Information Document on
Infection Control
Dentistry

2009 Edition
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The 2009 edition of the Document d’information sur le contrôle des infections -Médecine dentaire was developed with the participation of Dr Jean Barbeau, PhD, Professor, Faculty of Dentistry, Université de Montréal, and revised by Dr Daniel Grenier, PhD, Professor and Director of the Groupe de recherche en écologie buccale (bucal ecology research group), Faculty of Dentistry, Université Laval. This information document was approved by the administrators of the Ordre des dentistes and of the Ordre des hygiénistes dentaires on November 21 and 28, 2008.
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1. SYNOPSIS OF INFECTION PREVENTION OBLIGATIONS

General Principles

1. Any instrument used in the mouth must be sterilized before use. (See p. 29)
2. Sterilizers must be checked before each use by means of chemical indicators and monthly by means of a biological test. (See p. 31)
3. The operatory environment must be disinfected. (See p. 23 and p. 26)
4. Universal/standard precautions must be applied. (See p. 13)
5. Some vaccinations are recommended. (See p. 16)
6. A first-aid protocol must be readily available and easily accessible. (See p. 43 and p. 67)
7. The medical questionnaire must be updated with every visit. (See p. 8, p. 14, and p. 24)
8. Keep only what is required for treatments in the dental operatory rooms. (See p. 23)
9. The materials and instruments in the operatory room must be sterile, wrapped or covered, and protected against aerosols.

Daily protocol

1. Preparation of the operatory
   ▪ Clean and disinfect the work area: counter, chair, lamp, etc. (See p. 23 and p. 26)
   ▪ Flush all waterlines (turbine, slow handpiece, air/water syringe). (See p. 7, p. 10, and p. 14)
   ▪ Disinfect the suction devices. (See p. 7, p. 10 and p. 15)
   ▪ Bring out the sterile instruments in sealed packs. (See p. 23)
   ▪ Install the sterile handpieces using aseptic techniques.
   ▪ Seat the patient.
   ▪ Open the instrument pack in front of the patient.

2. Preparation of personnel
   ▪ Daily personal hygiene.
   ▪ Put on a clean lab coat or other clean protective garment. (See p. 20)
   ▪ Hand washing/antisepsis. (See p. 17 and p. 18)
   ▪ Wear gloves, mask, and protective eyewear. (See p. 20)
   ▪ Handle with caution all contaminated instruments and materials. (See p. 42)

3. Treatment
   ▪ Minimize aerosol production: dental dam, rapid suction, etc. (See p. 15)
   ▪ Aseptic handling of materials and instruments in the work area and outside the work area.
   ▪ Patients should be asked to rinse their mouths with a recognized antiseptic mouthrinse; children should rinse with water.
### 2. DAILY STEPS

**At the beginning of the day**

<table>
<thead>
<tr>
<th>Item</th>
<th>Rules to follow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands</td>
<td>Wash and dry thoroughly.</td>
</tr>
<tr>
<td>Safety glasses</td>
<td>Clean and disinfect.</td>
</tr>
<tr>
<td>Lab coat or uniform, utility gloves, mask, protective eyewear</td>
<td>Put them on.</td>
</tr>
<tr>
<td>Handpieces, air/water syringes, air jet polishers, scalers</td>
<td>Run them so as to expel water from the waterlines.</td>
</tr>
<tr>
<td></td>
<td>Lubricate the handpiece according to the manufacturer’s recommendations.</td>
</tr>
<tr>
<td>Chair and dental chair, headrest, tray, switches, handles, lamps, tables and counters, hand mirror, patient’s protective eyewear, chain, pencils, etc.</td>
<td>Clean and disinfect.</td>
</tr>
<tr>
<td>Suction evacuation system</td>
<td>Disinfect by suctioning a solution of disinfectant and hot water, and by suctioning air at the same time.</td>
</tr>
<tr>
<td>Utility gloves</td>
<td>Remove, clean, and disinfect with an antiseptic soap.</td>
</tr>
<tr>
<td>Hands</td>
<td>Wash and dry thoroughly.</td>
</tr>
</tbody>
</table>

- **Antiseptic hand wash or hand antisepsis 30–60 seconds**
- **Duration: 3 minutes**
- **Duration: according to manufacturer’s recommendations**
- **Quantity: 100 mL of liquid**
- **Antiseptic hand wash or hand antisepsis 30–60 seconds**
Prior to patient treatment: Prepare the work area

<table>
<thead>
<tr>
<th>Item</th>
<th>Rules to follow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental chair, headrest, decorative buttons of dental chair, switches, lamp handles, air/water syringe sleeve (if not sterilizable), etc.</td>
<td>Cover with protective covers or barrier protection.</td>
</tr>
<tr>
<td>Materials</td>
<td>Take out only the materials required to ensure compliance with asepsis standards.</td>
</tr>
<tr>
<td></td>
<td>Place one tray liner at a time.</td>
</tr>
<tr>
<td>Medical questionnaire</td>
<td>Obligations:</td>
</tr>
<tr>
<td></td>
<td>• Enter the date;</td>
</tr>
<tr>
<td></td>
<td>• Fill out and have the patient sign;</td>
</tr>
<tr>
<td></td>
<td>• Have the professional sign or initial the questionnaire;</td>
</tr>
<tr>
<td></td>
<td>• Update it at every appointment by entering the date.</td>
</tr>
<tr>
<td></td>
<td>Recommendation:</td>
</tr>
<tr>
<td></td>
<td>• Have the patient sign every update.</td>
</tr>
<tr>
<td>Recognized antiseptic mouthrinse for the patient and water for children</td>
<td>Strongly advise.</td>
</tr>
<tr>
<td>Hands</td>
<td>Wash and dry thoroughly.</td>
</tr>
<tr>
<td>Protheses and other laboratory-made appliances</td>
<td>Disinfect and rinse well.</td>
</tr>
</tbody>
</table>

Antiseptic hand wash or hand antisepsis 30–60 seconds
**TREAT ALL PATIENTS AS IF THEY WERE INFECTIOUS**

<table>
<thead>
<tr>
<th>Rules to follow</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protective eyewear</strong></td>
<td>To be worn throughout the treatment session by both the patient and the professional.</td>
</tr>
<tr>
<td><strong>Mask</strong></td>
<td>To be worn by the professional for any oral intervention.</td>
</tr>
</tbody>
</table>
| **Gloves** | To be worn by the professional for any oral procedures. | **To be changed:**  
- for every patient;  
- or  
- if damaged (punctured, torn, etc.);  
- if there is contact outside the operatory;  
- when the treatment session lasts more than an hour. |
| **Asepsis protocol to follow** | Avoid touching yourself (nose, protective eyewear, mask, hair, etc.) with gloved hands.  
Use sterile cotton plier to take objects from jars or from a drawer, during a treatment session. Use overgloves as required.  
Remove gloves if you leave the treatment room. |
| **Aerosols** | Whenever possible, use rapid suction and a dental dam.  
Avoid using air and water simultaneously. |
| **Sharpening instruments during patient treatment** | Use a sterile stone. |
| **Soiled instruments** | Apply a safe procedure so as to avoid injury. (See p. 42) |
| **X-rays** | Maintain asepsis protocol. |
After each treatment

<table>
<thead>
<tr>
<th>Gloves</th>
<th>Remove and dispose of safely.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands</td>
<td>Wash and dry thoroughly.</td>
</tr>
<tr>
<td>Utility gloves</td>
<td>Put on for cleaning and disinfection.</td>
</tr>
<tr>
<td>Instruments or cassettes</td>
<td>Place in a holding solution or immediately prepare for sterilization.</td>
</tr>
</tbody>
</table>
| Waste and single-use materials | Discard appropriately:  
|                                | - Ordinary waste;  
|                                | - Infectious waste.                               |
| Details on Page 46.            |                                                   |
| Handpieces, air/water syringes, air jet polishers, scalers | Run them so as to expel water from the waterlines.  
|                                | Clean the exterior with a detergent, rinse, dry, lubricate (if required), wrap for sterilization.  
|                                | Sterilize.                                        |
| Suction evacuation system      | Perform irrigation with a cleaning solution or with hot water while suctioning air at the same time. |
| Inert surfaces not covered with protective covers or barrier protection (chair and dental chair, tray, switches, handles, lamps, tables and countertops, suction tubing, waterlines, hand mirror, patient protective eyewear, chain, pencils, etc.) | Clean and disinfect. |
| Utility gloves                 | Disinfect and remove.                             |
| Mask                           | Remove and discard.                               |
| Hands                          | Wash and dry thoroughly.                           |

Put on gloves and prepare the work area, repeating the procedure on Page 8.

**Antiseptic hand wash or hand antisepsis**
- 30–60 seconds

**Duration:**
- 30 seconds

**Quantity:**
- 100 mL of liquid

**Duration:** according to manufacturer’s recommendations

**Antiseptic hand wash or hand antisepsis**
- 30–60 seconds
At the end of the day

<table>
<thead>
<tr>
<th>Rules to follow</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dental unit waterlines</strong> (tubing): handpieces, air/water syringes, air jet polishers, scalers</td>
</tr>
</tbody>
</table>
| **If an independent water system is used** | Follow the manufacturer’s recommendations if a disinfecting solution is used.  
Empty and disinfect each bottle.  
Let the bottles air dry by inverting them. |
| **Suction evacuation system** | Perform irrigation with a cleaning solution or with hot water while suctioning air at the same time.  
Clean the filter.  
Disinfect and use an enzyme solution in compliance with the frequency and concentrations recommended by the manufacturer. |
| **Work area (sink, floor, etc.)** | Clean daily. |
| **Biomedical waste** | See p. 46 |
| **Ultrasonic bath** | Change the solution. |
| **Uniform or lab coat** | Remove it. It must be laundered. Carry it separately in a bag if it is to be laundered outside the clinic. |
| **Hands and arms** | Wash and dry thoroughly. |

Duration: 3 minutes
Bleach: 15 mL/litre of water  
Duration: 10 minutes  
Quantity: 100 mL of liquid  
Antiseptic hand wash or hand antisepsis 30–60 seconds
3. INFECTION CONTROL OBJECTIVES

- To protect patients and personnel against infections.
- To reduce pathogenic microorganisms to help the immune system to prevent infections.
- To break the cycle of infection and to eliminate cross-contamination.

**Basic principles**

- The asepsis protocol must be known and understood by all.
- It is important to put someone in charge of the protocol.
- To protect against infections through an adequate vaccination program.
- Treat all patients as if they were infectious.
- Treat all soiled materials as a transmission vector for infection.
- Maintain asepsis protocol.
- What must be sterilized must never be only disinfected.
- Instruments can be decontaminated without being sterilized, but they cannot be sterilized without being decontaminated.

**Role of the person in charge of infection control, first-aid after occupational exposure and emergency situations:**

- To ensure the application of standard (universal) precautions.
- To train personnel or to organize training workshops;
- To keep a control measures register (e.g., efficacy test for sterilization);
- To stay on the lookout for developments and changes in infection control and to share recommendations.
4. STANDARD (UNIVERSAL) PRECAUTIONS

First established in the mid-1980s by the Centers for Disease Control and Prevention (CDC) to prevent hematogenous germ transmission, universal precautions were subsequently adopted by Canada in 1987. Subsequent to a review of its guidelines in 1996, the CDC introduced standard precautions so as to also prevent the transmission of pathogens by way of any other organic fluid, excretion, or secretion. These guidelines were also adopted in Canada.

Standard precautions are the set of procedures that must be applied by all health-care workers, for all patients. These precautions include immunization, personal protection (gloves, mask, protective eyewear, lab coat, etc.), as well as all work measures and techniques that must become part of regular habits: medical questionnaire, hand antisepsis, cleaning, disinfection and sterilization, maintenance of waterlines and evacuation systems, biomedical waste management, post-exposure methods, asepsis protocol in the laboratory, etc.

Modes of transmission of infections

Infections are transmitted by direct contamination or by cross-contamination.

Direct contamination can occur through injury of a health-care worker by a contaminated curet, for example.

Cross-contamination refers more to the contamination of a patient or other intermediary by an improperly decontaminated instrument or non-aseptisized hands (or gloves).

