

**INFECTION CONTROL GUIDELINES FOR  
REGISTERED DENTAL TECHNOLOGISTS**

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# INFECTION CONTROL GUIDELINES FOR DENTAL TECHNOLOGISTS

**Depending on your work situation, not all Guidelines may be applicable or related to your practice as a Dental Technologist.**

## Purpose of the Guidelines

Members of the College of Dental Technologists of Ontario (CDTO) are aware of the need to disinfect the various dental appliances they work with as a required task under current standards of practice. Since infection control is extremely important to the health and safety of both clients and practitioners, the following document describes, in detail, strategies for both the prevention of transmission of infectious disease and procedures for infection control in the dental laboratory.

These Guidelines can serve a number of purposes:

- They serve as a reference document for registered dental technologists in identifying appropriate procedures for infection control in the context of their practice
- They assist the registered dental technologist in her/his ongoing practice assessment
- They provide guidance for pursuing continuous learning
- They provide a basis for peer assessment activities as a component of the CDTO Quality Assurance Program
- They provide guidance for managing the dental laboratory in relation to infection control
- They assist in the development of undergraduate curricula and training relating to infection control
- They inform other stakeholders i.e. other professions, laboratory owners, regulators and the public on the infection control procedures considered advisable for the Registered Dental Technologist

The CDTO recommends these guidelines to its members as appropriate strategies to prevent infectious disease transmission in the dental laboratory. The control of infectious disease is an ongoing responsibility of health care workers, and systems need to be in place to disinfect:

- All dental work received by the laboratory
- Work areas in the facility
- Laboratory equipment and accessory material
- All dental work prepared for shipping

## **GUIDELINES RESPECTING INFECTION CONTROL**

Infection control involves taking steps to prevent the spread of infectious agents to you and your employees. Developing an effective and efficient infection control plan in the dental laboratory requires that you understand:

1. how to prevent transmission of infectious diseases,
2. management if exposure occurs and
3. guidelines 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** (4). These guidelines have been developed to assist registered dental technologists to meet professional standards and government regulations relating to infection control measures.

#### **1. Infectious Hazards**

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

#### **2. Chemical Hazards**

Chemicals are used in every dental laboratory; some are hazardous and others are not. Your occupational exposure to chemicals in the dental laboratory 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 laboratory 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.

#### **4. Dental Waste Management**

What you throw away at the laboratory 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 laboratory, as determined by medical, hazardous and toxic waste regulations and tracking acts. Please refer to [www.ec.gc.ca/mercury/](http://www.ec.gc.ca/mercury/) for the most recent copy of the "Dental Wastes - BMP Guide for the Dental Community".

## PREVENTION OF TRANSMISSION OF INFECTIOUS DISEASES

How diseases are transmitted from one person to another determines the procedures used for infection control in the dental laboratory. 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 laboratory 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 dental health care worker:**
  - a. through breaks in the skin
  - b. injury exposure
  - c. through mucous membranes
  
- 2. Dental health care worker to patient:**
  - a. DHCW'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. Dental laboratory to community:**
  - a. improper waste management
  - b. wearing contaminated clothing out of the laboratory

## MANAGEMENT OF EXPOSURE TO BLOODBORNE PATHOGENS

It is generally accepted that the dental health care worker 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 hepatitis B vaccine among practicing technologists 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 safely or with minimal risk of transmission of disease in the dental laboratory 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 dental laboratory.

Health care facilities, including dental laboratories, 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 dental laboratory 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)

## UNIVERSAL AND STANDARD 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 Centers for Disease Control (CDC) introduced the concept of universal precautions.

*Universal precautions is a system of infection control that assumes that every direct or indirect contact with body fluids has infectious potential and requires every exposed healthcare worker to be protected as though body fluids were infected with hepatitis B virus (HBV), human immunodeficiency virus (HIV), and other bloodborne pathogens. In 1996, Centers for Disease Control (CDC) expanded the concept and changed the term to **standard precautions**. Standard precautions apply to contact with: 1) blood; 2) all body fluids, secretions, and excretions (except sweat), regardless of whether they contain blood; 3) nonintact skin; and 4) mucous membranes.*

## 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 dental technologist. 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 dental technologists 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. Tuberculosis skin tests do not differentiate between active disease and prior exposure. One must rely on identifying symptoms.

