectrum activity • tuberculocidal • hydrophilic virus claims • low toxicity • contains detergent for cleaning	• readily inactivated by anionic detergents and organic matter • can damage some materials
iodine, combined with a surfactant	• broad-spectrum activity • tuberculocidal • effective cleaner & disinfectant • relatively non-toxic	• unstable at higher temperatures • may discolour some surfaces • inactivated by alcohol and hard water • must be prepared daily • residual biocidal action • proper dilution and contact times critical
PHENOL-ALCOHOL COMBINATIONS phenolic agent in an alcohol base	• tuberculocidal • fast-acting • residual activity • some inhibit the growth of mold, mildew, and other fungi	• may cause porous surfaces to dry and crack • poor cleaning capabilities
sodium bromide and chlorine	• fast-acting • tuberculocidal • supplied in tablet form for dilution • requires minimal storage space	• for use on hard surfaces only • chlorine smell

NOTE: High-concentration alcohols (ethyl alcohol or isopropyl alcohol of at least 70%), glutaraldehydes (2% and 3.2%), and simple quaternary ammonium compounds should not be *used for surface disinfection in dentistry.*

Source: OSAP Research Foundation: Chemical Agents for Surface Disinfection Reference Chart, October, 1998

References: Miller, Chris, and Palenik, Charles, Infection Control and Management of Hazardous Materials for the Dental Team, 2nd. Edition, Mosby, 1998

Organization for Safety and Asepsis Procedures, Infection Control and Safety Training System, 2002.

Organization for Safety and Asepsis Procedures, Position Paper on Laboratory Asepsis, November 1998.

Organization for Safety and Asepsis Procedures, Environmental Surface Asepsis, Pub. #8, 2001.