Contamination risks

Chain of asepsis

The chain of asepsis is the procedure to follow so as to avoid the transfer of potentially infectious germs. This means that each step is connected to the previous step and is carried out free of pathogenic microorganisms.
## 5. SOURCES OF CONTAMINATION IN THE DENTAL ENVIRONMENT

<table>
<thead>
<tr>
<th>Sources</th>
<th>Causes</th>
<th>Solutions</th>
<th>Rules to follow</th>
</tr>
</thead>
<tbody>
<tr>
<td>The patient</td>
<td></td>
<td>Medical questionnaire.</td>
<td>Update with every appointment.</td>
</tr>
<tr>
<td>Blood, saliva, calculus and other debris</td>
<td></td>
<td>1. Comply with the standard precaution measures.</td>
<td>Vaccinate personnel. Cleaning, disinfection, sterilization, etc. Wash hands, wear a lab coat, gloves, protective eyewear, etc. Disposable materials are single-use: never re-use. Handle all instruments with care.</td>
</tr>
</tbody>
</table>
| Water in the dental unit waterlines         | High concentration of microorganisms* in high- and low-speed handpieces, air/water syringes, scalers, and air jet polishers | 1. Flush waterlines of handpieces, air/water syringes, scalers, and air jet polishers.  
2. Avoid heating the dental unit’s water.  
3. Check the anti-reflux valves and ensure they function properly.  
4. Use sterile water for invasive procedures.  
5. If an independent water system is used, empty and disinfect each bottle at the end of the day: Bleach: 15 mL/litre of water for 10 minutes. Let the bottles air dry by inverting them.  
6. Follow the manufacturer’s recommendations during chemical treatment of the water. | 3 minutes: beginning of the day, end of the day, after mealtime.  
30 seconds: after each patient. |
| Municipal boil-water advisory               | Contaminated water                         | For the duration of the advisory  
Surgery, root canals, etc.; sterile water.  
Fillings, polishing, etc.; bottled, boiled, distilled or sterile water (using a bulb or syringe).  
Hand washing: bottled (or previously boiled) water, or use antiseptic foam or gel.  
In the presence of blood, saliva or dirt, washing with water is always essential.  
Waterlines: flush waterlines with bottled, boiled, distilled, or sterile water before using.  
When the advisory is lifted  
If the dental unit does not have a sterile water reservoir: flush all waterlines for at least 30 minutes and disinfect according to the manufacturer’s instructions. | See the appendix Contaminated Water Management Protocol (p. 52)  
Consider postponing appointments. |
| Municipal drinking water avoidance advisory | Contaminated water                         | Use bottled, distilled or sterile water.  
Do not use water from the public water system, even if it has been boiled. See the appendix Contaminated Water Management Protocol (p. 52) | Consider postponing appointments. |

*Flushing water for approximately two minutes reduces the number of microorganisms by 90%.
## 5. SOURCES OF CONTAMINATION IN THE DENTAL ENVIRONMENT (cont’d)

<table>
<thead>
<tr>
<th>Sources</th>
<th>Causes</th>
<th>Solutions</th>
<th>Rules to follow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evacuation system</td>
<td>Waterlines and evacuation traps are highly contaminated by oral fluids, debris, and human residues. Risk of contaminating patient through suctioning. Studies have shown a risk of fluid backflow one out of four times.</td>
<td>1. Irrigate the evacuation tubing by suctioning air simultaneously to create turbulence.</td>
<td>Approximately 100 mL of cleaning solution or hot water after each patient. Because it is corrosive, bleach is to be avoided. Disinfection at the end of the day and cleaning with an enzyme solution at least once a week. Use an anti-reflux saliva ejector or pierce an opening in the middle of the disposable tip of the saliva ejector with scissors, forceps, or a dental bur and a turbine. The opening breaks the vacuum created by closing lips around the tip. Clean the adaptor with detergent, flush with water and sterilize before inserting a new tip for the next time it is to be used. Lab coat, gloves, protective eyewear.</td>
</tr>
<tr>
<td>Ambient air</td>
<td>Aerosols created by breathing, coughing, sneezing, handpieces, cups, brushes, scalers, air/water syringes, etc.</td>
<td>1. Reduce or minimize the formation of aerosols.</td>
<td>1. Ask the patient to use an antiseptic mouthrinse before the procedure, or water for young children 2. Use a dental dam and rapid suction (whenever possible). Avoid using air and water at the same time. 3. Sterilize: high- and low-speed handpieces, air/water syringes, scalers, and air jet polishers. 4. Clean and disinfect: equipment and inert surfaces. 5. Cover the ultrasonic bath so as to reduce aerosols. 6. Avoid spraying disinfectant directly on a surface. e.g., spray disinfectant on a paper towel.</td>
</tr>
<tr>
<td>Dust</td>
<td></td>
<td>1. The work area must be properly dusted every day.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. The air filters must be cleaned and changed frequently.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Ventilation must be adequate.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consult Appendix II: Ventilation of Dental Clinics, p. 53.</td>
<td></td>
</tr>
</tbody>
</table>
6. PREVENTION: DENTAL CARE PERSONNEL

The prevention of infections for dental care personnel comprises four points: ensuring good health, getting vaccinated, washing hands, and wearing personal protection.

**Point 1: Ensure good health**
**Point 2: Get vaccinated (strongly recommended)**

**Summary of immunization recommendations for dental care personnel***

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Vaccinations</th>
<th>Recommendations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheria</td>
<td>DPT, DaPTP-Hib d2T5 dTap</td>
<td>Primary immunization completed and a booster less than 10 years ago</td>
<td>Vaccination against diphtheria and tetanus are part of basic vaccination. It is recommended for personal protection (tetanus and diphtheria), and for the protection of clients (diphtheria).</td>
</tr>
<tr>
<td>Tetanus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pertussis</td>
<td>DaPTP-Hib or dTap</td>
<td>1 dose of the dTap vaccine</td>
<td>Dental care staff members should have received 1 dose of the acellular Pertussis vaccine (dTap).</td>
</tr>
<tr>
<td>Poliomyelitis</td>
<td>OPV and/or IPV (present in the DaPTP-Hib vaccine)</td>
<td>Primary immunization completed, and at least one booster after 4 years of age</td>
<td>Only primary immunization is necessary (no booster).</td>
</tr>
<tr>
<td>Measles, Mumps, Rubella</td>
<td>MMR and/or measles vaccine</td>
<td>For people born before 1970 proof of protection against measles (vaccine or serology) For people born after 1970 2 doses of the MMR vaccine or 1 dose of the MMR vaccine and 1 dose of the measles vaccine</td>
<td>Vaccination against measles, mumps, and rubella is part of basic vaccination. This vaccination is recommended for personal protection and for the protection of clients.</td>
</tr>
<tr>
<td>Influenza</td>
<td>Fluviral or Vaxigrip</td>
<td>Vaccination to be received annually in the fall</td>
<td>Having been vaccinated can be crucial during an outbreak. This vaccination is recommended for personal protection and for that of users.</td>
</tr>
<tr>
<td>Hepatitis B**</td>
<td>Recombivax HB or Engerix-B</td>
<td>3 doses in accordance with minimal intervals and anti-HB serology</td>
<td>Regular intervals are preferable. All intervention is stopped as soon as a rate equal to or higher than 10 I/L is recorded.</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>TST</td>
<td>TST in two steps, except if previous positive TST or previous tuberculosis</td>
<td>If the result is negative, the TST must be taken again only in the event of exposure to tuberculosis.</td>
</tr>
<tr>
<td>Chickenpox</td>
<td>Varivax or Varilrix</td>
<td>History of chickenpox or 2 doses of the vaccine or positive varicella IgG serology</td>
<td>A history of chickenpox is considered sufficient for protection.</td>
</tr>
</tbody>
</table>

*Table adapted from Appendix C of the document: Immunisation des travailleurs de la santé, des stagiaires et de leurs professeurs – Recommandations.

Reproduction authorized by the Journal de l’Ordre des dentistes du Québec. L’immunisation du personnel dentaire, Dr Anne Charbonneau, DMD, PhD. Volume 46, numéro 1 - February/March 2009

**Seroconversion observed in 95% of subjects 20–40 years of age. Verifying seroconversion is recommended (serology test).**

Other immunization programs are recommended in some environments, e.g., meningococcus, hepatitis A, etc.
Point 3: Hand antisepsis

**Hand antisepsis is an essential step in the prevention of infections.** Wearing gloves is not a substitute for this step. While healthy skin is very good protection against germs, it remains a surface upon which microorganisms released during dental treatments can be deposited and is thus an important potential source of infection and transmission. These transient microorganisms must be eliminated.

The microbial skin flora consists of resident microorganisms (colonizing flora) and transient microorganisms (contaminating flora). The **resident flora** is rarely responsible for infections (exceptions: immune deficiency, grafts, etc.). Conversely, **transient flora**, from the oral cavity, the environment, instruments, etc., is sometimes the source of infections.

### Hand washing

<table>
<thead>
<tr>
<th>Rules to follow</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency</strong></td>
<td>Hand washing is the most effective measure in the prevention of infections.</td>
</tr>
<tr>
<td>At the beginning of the day; Before putting on gloves; After each removal of gloves; After mask removal; Before and after meals; After contact outside the operatory; After contact with blood or contaminated materials; At the end of each day.</td>
<td></td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td>Avoid water that is too hot. It affects skin integrity.</td>
</tr>
<tr>
<td><strong>Brushing</strong></td>
<td>Avoid brushing hands and nails. Possibility of microlesions creating a portal of entry for microorganisms.</td>
</tr>
</tbody>
</table>

### Types

<table>
<thead>
<tr>
<th>Agents</th>
<th>Purpose</th>
<th>Duration</th>
<th>Situations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hand washing</strong></td>
<td>Water and liquid soap (nonantimicrobial, detergent-based soap)</td>
<td>Physical (mechanical) elimination of dirt and transient flora.</td>
<td>30 seconds</td>
</tr>
<tr>
<td><strong>Hand antisepsis</strong></td>
<td>Antiseptic gel or foam, without water</td>
<td>Elimination or destruction of transient flora. Reduction of resident flora.</td>
<td>30–60 seconds</td>
</tr>
<tr>
<td><strong>Antiseptic hand washing</strong></td>
<td>Water and antiseptic soap</td>
<td>Elimination of dirt. Elimination or destruction of transient flora. Reduction of resident flora.</td>
<td>45–60 seconds</td>
</tr>
<tr>
<td><strong>Semi-surgical hand washing</strong></td>
<td>Water and antiseptic soap</td>
<td>Elimination or destruction of transient and resident flora. Persistent effect.</td>
<td>2–6 minutes</td>
</tr>
</tbody>
</table>

### Basic rules

<table>
<thead>
<tr>
<th>Rules to follow</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Jewellery</strong></td>
<td>They can cause gloves to tear. Jewellery has not been disinfected. The presence of microorganisms is promoted by moisture that forms between jewellery and the skin.</td>
</tr>
<tr>
<td>Must not be worn.</td>
<td></td>
</tr>
<tr>
<td><strong>Nails</strong></td>
<td>The concentration of bacteria is greater under and around the fingernails. Bacteria develops under nail polish and artificial nails.</td>
</tr>
<tr>
<td>Short and clean.</td>
<td></td>
</tr>
<tr>
<td>Without nail polish. Without artificial nails.</td>
<td></td>
</tr>
</tbody>
</table>
Methods

Antiseptic hand washing: 45–60 seconds
- Rinse hands under warm running water;
- Work 3–5 mL of soap into a lather and wash and rub hands, wrists, the areas around fingernails for 10–15 seconds, and interlace fingers;
- Rinse hands under warm, running water;
- Dry hands thoroughly with a (disposable) paper towel;
- Turn off the faucet using a paper towel.

Waterless hand antisepsis using a gel or foam with higher than 60% alcohol content: 30–60 seconds
- It should be noted: Hands must be dry and clean because humidity dilutes alcohol.
  - Immerse fingertips of each hand in 3 mL or more of gel;
  - Rub hands together, spreading the gel to cover all surfaces of hands and fingers;
  - Pay special attention to the areas around fingernails and between fingers.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quickly reduces the microbial load.</td>
<td>Destroys germs but does not clean. In the presence of blood, saliva, or dirt, washing with water is essential.</td>
</tr>
<tr>
<td>The addition of an emollient reduces irritation.</td>
<td>Depending on the antiseptic gel used, the manufacturer may recommend washing with water, after a certain number of uses (for example, after 10 uses).</td>
</tr>
<tr>
<td>Increasingly recognized by regulatory bodies.</td>
<td></td>
</tr>
</tbody>
</table>

Semi-surgical hand washing: 2–6 minutes
- Wet hands with warm/cold water;
- Dispense antiseptic soap onto hands;
- Work into a lather and rub over fingernails, between fingers, on wrists, and forearms for 30 seconds, without using a brush;
- Do not lather under running water so as to maximize contact with the soap;
- Rinse for 20 seconds from fingertips up to forearms;
- Keep hands elevated above forearms to prevent the soap from recontaminating hands;
- Repeat this process twice more;
- Dry, taking care to use a different paper towel for each hand: start at fingers and move up the forearm;
- Turn off the faucet using a paper towel.

Drying: use disposable paper towels, not re-usable towels.
**Antiseptic agents**

**Characteristics**

<table>
<thead>
<tr>
<th>Group and subgroup</th>
<th>Gram-positive bacteria</th>
<th>Gram-negative bacteria</th>
<th>Mycobacterium tuberculosis</th>
<th>Fungi</th>
<th>Virus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohols (gel or foam) (\geq 60-90%)</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Chlorhexidine 2% and 4% aqueous solution</td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
<td>Fair</td>
<td>Good</td>
</tr>
<tr>
<td>Hexachlorophene 3% aqueous solution</td>
<td>Good</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
</tr>
<tr>
<td>Iodine compounds, iodine in alcohol</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Iodophors</td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Parachlorometaxylenol (PCMX)</td>
<td>Good</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
</tr>
<tr>
<td>Triclosan</td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
<td>Poor</td>
<td>Good</td>
</tr>
</tbody>
</table>

**Point 4: Personal protection**

Given the large quantity of aerosols generated during various patient treatments and the possibility of them being projected onto the face and into hair, etc., all jewellery must be removed. Personal hygiene before leaving the workplace or upon arrival at home is a good practice for dental care professionals.