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 dental laboratory 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 practising dental technology, you may use different gloves for different tasks. These include:

#### **Examination/Treatment Gloves**

**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.

**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.

**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.

#### **Housekeeping Gloves**

These general purpose gloves non-medical 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. These commercially available gloves are made of nitrile, butyl rubber, neoprene and chloroprene blends.

## **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. For more information on latex allergies visit <http://latexallergylinks.tripod.com>.

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.

### ***POINTS TO REMEMBER:***

- 1. 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.*
- 2. Manufactured gloves may come with talc or cornstarch on the inside surfaces. The use of powder-free gloves at all times may be advisable as 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.*
- 3. 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.*
- 4. 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.*
- 5. 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.*
- 6. Do not use petroleum-based hand creams and lotions with latex gloves unless they have been shown to reduce latex-related problems.*
- 7. Hypoallergenic latex gloves do not reduce the risk of latex allergy. However, they may reduce the reactions to chemical additives in the latex.*
- 8. After removing your gloves, wash hands with soap and water and dry thoroughly.*

### **Protective eyewear**

Dental technologists should wear protective eyewear or an appropriate face shield in the dental laboratory or in the sterilization and disinfection area when mixing and pouring chemicals.

- a. 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.
- b. Face shields are recommended if side shields are not used.
- c. The eyewear can remain in place but should not be touched with ungloved hands.
- d. Protective eyewear should be disinfected after use.

### **Face masks**

The use of an approved face mask will protect the dental technologist 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.

- (a) 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.
- (b) A proper fit is required for both comfort and barrier efficiency.
- (c) 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.
- (d) If a plastic face shield is worn, the appropriate facemask should also be worn
- (e) The masks should be donned before the gloves for ease of placement.
- (f) The mask is adjusted to facial configurations for proper adaptation.
- (g) A mask should not be allowed to hang below the DHCW's chin after use; complete removal of the mask is recommended.

### **Laboratory Attire**

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

### ***POINTS TO REMEMBER***

1. *Long-sleeved or short-sleeved lab coats or clinic jackets are used; each type has positive and negative features.*
2. *All laboratory attire should be made of synthetic material so that contaminants are not easily absorbed into the material.*
3. *It is recommended that laboratory attire be washed separately from any household or street laundry.*
4. *Laboratory attire should be removed each day when all clinical activities are completed.*
5. *Laboratory attire is not considered general attire that is worn on a daily basis.*
6. *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.*
7. *Neckties and scarves have the potential for being a safety hazard and should not be worn if at all possible.*
8. *Jewelry, such as necklaces, bracelets, earrings, and rings, is not appropriate when working in a dental environment.*

### **Hand Hygiene**

Hand hygiene (e.g. handwashing, hand antisepsis, or surgical hand antisepsis) substantially reduces potential pathogens on the hand and is considered the single most critical measure for reducing the risk of transmitting organisms to patients and health care workers.

The preferred method for hand hygiene depends on the type of procedure, the degree of contamination, and the desired persistence of antimicrobial action on the skin. Handwashing and hand antisepsis is achieved by using both a plain or antimicrobial soap and water. If the hands are not visibly soiled, an alcohol-based hand rub is adequate. For more information on hand care visit [www.cdc.gov/handhygiene/](http://www.cdc.gov/handhygiene/)

**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.*

**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.

**INSTRUMENT CLEANING**

There are three methods generally used to clean instruments: **Hand Scrubbing**, **Ultrasonic Cleaning** 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.

**Hand Scrubbing**

If your laboratory 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***

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

**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***

- a) *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.*
- b) *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. Commercially available testers are also available.*

- c) *Don't overload the tank and always keep the cover on the tank while running. Ensuring that the lid is closed at all times when the ultrasonic bath is in operation reduces the aerosolization of contaminated materials from the surface. 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.*
- d) *Only use solutions formulated for use in the ultrasonic bath. Some ultrasonic cleaning products are also available with disinfectant capabilities.*
- e) *Other chemicals such as disinfectants may create the potential for hazardous fumes.*
- f) *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.*

### **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.

### **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. Sterilized instruments have a sterile life of 30 days; 90 days if a multiuse cleared package is used. After that, instruments should be reprocessed.