<table>
<thead>
<tr>
<th>MEASURES</th>
<th>Characteristics</th>
<th>Use</th>
<th>Rules to follow</th>
<th>Cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Uniform or lab coat</strong></td>
<td>Long-sleeved if there is a risk of spatter from blood or saliva droplets or aerosols. Otherwise, arms must be washed.</td>
<td>Wear only at work.</td>
<td>Change at least once a day or when visibly soiled. Carry uniform separately in a bag. Disposable blouses are single-use.</td>
<td>Wash separately in hot water (60–70°C), bleach, machine dry (100°C or hotter). Stains of blood or blood-tinged biological fluids must be cleaned immediately with a paper towel dipped in disinfectant (aqueous solution).</td>
</tr>
<tr>
<td><strong>Surgical mask</strong></td>
<td>While ensuring adequate protection for the professional, this type of mask is designed to protect the patient and the surgical site.</td>
<td>Any clinical procedure where aerosol production is anticipated, including cleaning and disinfecting instruments and surfaces.</td>
<td>Change after each patient or • when there is a high level of droplet and aerosol production (scaler, polisher), because the mask loses efficacy when wet; • soiled, or uncomfortable.</td>
<td>Direct contact with patients who possibly have SARS or other infectious diseases, or in pandemics.</td>
</tr>
<tr>
<td><strong>N95 mask or respirator</strong></td>
<td>• Essentially designed for professionals working in a high-density aerosol environment and a high level of infectiousness. • Certified by the National Institute for Occupational Safety and Health (NIOSH). • Requires more rigorous adjustment. This mask must not be worn by a person with a beard.</td>
<td>Direct contact with patients who possibly have SARS or other infectious diseases, or in pandemics.</td>
<td>Change after each patient or • when there is a high level of droplet and aerosol production (scaler, polisher), because the mask loses effectiveness when wet; • soiled, or uncomfortable.</td>
<td>Clean and disinfect after each patient with antiseptic hand soap.</td>
</tr>
<tr>
<td><strong>Protective eyewear</strong></td>
<td>With lateral visors. For prescription glasses, add protective sides.</td>
<td>Any clinical procedure where aerosol production is anticipated, including cleaning and disinfecting instruments and surfaces.</td>
<td>Clean and disinfect after each patient with antiseptic hand soap.</td>
<td>Clean and disinfect after each patient with antiseptic hand soap.</td>
</tr>
<tr>
<td><strong>Full visor</strong></td>
<td>Covers the face and neck.</td>
<td>Does not replace wearing a mask because there is a risk of contamination via the respiratory tract.</td>
<td>Clean and disinfect after each patient with antiseptic hand soap.</td>
<td>Clean and disinfect after each patient with antiseptic hand soap.</td>
</tr>
<tr>
<td><strong>Gloves</strong></td>
<td>Characteristics described on page 21.</td>
<td>Orodental procedures Anticipated contact with saliva, blood, mucous membranes. Anticipated contact with contaminated instruments or surfaces</td>
<td>Remove gloves by turning them inside out: after each patient or • at least every hour if the treatment is longer than planned; • if gloves are damaged (perforation, tear, etc.); • if a leak is suspected.</td>
<td>Gloves must not be washed One exception: utility gloves.</td>
</tr>
</tbody>
</table>
7. GLOVE SELECTION

**Wearing gloves does not replace hand washing.** It is a complementary measure. Gloves provide very good mechanical protection against the penetration of viruses, bacteria, and fungi. Their elasticity (latex and nitrile) also reduces the transfer of germs when they are accidentally pierced. They must never be washed.

<table>
<thead>
<tr>
<th>Types of gloves</th>
<th>Use</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Latex</strong> Non-sterile, low in protein content, powderless</td>
<td>Non-surgical dental procedures</td>
<td>Excellent mechanical, hydrophobic protection, very water resistant, elastic</td>
<td>Risk of allergic reaction.</td>
</tr>
<tr>
<td><strong>Polymer latex gloves</strong> Non-sterile</td>
<td>Non-surgical dental procedures</td>
<td>Added advantage: skin protection against latex allergies.</td>
<td></td>
</tr>
<tr>
<td><strong>Nitrile</strong> Non-sterile</td>
<td>Non-surgical dental procedures in the event of latex allergy</td>
<td>Low allergenic. Good adjustment.</td>
<td></td>
</tr>
<tr>
<td><strong>Vinyl (PVC, polyvinyl, chlorinated olefin)</strong> Non-sterile</td>
<td>Non-surgical dental procedures in the event of latex allergy</td>
<td>Limits exposure to latex.</td>
<td>Low elasticity and low impermeability. Tears when perforated.</td>
</tr>
<tr>
<td><strong>All purpose</strong> Rubber, neoprene, butyl, polynitrile, etc.</td>
<td>To clean and disinfect equipment, instruments, etc. For handling sharps.</td>
<td>Resistance, prevention of accidents (cuts, wounds, etc.). Limits exposure to latex.</td>
<td>Must be cleaned after each use, with antiseptic hand soap. N.B.: Discard gloves as soon as they show signs of deterioration.</td>
</tr>
<tr>
<td><strong>Sterile</strong> Latex, lined latex, nitrile, vinyl, etc.</td>
<td>Surgical procedures.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It is recognized that glove powder is a vehicle that promotes skin penetration of latex allergens. Powdered gloves are not compatible with the use of antiseptic gels and foams, and their use is therefore not recommended. Powderless gloves offer considerable advantages.
8. IRRITATION, DERMATOSIS AND ALLERGIES

The best protection is intact skin.

<table>
<thead>
<tr>
<th>Situations</th>
<th>Causes</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irritation</td>
<td>Moisture created by wearing gloves promotes the growth of microorganisms.</td>
<td>Wash hands before putting on gloves and immediately after removing them.</td>
</tr>
<tr>
<td></td>
<td>Skin that is moist before putting on gloves.</td>
<td>Adequately dry hands before putting on gloves.</td>
</tr>
<tr>
<td></td>
<td>Soap residue.</td>
<td>Adequate rinsing for at least 30 seconds.</td>
</tr>
<tr>
<td></td>
<td>Dry or sensitive skin.</td>
<td>Applying a water-based moisturizing cream at least twice a day (e.g., middle of and end of day).</td>
</tr>
<tr>
<td></td>
<td>Glove powder.</td>
<td>Choose gels or foams that contain emollients.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Choose powderless gloves.</td>
</tr>
<tr>
<td>Dermatosis</td>
<td>Reaction to soap.</td>
<td>Change soaps.</td>
</tr>
<tr>
<td></td>
<td>Reaction to a type of gloves.</td>
<td>Nitrile instead of latex.</td>
</tr>
<tr>
<td></td>
<td>Reaction to synthetic chemical compounds that are part of glove composition.</td>
<td>Polymer-lined hypoallergenic gloves.</td>
</tr>
<tr>
<td></td>
<td>Reaction to a disinfectant.</td>
<td>Test various brands.</td>
</tr>
<tr>
<td>Allergies 3–17% of healthcare workers</td>
<td>Respiratory: to varying degrees (rhinitis, coughing, etc.). The most frequent form.</td>
<td>Always wear gloves when using disinfectants.</td>
</tr>
<tr>
<td></td>
<td>Dermatological: to varying degrees (redness, urticaria, etc.).</td>
<td>Reduce exposure to latex by using other types of gloves.</td>
</tr>
</tbody>
</table>

Strategies for reducing skin irritation

- Use warm water for hand washing;
- Dry hands thoroughly with a disposable paper towel, and avoid vigorous rubbing;
- Use alcohol-based gels or foams in situations where hands are not visibly soiled;
- Choose antiseptic gels or foams that contain emollients;
- Use hand lotions or creams compatible with the antiseptic product and glove type;
- Use powderless and latex-free gloves;
- Minimize hand contact with surface disinfectants.
9. DISINFECTION: WORK AREA

A clean and tidy surface can be disinfected quickly and effectively. The fewer the items exposed (instruments containers, etc.) to aerosols and to contact, the easier it will be to manage what must be disinfected after patient treatment. As well, surface cleanliness has a direct impact on the contact time required for a disinfectant to act adequately.

<table>
<thead>
<tr>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Countertops and furniture surfaces</td>
</tr>
<tr>
<td>Compatible with recommended disinfecting agents (vinyl, laminated countertops). Smooth, even finishes.</td>
</tr>
<tr>
<td>Avoid:</td>
</tr>
<tr>
<td>wood surfaces; porous surfaces.</td>
</tr>
<tr>
<td>Materials required for patient treatment</td>
</tr>
<tr>
<td>Take out only the materials required for treating the patient and ensure that they comply with asepsis standards. Place one tray liner at a time. Open instrument packs in front of the patient.</td>
</tr>
<tr>
<td>Materials not required for patient treatment</td>
</tr>
<tr>
<td>Protect against contamination by keeping more than one (1) metre from the patient’s mouth, in containers that are closed or covered with a cloth or paper. Instruments or materials never used must not be kept in the operatory.</td>
</tr>
<tr>
<td>Dental chair</td>
</tr>
<tr>
<td>Non-porous finish, foot pedal.</td>
</tr>
<tr>
<td>Avoid:</td>
</tr>
<tr>
<td>decorative buttons, folds, fabrics.</td>
</tr>
<tr>
<td>Electronic equipment</td>
</tr>
<tr>
<td>Consult Chapter 18, <em>Asepsis for the new technologies</em>, page 38.</td>
</tr>
<tr>
<td>Especially polymerization lamps, cameras, keyboards, sensors, etc.</td>
</tr>
<tr>
<td>Sink, soap dispenser</td>
</tr>
<tr>
<td>Hands-free operation:</td>
</tr>
<tr>
<td>• foot pedal;</td>
</tr>
<tr>
<td>• photo-electric switches;</td>
</tr>
<tr>
<td>• control switch using</td>
</tr>
<tr>
<td>forearm instead of hands.</td>
</tr>
<tr>
<td>Paper towels (hand towels)</td>
</tr>
<tr>
<td>Accessible without having to touch hand crank.</td>
</tr>
<tr>
<td>Choose good-quality paper towels, gentle on hands.</td>
</tr>
<tr>
<td>Eliminate:</td>
</tr>
<tr>
<td>cloth towels.</td>
</tr>
<tr>
<td>General waste containers</td>
</tr>
<tr>
<td>Lined with resistant plastic bags and placed in a cabinet under a countertop opening or without a hinged leaf.</td>
</tr>
<tr>
<td>Rigid, hermetically sealed container identified for sharps disposal.</td>
</tr>
<tr>
<td>Accessible without being in a traffic area.</td>
</tr>
<tr>
<td>Disposal of needles and sharps.</td>
</tr>
<tr>
<td>Aeration</td>
</tr>
<tr>
<td>Must provide 6–12 air changes an hour, depending on the situation. Consult Appendix II: <em>Ventilation of dental clinics, p. 53</em></td>
</tr>
<tr>
<td>Floors</td>
</tr>
<tr>
<td>Smooth (e.g., vinyl).*</td>
</tr>
<tr>
<td>Avoid:</td>
</tr>
<tr>
<td>carpet.</td>
</tr>
<tr>
<td>Walls</td>
</tr>
<tr>
<td>Smooth.*</td>
</tr>
<tr>
<td>Housekeeping</td>
</tr>
<tr>
<td>Daily cleaning of sinks, floors, and bathroom stalls.</td>
</tr>
</tbody>
</table>

*Any surface contaminated by blood must be cleaned as quickly as possible.*
## 10. ASEPSIS: PATIENT

<table>
<thead>
<tr>
<th>Measures</th>
<th>Reasons</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medical questionnaire</strong></td>
<td>To know the risk factors, medical history, symptoms (fever, cough, etc.), and allergies.</td>
<td>Detailed questionnaire completed with the professional Questionnaire of the ODQ and the ACDQ.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obligations:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Enter the date;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Fill out and have the patient sign;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Have the professional sign or initial the questionnaire;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Update at every appointment by entering the date.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recommendation:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Have the patient sign every update.</td>
</tr>
<tr>
<td><strong>Prophylactic premedication</strong></td>
<td>To prevent bacteremias.</td>
<td>Check to see that the dosage is adequate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check the recommendations of the Canadian Dental Association (CDA) and the American Heart Association (AHA).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consider checking with the attending physician.</td>
</tr>
<tr>
<td><strong>Preprocedural mouthrinse:</strong> recognized antiseptic mouthrinse for the patient and water for children</td>
<td>To reduce bacterial flora.</td>
<td>90–98% reduction in bacterial flora.</td>
</tr>
<tr>
<td><strong>Protective eyewear</strong></td>
<td>To protect against aerosols, spatter, and injury.</td>
<td>To be worn by the patient during the entire treatment session.</td>
</tr>
<tr>
<td><strong>Aerosol reduction</strong></td>
<td>To reduce the risk of contamination.</td>
<td>Dental dam and quick suctioning, whenever possible. For air/water syringes, avoid using water and air at the same time as much as possible.</td>
</tr>
</tbody>
</table>

It is left to the judgement of the professional to consider postponing the appointment.
11. RESISTANCE OF MICROORGANISMS AND METHODS OF ELIMINATION

Resistence of Microorganisms (and Prions) and Methods of Elimination: See Appendix III (p. 54).
Survival of Germs on Inert Surfaces: See Appendix IV (p. 55).

12. CLASSIFICATION OF MATERIALS (Cleaning/Disinfection/Sterilization)

There is a problem in the practice of dentistry that makes application of Spaulding’s Classification onerous. Given the broad diversity of instrumentation and the thin dividing line between critical and semi-critical, it is recommended to sterilize everything that can be sterilized.

See the table: Spaulding’s Classification as Applied to Dentistry (Appendix V, p. 56).

13. CLEANING

Cleaning always precedes disinfection and sterilization.

Definition: mechanical action that removes visible debris and organic matter (blood, saliva, debris) that could interfere with the disinfection and sterilization process. Reduces the number of microorganisms but does not eliminate all of them.

Principle of bio cleaning
The principle of bio cleaning consists of always going from cleanest to the most soiled, and from top to bottom.

When cleaning, it is essential to wear a lab coat, mask, protective eyewear, and gloves.

<table>
<thead>
<tr>
<th>Items</th>
<th>Methods</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruments and devices</td>
<td>Manual brushing</td>
<td>Detergent, water, brush*</td>
</tr>
<tr>
<td>Instruments</td>
<td>Ultrasonic bath</td>
<td>Enzyme or detergent solution</td>
</tr>
<tr>
<td>Instruments</td>
<td>Wash/disinfect</td>
<td>Enzyme or detergent solution</td>
</tr>
</tbody>
</table>

*Disinfection of brushes (for instruments or conduits) used for cleaning:
Immersion at least once a day in a 1:10 bleach solution;
A new solution must be prepared every day.
14. DISINFECTION OF SURFACES

Definition: destruction of some microorganisms, but not bacterial spores, by direct application of chemical or physical processes. The degree of disinfection depends on the product used.

A disinfectant is used for inanimate objects (inert surfaces) while antiseptics are used on living tissue.

Criteria to consider for the selection of a disinfectant:

- DIN: drug identification number issued by Health Canada.
- Spectrum: a hospital-level disinfectant with intermediate activity is recommended for the dental care environment. Mycobacteria and small non-enveloped viruses are the most difficult to eliminate. Spores are destroyed by sterilization only.

See Appendix III (p. 54) the diagram: Resistance of Microorganisms (and Prions) and Methods of Elimination.

Therefore, the mention of tuberculocidal (Mycobacterium tuberculosis, Mycobacterium bovis, Mycobacterium smegmatis (or equivalent terms) and its ability to eliminate the small non-enveloped viruses (Poliovirus, Rhinovirus) are good indicators.

- Contact time required: according to manufacturer’s recommendations.
- Active ingredient (know the advantages and disadvantages).
- Safety for materials over the long term.
- Safety to use (low toxicity).
- Smell, impression, cost.

There is no such thing as the ideal disinfectant. They all have advantages and disadvantages.
Rules for using disinfectants

- Wear utility gloves when handling disinfectants. Use latex-free gloves.

- Limit aerosols: avoid spraying disinfectant directly on a surface. E.g., spray the disinfectant onto a paper towel.

- Two applications are recommended:
  1\textsuperscript{st} application: clean and discard the paper towel.
  2\textsuperscript{nd} application: saturate the surface and let it act (drying).

- A disinfectant combined with the heat of sterilization may alter the coating or mechanism of some instruments (e.g., handpieces, scalers, etc.).

- Use only disinfectants with a DIN (drug identification number issued by Health Canada).

- Check the label and take note of the necessary information: contact time, active ingredients, microorganisms tested, dilution, temperature, storage, effective period, etc. The manufacturer may also provide study data supporting product effectiveness.

Additional information regarding disinfectants

See Appendix VI (pp. 57–58) for information concerning the Health Canada drug product database (DPD): www.hc-sc.gc.ca
## Surface disinfectant guide

<table>
<thead>
<tr>
<th>Active ingredients</th>
<th>Level of activity</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Contraindication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>Low if used alone</td>
<td>In concentrations of approximately 20% (18–25%), by means of synergy, it optimizes the germicidal power of quaternary ammonium, phenolics, and chlorhexidine. It can help reduce the contact time required and provide prolonged action. Alcohol is sometimes used to clean certain instruments before sterilization (e.g., dental operatory instruments, optic fibre, etc.).</td>
<td>A high concentration (e.g., 70%) may damage (crack, discoulour) plastic surfaces and reduce cleaning action. Quick evaporation. Makes blood, saliva, and bacteria stick.</td>
<td>Using alcohol alone is not recommended for disinfecting surfaces.</td>
</tr>
<tr>
<td>Quaternary ammonium 0.2% (aqueous base)</td>
<td>Basic</td>
<td>Non-toxic, colourless, odourless, non-corrosive, detergent (cleaning) action.</td>
<td>Low tolerance to hard water. Limited efficacy at low temperatures. Variable antimicrobial action</td>
<td></td>
</tr>
<tr>
<td>Quaternary ammonium + Alcohol</td>
<td>Intermediate</td>
<td>Becomes tuberculocidal in the presence of alcohol. Synergy and prolonged action.</td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td>Chlorhexidine + Alcohol</td>
<td>Intermediate</td>
<td>Becomes tuberculocidal in the presence of alcohol. Synergy and prolonged action.</td>
<td>(1)</td>
<td>Incompatible with chloride.</td>
</tr>
<tr>
<td>Chlorine compounds (e.g., sodium hypochlorite)</td>
<td>Intermediate</td>
<td>Little affected by water hardness. Inexpensive. Efficacy at low temperatures. No residual action.</td>
<td>Corrosive, irritant, unstable. Discoulours surfaces. Must be prepared each day.</td>
<td>Incompatible with chlorhexidine.</td>
</tr>
<tr>
<td>Phenolics 0.1%</td>
<td>Intermediate</td>
<td>Residual action. Relatively gentle on materials but may alter plastics.</td>
<td>Irritant (skin, eyes): avoid contact with skin and mucous membranes. Some studies raise the possibility of a potential carcinogenic. (3) May discoulour surfaces. May leave a sticky film. (2)</td>
<td>Could be more harmful for children.</td>
</tr>
<tr>
<td>Phenolics + Alcohol</td>
<td>Intermediate</td>
<td>Becomes tuberculocidal in the presence of alcohol. Synergy and prolonged action.</td>
<td>Alcohol accentuates damage to materials and decreases cleaning capacity.</td>
<td></td>
</tr>
<tr>
<td>Iodophors</td>
<td>Intermediate</td>
<td></td>
<td>Discolourd surfaces. Corrosive. Must be prepared each day. May leave a sticky film. (2)</td>
<td></td>
</tr>
<tr>
<td>Accelerated hydrogen peroxide 0.5%</td>
<td>Intermediate</td>
<td>Non-toxic. Inexpensive. Leaves no residue. Biodegradable. May be active against biofilm. Cleaning action: low level.</td>
<td>May be corrosive.</td>
<td></td>
</tr>
</tbody>
</table>

Gluatraldehydes are not recommended as disinfectants.

1. An alcohol content of more than 20% may be damaging to materials.
2. Suggestion: clean surfaces with a mild soap at the end of the day to remove sticky residue and to preserve surfaces.
15. STERILIZATION

Definition: A procedure to destroy all microbial life including viruses and thermoresistant bacterial spores.

Sterility is an absolute concept: an instrument is either sterile or it is not. The only way to ensure it is sterile is to have a sterilizer checked regularly using biological indicators.

Cleaning is always the first step in sterilization (See p. 25).

Sterilization methods

• For any sterilization method, sterilization time is calculated starting only at the moment the desired temperature is reached. The length of the cycle depends on the type of device used, the temperature, the type, and the quantity of instruments to be sterilized. Do not overload with devices.
• The items must be prewrapped and sealed because any unwrapped item immediately becomes contaminated upon removal from the sterilizer.

Under ideal storage conditions, the packs will preserve instrument sterility for 90 days.

<table>
<thead>
<tr>
<th>CYCLE TIME</th>
<th>TEMPERATURE</th>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>15–20 minutes</td>
<td>Steam under pressure allows heat to better penetrate the objects to be sterilized. The temperature attained, the length of exposure, and the humidity provide the power to destroy microorganisms.</td>
<td>Moisture-free wrap.</td>
<td></td>
</tr>
<tr>
<td>5 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type B: approximately 30 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNSATURATED CHEMICAL-VAPOUR STERILIZATION (Chemiclave)</td>
<td>Mixture of alcohol and formaldehyde (ketone, water, and acetone) heated under pressure to form a gas that acts as a sterilizing agent.</td>
<td>Quick. Non-corrosive for metal and carbon instruments. Does not affect the cutting edge of instruments. Good for dental burs, oxidizable, and cutting instruments. Moisture-free wrap.</td>
<td>Damages objects sensitive to high heat (plastic and rubber). Does not sterilize liquids.</td>
</tr>
<tr>
<td>30 minutes</td>
<td>131°C/270°F (20 psi)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRY-HEAT STERILIZATION</td>
<td>High temperatures and long cycles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 hour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAPID-HEAT-TRANSFER STERILIZATION</td>
<td>Forced-air type</td>
<td>Does not affect the cutting edge of instruments. Materials are dry at the end of the cycle.</td>
<td>Does not sterilize liquids. Uncovered and unwrapped items quickly become contaminated after sterilization.</td>
</tr>
<tr>
<td>12 minutes (wrapped items) 6 minutes (unwrapped: emergency only)</td>
<td>190°C/375°F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Cold sterilization:** immersion in a chemical solution

This method must be used only when heat sterilization is impossible (e.g., heat-intolerant materials). The solution used must be a sterilizing agent approved by Health Canada.

- The objects must remain immersed during the recommended time.
- The objects must be thoroughly rinsed after soaking and bagged.
- The solution must be changed according to the manufacturer’s recommendations.
- The room must be well ventilated and a mask and gloves must be worn for handling.

<table>
<thead>
<tr>
<th>CYCLE TIME</th>
<th>TEMPERATURE</th>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glutaraldehyde 2% 10–12 hours or according to manufacturer’s instructions</td>
<td>Ambient (25°C/75°F)</td>
<td>Single-use.</td>
<td>Toxic and irritating to the eyes and skin. Allergic potential. Non-biodegradable. May discolour some metals. Unwrapped materials. Efficacy not biologically verifiable. Cannot be used as a disinfectant.</td>
</tr>
<tr>
<td>Accelerated hydrogen peroxide 7% 20 minutes or according to manufacturer’s instructions</td>
<td>Ambient (25°C/75°F)</td>
<td>Single-use. Non-toxic and biodegradable. Compatible with plastics.</td>
<td>Unwrapped materials. Efficacy not biologically verifiable.</td>
</tr>
</tbody>
</table>

**Type B sterilizers**

On the market for a long time, B Type sterilizers are becoming increasingly popular. Functioning on the autoclaving principle (steam), these sterilizers have a vacuum pump cycle after the sterilization cycle. The advantages are:

1. The water vapour is more efficiently distributed;
2. Porous loads (e.g., tissues) and devices with small conduits (e.g., handpieces) are sterilized with greater efficacy;
3. The packs and instruments are completely dry at the end of the cycle.

These sterilizers have certain disadvantages. Because of the vacuum pump cycle, the sterilization cycle is longer than for conventional autoclaving. Furthermore, in addition to the biological tests, they must be checked with physical indicators to ensure that the vacuum pump is functional.

**Modes of sterilization that are ineffective and not recommended:**

- Hot-salt or bead sterilizers;
- Conventional ovens;
- Domestic micro-wave ovens.
Checking the efficacy of sterilization
The daily use of a sterilizer and its essential role in the prevention of infections require that the sterilizer be checked regularly to ensure that it is functioning properly.

Only biological indicators provide a reliable indicator of the results of sterilization.

<table>
<thead>
<tr>
<th>INDICATORS</th>
<th>TYPES</th>
<th>ACTIONS</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. BIOLOGICAL</td>
<td>Paper strips or ampoules impregnated with non-pathogenic bacterial spores. Moist heat and chemical steam <em>Geobacillus stearothermophilus</em>. Dry-heat and ethylene oxide; <em>Bacillus subtilis</em>.</td>
<td>The absence of growth after culturing attests to the efficacy of the sterilization.</td>
<td>Biological indicator testing must be conducted and the results analyzed at least once a month, by an independent specialized laboratory. The list of laboratories offering biological verification of sterilizers is in Appendix XI, p.78. It is also suggested to conduct a test: • after having a sterilizer repaired; • if a new person is appointed to be responsible for sterilization.</td>
</tr>
<tr>
<td>The only reliable way to verify the efficacy of the device.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. CHEMICALS</td>
<td>Ampoules. Tape. Sticks. Labels impregnated with chemical products. Ink indicator test packs.</td>
<td>Indicator sensitive to heat or to chemical vapours. A uniform change in the colour indicates that the sterilization temperature and level of heat or steam penetration have been attained. Does not attest to the efficacy of sterilization. Identifies packs that underwent the cycle.</td>
<td>Every sterilization cycle.</td>
</tr>
<tr>
<td>3. MECHANICAL</td>
<td>Graphs, diagrams, and print-outs indicating cycle times and temperatures.</td>
<td>Indicates that the conditions required to obtain sterilization (duration, temperature, pressure) were met.</td>
<td>As required.</td>
</tr>
<tr>
<td>4. PHYSICAL</td>
<td>Bowie-Dick test: a test card in the middle of a paper pack. Helix test: tube containing 100 indicators.</td>
<td>Checks the ability of the device to remove air and it assesses steam penetration into hollow loads.</td>
<td>Once a week. To be placed: In a vacuum chamber, over the drain.</td>
</tr>
<tr>
<td>(for Type B sterilizers)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

General recommendations for sterilization
• Organize the sterilization area so as to prevent soiled materials from contaminating disinfected/sterilized materials.
• Always clean instruments before sterilizing them.
• Always put the items in bags and seal them before sterilization; and keep them intact after sterilization, away from moisture and light (ultra-violet rays) until use.
• Ensure the efficacy of biological indicator testing.
• Maintain devices according to manufacturer’s instructions.
• Ensure good ventilation. (Consult Appendix II: Ventilation of Dental Clinics, p. 53)
Steps to follow when sterilizing instruments

For handpieces, consult page 36.