### **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 dental technology. 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 the following for heat-tolerant dental instruments:

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) and
3. Unsaturated chemical vapour - Harvey Chemiclave

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.

### **MONITORING STERILIZATION**

It is critical to your Infection Control Program 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, incubation is 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 your own files.

**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. has a low potential for allergy
8. has an effective shelf life;
9. is odourless;
10. is inexpensive and
11. is simple to use.

**No single disinfectant product currently marketed meets all of these criteria.** There are three levels of disinfection: low, intermediate, and high.

1. **Low-level disinfection (LLD)** is the least effective disinfection process. Destroys the majority of vegetative bacteria, certain fungi, and viruses. Examples: quaternary ammonium compounds, some phenolics and some iodophors.
2. **Intermediate-level disinfection (ILD)** Destroys vegetative bacteria and the majority of fungi and viruses. Not necessarily capable of killing bacterial spores. Examples: chlorine-containing products, quaternary ammonium compounds with alcohol, phenolics, iodophors, chlorine-based products.
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. Examples: glutaraldehyde, glutaraldehyde with phenol, hydrogen peroxide, hydrogen peroxide with peracetic acid.

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 employer, select a disinfectant with inherent cleaning ability. Cleaning is a critical first step in the disinfection process.



### **MATERIAL SAFETY DATA SHEETS**

Dental technologists must maintain and file a **material safety data sheet (MSDS)** for every product utilized in the laboratory. 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.

### **DISPOSAL OF WASTE MATERIALS**

Although most wastes generated in the dental laboratory do not require special consideration, disposal of all infectious waste, including chemicals, must be disposed of according to municipal, provincial or federal regulations. For more information on disposal of waste material visit [www.ec.gc.ca/mercury](http://www.ec.gc.ca/mercury).

## **DENTAL LABORATORY ASEPSIS**

Dental prostheses, appliances, and items used in their fabrication (ex. impressions, occlusal rims, and bite registrations) are potential sources for cross-contamination and should be handled in a manner that prevents exposure of dental health care workers, patients or the laboratory environment to infectious agents. Effective communication and coordination between the laboratory and dental practice will ensure that appropriate cleaning and disinfection procedures are performed in the dental office or laboratory, materials are not damaged or distorted because of disinfectant overexposure, and effective disinfection procedures are not unnecessarily duplicated.

When a laboratory case is sent to a dental laboratory, dental health care workers should provide written information regarding the methods used to clean and disinfect the material.

Appliances and prostheses delivered to the patient should be free of contamination. Communication between the laboratory and the dental practice is also key at this stage to determine which one is responsible for the final disinfection process.

Dental prostheses or impressions brought into the laboratory can be contaminated with bacteria, viruses and fungi. Dental prostheses, impressions, orthodontic appliances, and other prosthodontic materials (ex. Occlusal rims, temporary prostheses, bite registrations, or extracted teeth) should be thoroughly cleaned, disinfected with a disinfectant with a tuberculocidal claim, and thoroughly rinsed before being handled in the in-office laboratory or sent to an off-site laboratory. The best time to clean and disinfect impressions, prostheses, or appliances is as soon as possible after removal from the patient's mouth before drying of blood or other bioburden can occur. Dental health care workers are advised to consult with manufacturers regarding the stability of specific materials during disinfection.

In contrast to the dental treatment area, 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:

### **Receiving area**

A separate receiving and disinfecting area should be established to reduce contamination in the production area. If no communication has been received regarding prior cleaning and disinfection of a material, the dental laboratory staff should perform cleaning and disinfection procedures before handling.

### **Incoming cases**

Unless the dental technologist 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.

### **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 by the registered dental technician in the laboratory.

### **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. Immersion is preferable to spraying when possible because it ensures that all surfaces are adequately exposed to the disinfectant.

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. For more information on dental materials visit [www.iadr.org](http://www.iadr.org).

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 and water baths are particularly susceptible to contamination and should be cleaned and disinfected between patients or cases.

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 dental office.