*If instruments are cleaned immediately, go to Step 3.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Holding solution</td>
<td>Prevent organic debris from drying on instruments and in this way prevent contamination.</td>
</tr>
<tr>
<td>2. Rinsing</td>
<td>Instruments that have been soaked in a holding solution must be rinsed before cleaning.</td>
</tr>
</tbody>
</table>
| 3. Cleaning instruments | **Eliminate visible debris and organic matter.**
What has not been cleaned cannot be sterilized:
• Brush under water to minimize aerosols.
Or • Ultrasonic bath for 15 minutes (with a detergent or enzyme solution that attacks proteins). The solution must be changed at least once a day or more often depending on use.
Disinfectants must not be used for the ultrasonic bath.
Cover the ultrasonic bath so as to reduce aerosols.
Or • Washer/disinfector. |
| 4. Rinsing | Detergent residues alter sterilization and stain instruments. Avoid spatter during this operation. |
| 5. Check cleaning | Ensure that there is no debris or blood because there can be no sterilization if they are present. Check for broken instruments. |
| 6. Drying | Moisture compromises the efficacy of sterilization and promotes corrosion. Anti-corrosive soaking agents are optional. For sterilization, open hinged instruments. |
| 7. Packaging and bagging | • **Cassettes:** hospital-quality paper or cotton.
The cotton must be washed after each use to shrink the fibres and ensure the efficacy of this barrier.
Cassettes have the advantage of minimizing the risk of injury.
• Paper pouches (single-use, non-reusable), paper/plastic pouches or plastic/cloth bags.
Avoid overloading the packs.
To prevent perforation of the pack, ends can be covered with 2×2 strips
Never staple packs because perforations create openings for microorganisms. |
| 8. Identification | After the cycle, contents that are identified are more readily stored. |
Whenever possible, place the packs in a vertical position making sure that two plastic-coated sides do not touch. |
| 10. Sterilization | Respect the required cycle time and temperature. An interrupted cycle must be completely restarted. |
| 11. Drying and cooling | It is important not to handle the hot, moist packs.
Drying is important for the handpiece mechanisms.
In order to maintain the integrity of the packs, wait until they are dry and cold.
Wet packs are more fragile and may be perforated by handling, thus compromising sterility. |
| 12. Checking sterilization | Indicators: Physical (Type B sterilizer): Once a week.
Mechanical or chemical: every cycle.
Biological: **Once a month.**
Carried out by an external laboratory. The list of laboratories offering biological verification of sterilizers is in Appendix XI, p.78. |
| 13. Date | Ensure instrument rotation.
Allow for identifying the packs from cycles that failed (e.g., sterilizer breakdown). |
| 14. Storage and maintaining sterility | Under ideal conditions, wrapped instruments can remain sterile for 90 days.**
Essential conditions
• **Intact packs:** if wrapping is altered (perforated, torn, half open, seal not impervious), sterilization must be done over.
• **Storage:** dry place (shelf or drawer), clean, closed, away from aerosols, humidity, and light (ultraviolet rays), with light traffic and far from any source of contamination (namely, outside the work area). |
Steps to follow when sterilizing instruments

END OF TREATMENT

Rinse

Clean instruments

Rinse and check

Dry

Wrap or bag.
Identify. Load sterilizer.

Sterilization

Dry. Cool.
Check sterilization.
Date.

Store and maintain sterility

Everything that can be sterilized, must be sterilized.
Causes of sterilization failure

Main causes:

• poorly cleaned instruments;
• non-compliant wrap, overload, or poorly sealed;
• alteration of the integrity of the wrap attributable to incomplete drying or improper handling;
• non-compliance with recommended cycle;
• malfunctioning of the sterilizer;
• overloaded sterilizer; lack of space between items.

Loading the sterilizer

It is preferable to place the plastic side facing downwards to promote better drying.

Whenever possible, place the packs in a vertical position making sure that two plastic-coated sides do not touch. This facilitates the distribution of heat and steam or chemicals and promotes the evacuation of air and water condensation.

85% of sterilization failures are attributable to human error.
16. ASEPSIS FOR X-RAYS

### Before exposure

<table>
<thead>
<tr>
<th>Item</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment and surfaces (dental chair, headrest, armrest, lamps, countertops, x-ray devices and points, activating buttons, film dispensers, etc.)</td>
<td>Clean and disinfect. Cover with protective barriers everything that will be handled while taking the x-ray (devices, points, controls, etc.).</td>
</tr>
<tr>
<td>Gloves</td>
<td>Clean and disinfect after each use. A dental napkin placed on top ensures protection in the event of spatter.</td>
</tr>
<tr>
<td>Iron apron (with collar)</td>
<td>Ensure sterility or use disposable materials.</td>
</tr>
<tr>
<td>Film holder (Bite-block, XCP, Snap-A-Ray, etc.)</td>
<td>Take out only the number of films required. Place in a clear, disposable cup.</td>
</tr>
</tbody>
</table>

### After exposure

1. Place exposed X-ray films on resin-coated paper or in a disposable paper cup.
2. Remove gloves, wash hands, and put on clean gloves.
3. Development:

<table>
<thead>
<tr>
<th>Automatic developer</th>
<th>Regular films</th>
<th>Daylight loader</th>
<th>Films in protective envelopes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open the X-ray films without touching the emulsion.</td>
<td>Lift the cover.</td>
<td>Prepare the developer.</td>
<td>Tear the protective envelope.</td>
</tr>
<tr>
<td>Pour the emulsion into another disposable cup or onto clean paper.</td>
<td>Place the cup containing the films on the plastic film in the container.</td>
<td>Place the emulsions in the developer.</td>
<td>Drop the X-ray films into a clean disposable cup.</td>
</tr>
<tr>
<td>Remove gloves.</td>
<td>Close the cover.</td>
<td>Remove and discard gloves in the waste paper cup.</td>
<td>Remove gloves, wash and dry hands.</td>
</tr>
<tr>
<td>Wash and dry hands.</td>
<td>Open the X-ray films without touching emulsions and drop them onto the plastic film.</td>
<td>Develop the films.</td>
<td>Place the emulsions in the developer.</td>
</tr>
<tr>
<td>Place the emulsions in the developer.</td>
<td>Remove plastic coatings into the cup acting as a waste receptacle.</td>
<td>When the cycle is complete, lift the lid a second time.</td>
<td>Take out the developed X-rays.</td>
</tr>
<tr>
<td>Discard both cups.</td>
<td>Develop the films.</td>
<td>Remove the two cups and the plastic film being careful not to touch the waste.</td>
<td>Cover the bottom of the receptacle with a new plastic film.</td>
</tr>
</tbody>
</table>

4. Clean, disinfect, discard protective envelopes, and sterilize items listed the “Before exposure” section.

### Digital X-rays

The sensors of digital X-ray equipment come into contact with mucous membranes and must ideally be cleaned and heat sterilized. If they are not sterilizable, they must be adequately disinfected and covered with a new protective barrier for each patient. It is important to follow the manufacturer’s recommendations to know the appropriate disinfecting and sterilization process and to choose the right protective barrier.
17. ASEPSIS: HANDPIECES, AIR/WATER SYRINGES, AIR JET POLISHERS AND SCALERS

Single-use items must never be sterilized or re-used. They must be discarded.

High- and low-speed handpieces

• Must be cleaned and sterilized after each use.
• It is thus essential to have several available.
• If the handpiece was used with a dental bur, keep it attached to prevent the detergent from penetrating the mechanism. After rinsing, the bur will be removed and sterilized separately.
• Run for 30 seconds after each patient (3 minutes at the beginning and end of the day).
• Rinse the handpiece under running water for 20–30 seconds.
• Brush the entire handpiece with detergent. Never place in the ultrasonic bath.
• Rinse under water and dry thoroughly. Drying is very important for the mechanism.
• Remove the bur so as to sterilize it separately.
• Separate the handpiece from the waterline.
• Clean and disinfect the waterline and supports. Let them dry.
• Lubricate according to the manufacturer’s recommendations.
  All excess lubricant must be removed before sterilization.
• For sterilization, separate the parts of the handpiece, when detachable.
  The motor of low-speed handpieces in three parts need not be sterilized.
• Wrap the handpiece for sterilization.
Air/water syringes, air jet polishers and scalers

• Must be cleaned and sterilized after each use.
• It is thus essential to have several available.
• Flush water from the device for 30 seconds after each use (3 minutes at the beginning and end of the day).
• Rinse under water for 20–30 seconds.
• Brush using a detergent. Rinse and dry.
• Separate the device from the waterline.
  Clean and disinfect the waterline and supports. Let them dry.
• Separate the two parts (e.g., handle and tip).
• Separate the handle from the waterline. If the handle (of air/water syringes, air jet polishers, or scalers) is not sterilizable, it must be adequately disinfected and covered with a new protective barrier for each patient.
• Wrap for sterilization.
• Sterilize.

Everything that can be sterilized, must be sterilized.
18. ASEPSIS FOR THE NEW TECHNOLOGIES

Whatever touches the mucous membranes is considered to be semi-critical and must ideally be cleaned and heat sterilized for each patient.

Semi-critical items that cannot be heat sterilized must at least be covered with a protective barrier. Using a protective barrier does not however protect against all risks of contamination. After removing the protective barrier, the device must be cleaned and disinfected using a hospital-level (intermediate action) disinfectant after each patient.

Some equipment (e.g., central unit, monitor, printer, etc.) can be placed outside the operatory, away from exposure to contamination.

With regard to what remains in the room, the protective plastic barriers make it possible to see the equipment during patient treatment while reducing the risks of contamination. All surfaces that will be in contact with gloves or soiled instruments, or that can become soiled by aerosols or splatters must be disinfected and covered.

Examples of computer keyboard protection
• Disposable plastic cover to be thrown out after each patient (e.g., plastic sheet, self-adhesive plastic, protective barrier for headrest, etc.).

• Preformed, reusable plastic keyboard. This cover must be cleaned and disinfected after each patient.

Example of protection for the computer mouse
• Disposable, single-use plastic cover to be changed after each patient. (e.g., plastic sheet, self-adhesive plastic, protective barrier for headrest, etc.).

Questions to ask before any new technology purchase
• Can the device withstand heat sterilization?
• Can it be properly decontaminated?
• Can it be cleaned with soap and water or detergent?
• Does it have to be taken apart before cleaning?
• Will the protective barriers interfere with its functioning?
19. ASEPSIS IN THE LABORATORY

Important reminders
• Everything that is brought into the laboratory from an operatory must be:
  → sterilized, if sterilizable, or it must be adequately disinfected.
• Everything that is brought into the laboratory from an outside laboratory, even if the laboratory carried out disinfection, must be:
  → sterilized, if sterilizable, or it must be adequately disinfected.
• Everything that leaves the laboratory and is intended for oral procedures must be:
  → sterilized, if sterilizable, or it must be adequately disinfected.
• Everything that leaves the laboratory to go to an outside laboratory must be:
  → sterilized, if sterilizable, or it must be adequately disinfected.

General rules

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>STEPS TO FOLLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>BITE IMPRESSIONS AND WAXES</td>
<td>• Clean, rinse under running water, shake.</td>
</tr>
<tr>
<td></td>
<td>• Wet with disinfectant, place in a reclosable plastic bag, and allow to act for 2 minutes (depending on the disinfectant).</td>
</tr>
<tr>
<td></td>
<td>Exception: final alginate impression. These require special precautions; disinfectant can be applied on the model, after casting. Avoid spraying disinfectant.</td>
</tr>
<tr>
<td></td>
<td>• Rinse again and cast the impression.</td>
</tr>
<tr>
<td>OCCLUSAL BITE PLANES</td>
<td>• Respect the manufacturer’s recommendations: product, method, and duration.</td>
</tr>
<tr>
<td>PROTHESES AND APPLIANCES</td>
<td>• Clean, rinse under running water.</td>
</tr>
<tr>
<td></td>
<td>• Immerse in a tuberculocidal solution (avoid phenolics).</td>
</tr>
<tr>
<td></td>
<td>• Rinse again and dry.</td>
</tr>
<tr>
<td></td>
<td>Acrylic prostheses that have been disinfected can be kept in a bag or other container in a diluted mouthrinse solution.</td>
</tr>
<tr>
<td>PLASTER OR STONE MODELS</td>
<td>Wet with disinfectant until they are completely soaked. Avoid spraying disinfectant.</td>
</tr>
</tbody>
</table>

Disinfecting solutions: Always respect the time recommended by the manufacturer. Alcohol alone is not recommended.

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>Glutaraldehyde</th>
<th>Iodophor (1:213)</th>
<th>Bleach (1:10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impressions:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alginate (exception: final impression)</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Polysulphide</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Silicone</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Polyether</td>
<td>-</td>
<td>-</td>
<td>+*</td>
</tr>
<tr>
<td>Hydrocolloid</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Protheses:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed (metal/porcelain)</td>
<td>+</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Removable (acrylic/porcelain)</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Removable (metal/acrylic)</td>
<td>-</td>
<td>+#</td>
<td>#</td>
</tr>
<tr>
<td>All metal</td>
<td>+</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

Legend: + Recommended method
- Method not recommended
? Insufficient data
* Use with caution and consult the manufacturer’s recommendations
# Minimal immersion time (10 minutes)
Disinfection and sterilization of polishing agents and various materials

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>ACTIONS</th>
<th>Clean and disinfect</th>
<th>Sterilize</th>
<th>Discard</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTICULATORS</td>
<td></td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BURS: carbon steel steel tungsten carbide</td>
<td></td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>IMPRESSION TRAYS: aluminium chrome (plated) acrylic resin plastic</td>
<td></td>
<td>√</td>
<td>√ cold</td>
<td>√</td>
</tr>
<tr>
<td>ORTHODONTIC MATERIALS: arches, wires, brackets</td>
<td></td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POLISHING AGENTS: garnet paper rubber cups</td>
<td></td>
<td></td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>POLISHING TIPS, WHEELS, DISKS, AND BRUSHES: garnet rubber tips/wheel felt or fibre flocked wheels brushes</td>
<td></td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STONES: diamond abrasive (polishing)</td>
<td></td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPATULAS, BOWLS, SCISSORS, BITE WAX</td>
<td></td>
<td></td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>COLOUR GUIDE</td>
<td></td>
<td>√</td>
<td>√ cold</td>
<td></td>
</tr>
</tbody>
</table>

**Pumice stone:**
- Mix with one of the following disinfecting solutions:
  - bleach (1:10);
  - iodophor;
  - quaternary ammonium;
  - chlorhexidine.
- Prepare a new mixture for each patient.
20. ASEPSIS IN PUBLIC DENTAL HEALTH

In public dental health, activities such as screening, individual follow-up, and the application of sealing agents are carried out in a specific context. The asepsis protocol must thus be adapted based on this practice.

Comment: while the risks may seem low, one must consider that the potential risk of contamination is increased by the large number of children seen in one day.

Description of activities

Screening: individual meeting of approximately one to two minutes with students to check their obvious treatment needs or to classify them depending on their vulnerability to carries. Several classes can be seen on the same day.

Individual follow-up and application of sealing agents: individual meeting lasting approximately 30 minutes, comparable to a preventive visit to a dental clinic (screening and oral hygiene, topical application of fluoride, etc.).

Principle of anticipated contact

Dental care activities in the school environment impose significant constraints in terms of the principles underlying the prevention of cross-contamination. While the basic rules of disinfection and sterilization must always prevail, a certain number of arrangements are possible so as not to interfere with professional action, which must remain the central element. These arrangements must ensure the flexibility required for all dental care workers to accomplish their work without compromising the overall safety in the care area.

Infectious risk management procedures that must be followed during clinical activities are subject to the principle of the healthcare workers’ anticipated contact with mucous membranes, saliva, or blood, with blood representing the highest level of risk factor (Level I).

| Level of anticipated contact between the dental care worker and the patient in the community and school context |
|---|---|---|---|
| Anticipated contact with |
| Level of risk | Mucous membranes | Blood or blood-tinged saliva | Examples |
| I | YES | YES | Periodontal probe Brushing +\-
| II | YES | NO | Dental explorer and mirror Fluoride application |
| III | NO | NO | Visual inspection with tongue depressor |

Recommendation

To ensure that your infection control methods protect your patients, refer to Appendix VIII (p. 60), the scientific article Infection control applied to dentistry in a school environment.
21. FIRST-AID AFTER OCCUPATIONAL EXPOSURE

Occupational exposure
Contact with blood or any other biological fluid carrying risk for the healthcare worker of contracting a transmittable disease. During the dental procedure, saliva is considered to be contaminated by the blood.

Responsible management of occupational exposure is crucial for healthcare workers. While the risk of contracting HIV is low, the relative risks of contracting hepatitis B and C are higher. Assessment of the follow-up in the event of exposure depends on the degree of severity of the wound and on the type of exposure (percutaneous, mucous membranes, healthy skin, damaged skin).

Prevention
Regardless of the patient being treated, dental care professionals must always take the following precautions so as to avoid injury:
1. Use personal protection and wear utility gloves to clean instruments and the work area after patient treatment.
2. Never cap needles with both hands. Use the one-hand technique or protective shields.
3. Do not try to catch an instrument you drop: let it fall.
4. Carefully carry instruments between the treatment area and the sterilization area.
5. Handle pointed instruments and sharps (needles, burs, etc.) with caution and dispose of them in the designated containers.
6. Use cassettes for instruments: they have the advantage of minimizing the risk of injury.
7. Verify seroconversion.

The sheet Procedures to follow in the event of occupational exposure must be posted in plain sight in every operatory.

It is strongly recommended that the clinic have at least one eye wash fountain.

Blood-Borne Infection Risk Assessment Unit
Like other healthcare professionals, dentists and dental hygienists carrying a blood-borne infection and who are performing procedures involving a risk of transmitting the infection can undergo a confidential assessment for the risk of transmission provided by the Institut national de santé publique (INSPQ). As required, a committee of experts can make recommendations to the professional orders concerned on the risk of infecting their patients.

Every professional has an ethical obligation to protect his or her patients. Professionals who know they are carrying a blood-borne infection must undergo the transmission risk assessment provided by the Unit. The Blood-Borne Infection Risk Unit has provided this service to the professionals involved since January 2005 and to students since 2006.

To take advantage of this free and confidential service, call 1-866-680-1856.

Every professional must refrain from practising his profession or performing certain professional acts to the extent that his state of health is an obstacle thereto. (Professional Code R.S.Q., C.c-26, section 54)

First-aid protocol in the event of accidental contamination

Any accidental contamination with blood or organic fluid potentially infected with hepatitis B or C (HBV/C) or with the human immunodeficiency virus (HIV) requires quick, appropriate intervention by the healthcare worker, even if he or she was previously vaccinated against hepatitis B. It should be stressed that in this respect some people do not respond to the vaccination.

Every dental clinic must in advance establish a procedure to follow and enter into an agreement with a health service, whether a clinic or other organization, to provide support in the event of accidents or emergencies.

Biological materials
Risky biological materials consist of blood, semen, vaginal secretions, or any other body fluid visibly contaminated with blood. Saliva is considered to be contaminated by blood during dental procedures and dental surgery. Until now, only blood, fluids visibly contaminated with blood, and fluids in research laboratories containing virus concentrates were found to be involved in the occupational transmission of HIV. Moreover, in the absence of visible blood in saliva, exposure to the saliva of a person living with HIV-AIDS is not considered to be a risk for transmission of HIV. The same holds true for tears, sweat, urine, and feces. On the other hand, maternal milk from women living with HIV-AIDS is involved in the transmission of HIV to newborns. HIV can thus be transmitted during breastfeeding by women living with HIV-AIDS. However, skin contact with this milk does not represent a risk for HIV transmission. With regard to hepatitis C, only transmission through infected blood is possible; and for hepatitis B, in addition to blood, saliva is a risk factor if the person has been bitten by an infected person.

Medical consultation
If there is a risk of transmission of a blood-borne infection, it is essential to seek a medical consultation as quickly as possible to determine the need for post-exposure chemoprophylaxis. In fact, antiretroviral drugs must be taken in the first few hours following exposure.

During the medical consultation, the risk of exposure will be assessed based on the type of biological materials involved, the means of exposure, and the severity of exposure. The person exposed to the risk will also be examined as well as the source person, if possible.
Source person

All efforts to obtain information from the source person must be made in the strictest confidentiality, without pressure or prejudice.

If possible, the source person will be assessed to determine whether he or she is infected with HIV, HBV, HCV, or any other active infection (malaria, syphilis, etc.). To do so, screening tests must be conducted with the individual’s authorization. Also being assessed will be the person’s medical history and clinical symptoms that may be associated with a transmittable infection and the main risk factors\(^1\) for the following pathogens:

- HIV (e.g., injection drug use, unprotected sex with multiple homosexual or heterosexual partners, or with an HIV-infected partner, or a partner at high risk of being HIV infected, the fact of having received blood or blood products before 1985, coming from a region with a high endemcity for HIV infection);
- HBV (e.g., injection drug use, unprotected sex with multiple homosexual or heterosexual partners, or with an HBV-infected partner, or a partner at high risk of being HBV infected, close family contact with the HBV-infected person, the fact of having received blood or blood products before 1970, coming from a region with a high endemcity for hepatitis B);
- HCV (e.g., injection drug use, the fact of having received blood or blood products before 1990, the fact of having undergone hemodialysis, coming from a region with a high endemcity for hepatitis C);

If the person is HIV-negative, it is generally not necessary to take any further action. On the other hand, if the exposed person tests HIV-positive, the stage of the infection should be identified and post-exposure chemoprophylaxis begun as quickly as possible. If it is uncertain whether or not the source person is HIV-infected, it is recommended to consult a physician to receive the necessary follow-up.

If the source person is HBV-negative, it is generally not necessary to take any further action. However, if the source person is HBV-positive or if there is any doubt, even if the exposed person has been vaccinated, it is recommended to consult a physician for blood testing for HBV and HBV antibodies and to receive the necessary follow-up.

If the source person is HCV-negative, it is generally not necessary to take any further action. However, if the source person is HCV-positive or if there is any doubt, it is recommended to consult a physician to determine the serum levels of hepatic enzymes and HCV antibodies and to receive the necessary follow-up. It should be noted that to date there exists no prophylaxis to prevent the transmission of HCV.

Exposed person

The exposed person must undergo screening for the pathogen or pathogens involved in order to determine his or her serological status at the time of exposure. In the event that the source person represents a risk for HIV transmission, the exposed person begins chemoprophylaxis and is periodically tested during follow-up (e.g., three or six months after exposure).

It should be noted that dental care workers who, in their work, are likely to be in contact with blood should be vaccinated for HBV. Testing for HBV antibodies must be within four to eight weeks after the third dose of the vaccine in order to establish response to the vaccine.

Exposure report

Fill out the Exposure report. This information is essential for good management of exposure follow-up.

See Appendix IX:

p. 67: Protocol to Follow after Exposure to a Biological Material;
pp. 69-70: Dental Clinic Accident Report Following Accidental Exposure to Blood or other Biological Fluids.

\(^1\) The order in which these risk factors is described is not indicative of their relative importance.
22. SPECIFIC INFECTIONS

SARS (severe acute respiratory syndrome) or influenza pandemic

Federal, provincial, and local authorities will issue the appropriate and timely advisories.

The Canadian Pandemic Influenza Plan and the Quebec Pandemic Influenza Plan—Health Mission are appropriate guides for consultation.

Prions
Prions are composed primarily of proteins and have neither DNA nor RNA. They have a distinct structure and a different mode of transmission. They are the infectious agents responsible for spongiform encephalopathies (e.g., Creutzfeldt-Jakob disease (CJD), mad cow disease, etc.). Neither viruses nor bacteria, prions are resistant to our usual methods of sterilization. Prions require special precautions in hospital settings.

See Appendix X (p. 71):
Transmission et résistance des prions : la pratique de la médecine dentaire en sera-t-elle affectée?
23. BIOMEDICAL WASTE

Standard precautions must be taken when handling biomedical waste. Take adequate personal protective measures (utility gloves, mask, protective eyewear, and lab coat).

<table>
<thead>
<tr>
<th>Categories</th>
<th>Examples</th>
<th>Container</th>
<th>Disposal</th>
</tr>
</thead>
</table>
| A Sharps waste              | Needles, scalp blades, and sharp objects: glass, slides, matrix products, wires, and metallic ligatures, etc. | Hermetic and rigid container identified as such. | • Incineration on site.  
or • Sanitary landfill, if rendered non-infectious (sterilized) and record to be kept.  
or • Contract with a company specialized in disposal. |
| B Non-anatomical and solid waste | • Personal protective equipment: disposable lab coat, masks, gloves.  
 • Plastic protective envelopes and paper covers.  
 • Single-use materials: plastic and paper sterilization bags, 2x2 strips, cotton rolls, saliva ejectors, fluoride trays, cups, wipes, etc. | Impermeable plastic bag, resistant, hermetically sealed. | Ordinary waste. |
| C Infectious* biological waste | Disposable items heavily contaminated and saturated with blood (for example, soiled 2x2 strips, etc.) | For small quantities: use the container in A above.  
For significant quantities, use a double yellow bag. | • Incineration on site.  
or • Sanitary landfill, if rendered non-infectious (sterilized) and record to be kept.  
or • Contract with a company specialized in disposal. |
| D Non-anatomical and fluid waste | Blood and aspirated fluids. | All containers holding blood or saliva (aspirated fluids) can be emptied without danger into a utility sink, a drain, or a toilet connected to a sewage system or septic tank. | |

*Infectious waste: contaminated biomedical waste that can cause infectious diseases.
24. CHECKING THE EFFICACY OF AN ULTRASONIC BATH

• Suspend a sheet of aluminum into the bath and start the device.
• Check every 3–5 minutes.

Results: symmetrical perforations indicate a uniform distribution of the ultrasound waves. After 15 minutes, the sheet will be almost entirely destroyed.

Suggested frequency: once a month.
25. FREQUENTLY ASKED QUESTIONS

Do you have questions related to infection control?

The FAQs published on the Web sites of the Ordre des dentistes du Québec and of the Ordre des hygiénistes dentaires du Québec allow you to submit your questions to Dr Jean Barbeau, PhD. Dr Barbeau’s answers will subsequently be posted on the sites of the two orders in the section reserved for members so that you and your colleagues have access to this useful information.
26. LEXICON

Antimicrobial agent: product that destroys microorganisms or suppresses their growth.

Antiseptic: chemical product that inhibits the growth of microorganisms on living tissues and that can also destroy these microorganisms.

Bacterial spore: dormant form of resistance of a bacterium, being able to return to a vegetative form when conditions again become favourable. The thermostolerance of the spore is in part due to its dehydration.

Bactericide: antimicrobial agent able to destroy bacteria but not necessarily bacterial spores or mycobacteria.

Biofilm: process of irreversible adhesion triggered by fixation of bacteria to a surface by means of exopolysaccharide fibres (glycocalyx). Development of adherent colonies leads ultimately to the production of a continuous biofilm on the colonized surface. Biofilm bacteria generally have greater resistance to antibiotics and to biocides than have cells in discontinuous cultures.

CJD: Creutzfeldt–Jakob disease (further information on page 45 and in Appendix 10, page 71).

Cleaning: mechanical action that removes visible debris and organic matter (blood, saliva, debris) that could interfere with disinfection and sterilization. Reduces the number of microorganisms but does not eliminate all of them.

Critical infection: penetrates soft or hard tissues (membranes, bones, and teeth). Affects soft tissues that have lost their integrity.

Detergent: product that helps to eliminate dirt adhering to a surface by suspending or dissolving it in a solution.

Disinfection: destruction of some microorganisms, but not bacterial spores, by direct application of chemical or physical processes. The degree of disinfection depends on the product used. A disinfectant is used for inanimate objects (inert surfaces) while antiseptics are used on living tissue.

Enzymatic cleaner: solution that helps to dissolve proteins on devices and instruments when water and detergent are not sufficiently effective.