### **Special considerations and exceptions**

Prosthetic devices may have copious amounts of calculus and other tenacious biofilm. 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 Guidelines**

The purpose of these guidelines is to provide the registered dental technologist 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 laboratory. The registered dental technologist is encouraged to continually evaluate their infection control procedures to protect themselves and their employees and to create a safe environment in which to practice as professionals.

**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
- \* rapid, broad-spectrum activity
- \* tuberculocidal
- \* effective in dilute solution

- \* diluted solutions must be prepared daily
- \* cannot be reused
- \* corrosive to some metals
- \* may destroy fabrics
- \* may irritate skin and other tissues
- \* chlorine dioxide is a poor cleaner

**Complex phenols**

("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

**Iodophors**

(iodine, combined with a surfactant)

- \* broad-spectrum activity
- \* tuberculocidal
- \* relatively non-toxic
- \* effective cleaner & disinfectant
- \* residual biocidal action

- \* unstable at higher temperatures
- \* may discolour some surfaces
- \* inactivated by alcohol and hard water
- \* must be prepared daily
- \* proper dilution and contact times critical

**Active ingredient**

**Advantages**

**Disadvantages** (continued)

**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

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**Other halogens**  
(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

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**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

## **INFECTION CONTROL CHECKLIST**

The shipping and receiving area should be stocked with the following:

1. Sink
2. A variety of disinfectant solutions including laundry bleach
3. Disposable rubber or vinyl gloves and heavy duty reusable gloves
4. Disposable masks and face shields
5. Waterproof aprons, either disposable or reusable
6. Liquid hand soap
7. Hand cream
8. Paper towels
9. Plastic bags (zip-type and/or heat seal)
10. Spray bottles
11. Mops
12. Buckets
13. Labels and tags
14. Indelible pens
15. Containers with lids for disinfectant solutions (size depends on volume of work)
16. Work pans that can be disinfected
17. Tongs (metal or plastic)
18. Timer
19. First Aid Kit
20. Emergency and/or poison control phone numbers

### **REMEMBER TO:**

1. Clean and disinfect workbenches daily. Wear heavy-duty gloves for this purpose.
2. Clean and disinfect floors, sinks, coffee stations, model trimmers, and rest rooms daily.
3. Disinfect work pans as soon as possible after removing an appliance to make certain that they have been decontaminated before being used again.
4. Disinfect large areas such as walls, floors etc. regularly.
5. Observe conscientious housekeeping practices in all parts of the laboratory - both production and non-production areas.

## APPENDIX I

### REFERENCES:

Miller, Chris, and Palenik, Charles, Infection Control and Management of Hazardous Materials for the Dental Team, 2<sup>nd</sup>. 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.

Centers for Disease Control and Prevention, Guidelines for Infection Control in Dental Health-Care Settings, December, 2003



## APPENDIX II

### RESOURCES:

Further information respecting infection control is available through the College office. The following web sites (accessible through the College web site at [www.cdto.ca](http://www.cdto.ca)) are also useful reference sources.

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Information on Dental Materials	<a href="http://www.iadr.org">www.iadr.org</a>
Disposal of Dental Waste Material	<a href="http://www.ec.gc.ca/mercury">www.ec.gc.ca/mercury</a>
Hand Hygiene	<a href="http://www.cdc.gov/handhygiene/">www.cdc.gov/handhygiene/</a>
Latex Allergy	<a href="http://latexallergylinks.tripod.com">http://latexallergylinks.tripod.com</a>
Canadian Dental Association	<a href="http://www.cda-adc.ca">www.cda-adc.ca</a>
Centers for Disease Control and Prevention	<a href="http://www.cdc.gov">www.cdc.gov</a> <a href="http://www.cdc.gov/oralhealth">www.cdc.gov/oralhealth</a>
College of Dental Technologists of British Columbia	<a href="http://www.cdt.bc.ca">www.cdt.bc.ca</a>
Health Canada	<a href="http://www.hc-sc.gc.ca">www.hc-sc.gc.ca</a>
Organization for Safety and Asepsis Procedures	<a href="http://www.osap.org">www.osap.org</a>
Royal College of Dental Surgeons of Ontario	<a href="http://www.rcdso.org">www.rcdso.org</a>