Germicide: synonym for “disinfectant.”

Infectious waste: contaminated biomedical waste that can cause infectious diseases.

MRSA (Methicillin-resistant Staphylococcus aureus): staphylococcus A (Staphylococcus aureus) occurs naturally on the skin or in the nostrils in about 30% of the population. This bacterium generally does not cause infection in individuals who are in good health, but it can sometimes cause a skin infection (for example, cellulitis, furuncle, abscess) or a wound. More rarely, staph A causes a more serious infection (for example, pneumonia, a blood infection, or infection of a surgical wound).

Having developed a resistance to several antibiotics including methicillin, MRSA causes the same types of infection as staphylococcus but limits the choice of antibiotic treatment. There are considered to be two types of MRSA: one that is contracted in a healthcare environment (for example, in a hospital) and one that is contracted in the community by an individual having had no contact with a healthcare environment in the preceding year.

Mycobactericidal: synonym for “tuberculocidal”

Non-critical infection: does not affect the mucous membranes but risks contamination by blood or saliva droplets, by the soiled hands of healthcare workers or by soiled instruments.

Nosocomial infection: describes an infection transmitted in a healthcare institution.

SARS: severe acute respiratory syndrome (also known as atypical pneumonia). Respiratory disease that appeared in late 2002. A coronavirus is thought to be involved, possibly transmitted, among other modes, by direct contact and by means of respiratory particulates.

Semi-critical infection: makes contact with mucous membranes and teeth but without penetration.

Seroconversion: appearance of antibodies in the blood in response to vaccination.

Sterilization: operation that eliminates all forms of microbial life, including viruses and thermostaprobable bacterial spores. Sterility is an absolute concept—either an instrument is sterile or it is not. The only way to ensure sterility is to have a sterilizer checked regularly with biological indicators.

Tuberculocidal: antimicrobial agent able to destroy mycobacteria.

Virucidal: antimicrobial agent able to destroy viruses.
27. ELECTRONIC REFERENCES

Public Health Agency of Canada: www.phac-aspc.gc.ca/index-eng.php

American Dental Association: www.ada.org/prof

American Heart Association: americanheart.org

Canadian Dental Association: www.cda-adc.ca


CSST/SIMDUT: Système d’information sur les matières dangereuses utilisées au travail/Service du répertoire toxicologique: www.reptox.csst.qc.ca

Institut national de santé publique du Québec: www.inspq.qc.ca

Ministère de la Santé et des Services sociaux du Québec: www.msss.gouv.qc.ca

National Center for Chronic Disease Prevention and Health Promotion (CDC) Oral Health Resources: www.cdc.gov/oralhealth

Occupational Safety and Health Administration (OSHA): www.osha.gov

Ordre des dentistes du Québec: www.odq.qc.ca

Ordre des hygiénistes dentaires du Québec: www.ohdq.com


Health Canada: www.hc-sc.gc.ca, notably offering the Drug Product Database (BDP) and the Medical Devices Active Licence Listing (MDALL).

Université de Montréal: www.medent.umontreal.ca

Université Laval: www.fmd.ulaval.ca

McGill University: www.mcgill.ca/dentistry
28. SCIENTIFIC REFERENCES


Direction des communications, La qualité de l’air intérieur dans les établissements du réseau de la santé et des services sociaux, 2005.


Direction générale de la santé publique, Immunisation des travailleurs de la santé, des stagiaires et de leurs professeurs - Recommandations, November 2005.

Accidental exposure to blood or other body fluids potentially contaminated by the hepatitis B virus, the hepatitis C virus, or the AIDS virus—Information for exposed persons.

Ministry of Health and Long-Term Care/Public Health Division/Provincial Infectious Diseases. Best Practices For Cleaning, Disinfection and Sterilization In All Health Care Settings, Ontario, 2006.


L’asepsie, JODQ, February/March, 2009.

Le contrôle de l’infection appliqué à la dentisterie en milieu scolaire, JODQ, January, 2008.


Protocolle de premiers soins lors d’une contamination accidentelle, 2000.


Guide de prévention des infections pour les travailleurs de la santé dans les établissements de soins et autres établissements, Syndrome respiratoire aigu sévère, 2003

Preventing the Transmission of Bloodborne Pathogens in Health Care and Public Services Settings, 1997.


Université de Montréal, Prévention de la contamination professionnelle au VIH en milieu dentaire, 2003.


29. APPENDICES

APPENDIX 1

Contaminated Water Management Protocol

Boil-water advisory
If the municipality where you work has issued an advisory to boil water before drinking it, here are the best practices according to specialists on the issue:

DURING THE FULL DURATION OF THE ADVISORY
1. For any gum or bone-related surgery, including root canals, it is essential to use sterile water or a sterile saline solution with all devices.
2. For fillings or other dental procedures such as polishing, choose from the following options:
   a. use bottled, boiled, distilled, or sterile water with a bulb or syringe;
   b. if the device has a reservoir, it is enough to fill it with bottled, boiled, or sterile water; nevertheless, you must flush out the whole system with this water before using the apparatus.
3. For mouth rinsing, it is necessary to use boiled, bottled, or distilled water.
4. Hand washing must be done with safe and clean water (bottled or boiled) or by using antibacterial foams or gels.

These measures must be continued until the boil-water advisory is lifted.

WHEN THE ADVISORY IS LIFTED
1. If the dental unit is not equipped with a sterile water reservoir, all waterlines must be fully opened and flushed for at least 30 minutes in order to purge the system of the contaminated water.
2. Once the waterlines have been flushed, they should be disinfected according to the manufacturer’s instructions, if the unit is equipped with an integrated disinfection system.

N.B.: It is important to follow these procedures even if the clinic is closed throughout the advisory (for example, the dentist is on vacation during this period).

Drinking water avoidance advisory
Water from the public water system must not be used, even if it has been boiled.
APPENDIX II

Ventilation of Dental Clinics

The current ventilation standard for areas in dental care facilities is issued by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), an organization with an international reputation.

This standard requires:

For clinics using an anaesthetic gas such as nitrous oxide: a minimum of 12 air changes per hour, of which 3 consist of fresh outdoor air.

For clinics not using nitrous oxide: a minimum of 6 air changes per hour, of which 2 consist of fresh outdoor air.

For an environment contaminated by bioaerosols: all air exhausted directly to the outdoors. Thus, a fraction of the recycled air can come from the rest of the building but not from the dental clinic.

For clinics using an anaesthetic gas such as nitrous oxide as well as for optimum control of bioaerosols:

- The air must enter the room from the ceiling;
- The airflow must be directed towards the floor;
- The exhaust vent at the base of the wall at the other end of the room must be located nearest to the patient’s head.

APPENDIX III

Resistance of Microorganisms (and Prions) and Methods of Elimination

<table>
<thead>
<tr>
<th>Least susceptible to disinfectants</th>
<th>Most resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRIONS</strong></td>
<td><strong>Decontamination</strong> specific to prions</td>
</tr>
<tr>
<td>BACTERIA WITH SPORES (Bacillus subtilis, Clostridium tetani, C. difficile, C. botulinum)</td>
<td></td>
</tr>
<tr>
<td>PROTOZOA WITH CYSTS (Giardia lamblia, Cryptosporidium parvum)</td>
<td></td>
</tr>
<tr>
<td>MYCOBACTERIA (Mycobacterium tuberculosis, M. avium intracellulare, M. chelonae)</td>
<td></td>
</tr>
<tr>
<td>NON-ENVELOPED VIRUSES (Coxsackie viruses, polioviruses, rhinoviruses, rotaviruses, Norwalk virus, hepatitis A virus)</td>
<td></td>
</tr>
<tr>
<td>FUNGI (Candida species, Cryptococcus species, Aspergillus species, Dermatophytes)</td>
<td></td>
</tr>
<tr>
<td>VEGETATIVE BACTERIA (Staphylococcus aureus, Salmonella typhi, Pseudomonas aeruginosa, coliforms)</td>
<td></td>
</tr>
<tr>
<td>ENVELOPED VIRUSES (Herpes simplex virus, varicella-zoster virus, cytomegalovirus, Epstein-Barr virus, measles virus, mumps virus, rubella virus, influenza virus, respiratory syncytial virus, hepatitis B and C viruses, hantaviruses, and human immunodeficiency virus.)</td>
<td></td>
</tr>
<tr>
<td><strong>Sterilization</strong></td>
<td></td>
</tr>
<tr>
<td>High level disinfection</td>
<td></td>
</tr>
<tr>
<td>Intermediate level disinfection</td>
<td></td>
</tr>
<tr>
<td>Low level disinfection</td>
<td></td>
</tr>
</tbody>
</table>

With regard to prions, see Appendix X (p. 71):

*Transmission et résistance des prions : la pratique de la médecine dentaire en sera-t-elle affectée?*
## APPENDIX IV

**Survival of Germs on Inert Surfaces**

<table>
<thead>
<tr>
<th>Microorganisms</th>
<th>Survival on a surface</th>
<th>Incubation period*</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>1 hour to 7 days</td>
<td>From 6 months to more than 7 years</td>
</tr>
<tr>
<td>HBV</td>
<td>Up to 3 months</td>
<td>24–180 days (average: 60–90 days)</td>
</tr>
<tr>
<td>HAV</td>
<td>2 months</td>
<td>10–50 days, depending on dosage (average: 28–30 days)</td>
</tr>
<tr>
<td>MRSA</td>
<td>7 months</td>
<td>Variable and indeterminate: around 4–10 days</td>
</tr>
<tr>
<td>SARS</td>
<td>48 hours</td>
<td>Up to 10 days after contact</td>
</tr>
<tr>
<td>Influenza</td>
<td>24–48 hours</td>
<td>3 days on average</td>
</tr>
<tr>
<td><em>Clostridium difficile</em></td>
<td>5 months</td>
<td>Unknown</td>
</tr>
<tr>
<td><em>Mycobacterium tuberculosis</em></td>
<td>4 months</td>
<td>4–12 weeks</td>
</tr>
</tbody>
</table>

*Source of data: Public Health Agency of Canada, 2008*
APPENDIX V

Spaulding’s Classification as Applied to Dentistry

<table>
<thead>
<tr>
<th>Instruments, devices, equipment, and surfaces</th>
<th>Classification</th>
<th>Definition</th>
<th>Procedure</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handpieces (high and low speed), scaler tips and sleeves, detection instruments (decay or calculus) mirrors, dental explorers, probes, curets, dental burs, periodontal instruments, surgical instruments, orthodontic instruments, endodontic instruments, operative dentistry instruments, clamps, dental impression trays, etc.</td>
<td>Critical</td>
<td>Penetrates soft or hard tissue (membranes, bone, and teeth). Touches soft tissue that has lost its integrity.</td>
<td>Sterilization Preceded by cleaning or use disposable materials</td>
<td>Operation that eliminates all forms of microbial life, including viruses and thermoresistant spores.</td>
</tr>
<tr>
<td>Tips and sleeves of air polishers, air/water syringes and tips, intermediate suction adapter, rapid suction nozzle (metal), syringes, tweezers, etc.</td>
<td>Semi-critical</td>
<td>Touches mucous membranes and teeth but without penetration.</td>
<td>Sterilization</td>
<td>Operation that eliminates all forms of microbial life, including viruses and thermoresistant spores.</td>
</tr>
<tr>
<td>Polymerization lamp, intraoral camera, trays, supports (suctions, handpieces, air/water syringe, etc.), surfaces (work setting, x-ray room, laboratory, etc.), lamp handles, drawer handles, x-ray cones and heads, dental chair, chair, controls, stool, metal/wood spatula, mixing bowl, pencils, etc.</td>
<td>Non critical</td>
<td>Does not touch mucous membranes but risks contamination by: 1. blood droplets 2. saliva droplets 3. operators’ contaminated hands 4. soiled instruments</td>
<td>Disinfection</td>
<td>Germicide that destroys all pathogenic microbial agents except bacterial endospores, when used according to instructions.</td>
</tr>
</tbody>
</table>

*Non-sterilizable air/water syringes must be covered with protective barriers.*
APPENDIX VI

Supplementary Information Concerning Disinfectants

Drug Product Database (DPD) of Health Canada
This database, which is administered by Health Canada in its role as regulator of therapeutic products, comprises human pharmaceutical and biological drugs, veterinary drugs, and disinfectant products.

To search the DPD for information about a disinfectant
• On the Health Canada home page (www.hc-sc.gc.ca), click the image for the Drug Product Database:
• Then click **Drug Product Database Online Query**.
• The search can then be made based on a single criterion such as the DIN, the company, the product name, or the active ingredient.

**Example**

**Product name: Burnishine**

![Drug Product Search](image)

**Information provided:**

- Company;
- Class (e.g., disinfectant);
- Dosage form (e.g., liquid);
- DIN: drug identification number given by Health Canada to each product authorized for use in Canada;
- Active ingredient group (AIG) number for all the product’s active medical ingredients;
- Product name;
- Ingredients and concentration (%);
- Similar products.
APPENDIX VII

Licensed Medical Devices in Canada

The term “medical devices” as defined by the Food and Drugs Act applies to a wide range of medical instruments used in the treatment, mitigation, diagnosis, or prevention of a disease or physical condition. Health Canada reviews medical devices to assess their safety, effectiveness, and quality before being authorized for sale in Canada.

The list of licensed medical devices notably includes instruments, equipment, and supplies (for example, gloves, masks, etc.).

To search the Medical Devices Active Licence Listing (MDALL):
• Go to the home page of Health Canada (www.hc-sc.gc.ca) and select Drugs & Health Products from the left sidebar.
• Select after Medical Devices, and then Licences.
• Then click Medical Devices Active Licence Listing (MDALL), then MDALL online query and finally Active Licence Search.
Scientific article

Jean Barbeau

Infection control applied to dentistry in a school environment

» Résumé

» Summary
Dental care activities in a teaching environment impose significant constraints with regards to applying the principles of prevention of cross-contamination. As much as the basic rules of disinfection and sterilization must always prevail, a number of work-place design modifications are possible in order not to interfere with the professional act that must remain the primary focus. These design plans must assure the necessary flexibility so that all the individuals involved may accomplish their duties, without compromising on the global security of the area of where the care is given. In this article, we will review the basic principles of infection control and their application in a teaching environment. May personal protection (gloves, masks, glasses) be optional on occasion? Using hydro alcoholic gels or hand-washing? How to treat instruments in terms of moving them? Should the instruments be soaked? In which solution and for how long? How to react in cases of different epidemics? These are but a few of the questions that will be addressed.
Scientific article

Introduction

There have been very few publications dealing with the principles of infection control during screening or hygiene activities in school environments. In fact, I have been able to find only one general article on the subject, published in the Journal of the American Dental Association. I have thus based this article in part on the Summers article as well as on a sampling of relevant publications supporting the guidelines presented here. It should be noted that these guidelines are intended to simplify tasks rather than to make them more complex. During my clinical observations, I noted that some procedures were routinely applied despite the fact that their relevance might well be subject to legitimate questioning. Thus, it is up to each individual involved to decide if these recommendations apply to his or her way of working. Recommendations made here are tools to be used and not absolute obligations, at least unless advised to the contrary.

The concept of anticipated contact

The excellent article by Chester J. Summers reminds us that procedures to be followed during clinical activities for managing infection risks are subject to the principle of anticipated contact of care providers with mucous membranes, saliva, or blood, with blood representing the highest risk factor (Level I). I myself follow this principle, which is repeated by other specialized publications. The table below sums up the key points. Keep this simple table in mind; it acts as a guide for decisions regarding the question of gloves, masks, uniform, hand asepsis, disinfection, and sterilization.

<table>
<thead>
<tr>
<th>Level of anticipated contact between the dental care worker and the patient in the community and school context</th>
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<tbody>
<tr>
<td>Anticipated contact with</td>
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<tr>
<td>Level of risk</td>
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<tr>
<td>I</td>
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<td>II</td>
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<tr>
<td>III</td>
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</tbody>
</table>

Infection control applied …

Assume this proposition: If operators maintain adequate hygiene conditions, screening and prevention activities should present little or no risk of exposure to blood-borne infections. That is the crux of it. Do not forget that universal or standard precautions have been specifically conceived for the purpose of managing blood-borne infections.

Masks

The mask’s primary usefulness is to protect the operator against aerosols and to protect patients against the germs of the care provider during invasive procedures or if the procedures cause bleeding (Level I). In the vast majority of cases, the operator will not face Level II or Level III situations. Masks are thus optional. However, there are special cases: 1) The presence of cold sores in the operator (herpes simplex), regardless of stage, is reason to wear a mask. 2) In the case of epidemics involving airborne pathogens (influenza, SARS), a mask is recommended: however, the surgical mask would suffice, the N95 mask being unnecessary in this situation.

Remember that the N95 respirator was designed to protect workers against aerosols (particulates or microbial). Its filtration capacity is superior by far to the surgical mask. Its utilization is justified in situations involving the use of an ultrasonic scaler, high-speed drill, or air/water syringe. For other clinical procedures, the surgical mask is fully adequate.
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A mask is not required when screening with a mirror and an explorer, or a tongue depressor. Of course you can choose to wear a mask and no one will question it, but the mask is optional in this situation.

Think about it—a mask is a filter. As such, it concentrates particles on its surface, which will soon be heavily contaminated by bacteria (and probably by viruses). Considering that you must now avoid touching the mask with your gloves, the fact of wearing it will inevitably be on your mind during clinical actions: Have I touched it or have I not? Should I change it? How often? If you choose not to wear a mask when not required, 1) you won’t have to keep questioning yourself; 2) you will have eliminated a surface heavily loaded with germs; and 3) you will have done your part in reducing the amount of non-recyclable waste. In other words, a mask represents a problem out of all proportion to its actual usefulness. On the other hand, I remind you that this arrangement with regard to wearing a mask in no way exempts you from wearing the mask in the dental clinic.

Infection control applied…

2) you reduce the frequency of hand washing (normally, before putting on the gloves and after taking them off);
3) you again reduce the amount of non-recyclable waste. However, if you do decide to wear masks, you still have to change them between each patient.

For similar reasons, when entering information in the patient’s file, you do not have to ask if the pencil should be disinfected. If you have not had contact with mucous membranes or saliva, the pencil does not have to be disinfected, and the file will not be contaminated.

What must you do when you have come in contact with mucous membranes or saliva while not wearing gloves? (You did not anticipate this contact.) Wash your hands with ordinary soap or antibacterial soap or with a hydroalcoholic gel or foam.

Gloves

- Wearing gloves is optional when there is no anticipated contact with blood, saliva, or mucous membranes.
- If gloves are being worn, they must be changed between each patient.
- Wear gloves only for intraoral procedures; you do not have to wear them when handling toothbrush or dentition models, or when demonstrating brushing techniques.
- If there has been no contact with mucous membranes, saliva or the contact surfaces of instruments, files and pencils can be handled without risk.
- Latex, vinyl, or nitrile gloves are sufficient: after all, you are not performing invasive procedures.

Gloves

Table I also informs us about when gloves are required. Is there probability of hand contact with mucosa? With saliva? With blood? If not, then gloves are optional, and hand washing or the use hydroalcoholic gels or foams is sufficient. It bears repeating that this advice does not promote laxism nor does it encourage you to expose yourself or your patients to any kind of risk. The CDC thus notes that gloves must be worn if there is probability of contact with blood, saliva, or mucosa. The advantages implied by this suggestion are not insignificant: 1) You reduce your exposure to latex and to irritants;
You must wash your hands (soap and water) at the beginning of the day, before leaving for lunch, and before leaving at the end of the day. For daily clinical activities, you can follow the protocol below.

In the majority of cases, your hands do not come into contact with highly contaminated surfaces. What I suggest is the use of hydroalcoholic gels or foams, which have often proven their effectiveness. For maximum benefits, choose products that are more than 60% alcohol and that contain softeners and emollients (for example, aloe). For maximum effectiveness, use enough of the product to enable a scrub of at least 30 seconds. Given that emollients accumulate on the skin over use, it is recommended to wash hands with soap and water from time to time (for example, after 10–15 uses of the rub).

As well, use hand creams and lotions, for example, for lunch, during health breaks, and after work. Dermatologists agree in saying that this practice, by conserving epidermal health, provides good protection against infections.

**Disinfection of surfaces**

Will your work surfaces become contaminated by saliva or blood? If not, a low-level disinfection is fully acceptable. A tuberculocidal disinfectant is not an absolute requirement. However, I suggest all the same that you choose tuberculocidal disinfectant for three reasons: 1) the new tuberculocidal disinfectants are very safe and act rapidly; 2) you will have an intermediate-level disinfectant at hand in case you need one (surfaces visibly soiled); and 3) it is easier to control the contact time (determining the level of disinfection needed) than to have to buy two different types of disinfectants. Avoid phenolics (o-phenylphenol) that are absorbed by the skin, especially in children.

The area most likely to be contaminated is the sink where you wash your hands or where children brush their teeth. Therefore you should emphasize this area for disinfection. The dental chair as well must be disinfected, with special attention to the headrest and arm supports: Contact time is not critical unless the surface is visibly soiled. Impregnated wipes are quite practical: use both sides of the wipe so as to completely moisten the surface to be disinfected.

**Handling instrumentation**

All reusable instruments that come into contact with oral tissue must be sterile. Clinical rules apply for their sterilization. Given that you probably have to carry the instruments to the sterilization area, you must be careful not to let them dry in the meantime. Here is one of the several ways to proceed:

Place the used instruments in a bath containing an enzymatic solution or disinfectant (not glutaraldehyde or phenolics). At the end of the day, discard the solution and wrap the instruments in a disposable wipe moistened with a disinfectant or with an enzymatic solution. Place all in a rigid container (Tupperware style) appropriate for carrying.

You can sterilize more than one set of instruments at the same time and in the same bag. Since you are not carrying out invasive treatments, you can proceed as follows in using the instruments: Before the first procedure, open the bag and with a forceps (need not be sterile) or with aseptic hands, take out the instruments you need. Nevertheless, avoid touching the instrument sections that will be in contact with oral tissue. Close the bag by folding the opening twice and then sealing it with masking tape (adhesive tape is not practical) thus allowing you to easily reopen and reclose the bag. Repeat the same procedure for all other interventions. Dispose of the bag. It must not be reused.

**Before interventions**

- Instruments must arrive at the site bagged and in sterile condition.
- It is acceptable to have more than one set in a bag.
- After hand antisepsis or after donning gloves, remove the instruments by hand or with forceps.
- Avoid touching instrument sections that will come into contact with oral tissues.
- Close the bag.
- Keep the bag closed between each intervention by using masking tape to avoid contamination.
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Infection control applied …

**After interventions**

- Do not use glutaraldehyde or phenolics for soaking.
- Do not allow contaminated instruments to air dry.
- Soaking in an enzymatic solution is acceptable (replace it daily).
- Ideally, soaking in an immersion disinfectant (e.g., hydrogen peroxide, quaternary ammonium, chlorhexidine);
- In order to reduce corrosion, avoid prolonged soaking (a weekend).

**Mobile dental units**

There are several different models of mobile dental units. You will probably be using ones equipped with an air/water syringe and suction. Maintenance of these units is essential for efficiency and to avoid the formation of biofilms in bottles and waterlines. Use of sterile water is not necessary. Even though distilled water is preferable in order to prevent calcite formation, it is also not required (unless indications to the contrary by the manufacturer). Given that the water is not stagnant in the lines, drainage is optional.

Maintenance of suction systems must also be done in order to ensure efficacy and safety. Thus if you suction water after each patient, the bottles will fill quickly and you will have to go and empty them regularly. However, rinsing is desirable: suction about 50 mL of water (about 1/4 of a cup) between each patient.

You must empty the reservoirs and waterlines of your systems at the end of the day and disinfect them. If the manufacturer allows it, household bleach diluted 1:10 with tap water works effectively. Leave the disinfectant in the bottle for 10 minutes or so. Flush and dry, neck down for adequate drip-drying.

**Waterlines**

- Flushing at the start of the day is optional;
- Reservoir and tubing must be completely emptied at the end of the day;
- Disinfect the reservoir with a dental unit disinfectant at least once a week. If the manufacturer authorizes it, a possibility is a solution of household bleach diluted 1:10 (contact period of 10 minutes), and then flush with tap water and allow the unit to dry;
- Use tap water (unless there is a municipal boil-water advisory).

**Suctioning systems**

- Same procedure as for the standard dental unit;
- Flush with water after each use (with about 100 mL or 1/2 cup of water);
- Suction with a disinfectant at the end of the day. Fill the bottle with household bleach diluted 1:10, leaving it for a minimum of 10 minutes. Then flush and allow it to dry.

**Special situations**

There are some situations in which the recommendations above must be adjusted. During an epidemic or pandemic, you may possibly have to suspend your activities until the advisory has been lifted. This applies to situations of pandemics or epidemics involving gastroenteritis, influenza, or SARS.

Viral gastroenteritis can be very contagious; fewer than 10 virions can transmit the infection. Although ordinary soap cannot kill the virus, studies show that soap at least mechanically removes a good part of the contaminants. As such, hand washing or antisepsis with gels or hydroalcoholic foams are crucial in limiting virus propagation. Some experts suggest that it is safe for children to use gels even if they have a high alcohol content. In any case, supervision is essential.
In the event of an influenza or SARS pandemic, you are yourself a carrier of the bacteria. In this case, you thus do not have to do anything special, unless you experience and the degree of comfort you feel in environments. Remember that children are not highly susceptible. In fact, 8% of children aged more than two years are carriers without presenting any clinical symptoms. Even though some cases of community transmission of C. difficile have been reported, at this time you do not have to be concerned about it in your activities. Basic hygiene remains the best prevention.

Conclusion

Recommendations presented here are supported by the scientific literature, and the flexibility they allow must nevertheless be counterbalanced by your judgment, your experience, and the degree of comfort you feel in applying them. Remember, these are not obligations, but rather they are guidelines. In using this guide, you will, I believe, be able to do your work with ongoing professionalism while simplifying your tasks without compromising your safety or the safety of your patients. Also to be taken into consideration is a concern about the huge amount of non-recyclable waste that is generated. Remember that you are not carrying out invasive treatments, that you do not generate large quantities of aerosols, and that your contact with blood is predictable. It is from this perspective that these recommendations have been prepared for you.
Bibliography


12 Wilson, M.E. Clostridium difficile and childhood diarrhea: cause, consequence, or confounder. CID 2006;43: 814-816.

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APPENDIX IX

Protocol to Follow after Exposure to a Biological Material

These are the first actions to take after exposure to a biological material:

• Following a percutaneous exposure such as a needlestick, a cut, or a scratch with broken skin, involving blood or a contaminated instrument (contaminated instruments such as needles or other sharps that penetrate the skin):

  1. Wash the wound for several minutes with tap water and soap or with an antiseptic solution, and then rinse with water.  
  2. Request a medical consultation to determine the need for chemoprophylaxis.  
  3. Fill out an exposure report.

• Following a cutaneous exposure or when there is blood contact on damaged skin (the integrity of the skin has been compromised when there is dermatitis, a scratch, or an open wound):

  1. Wash the wound for several minutes with tap water and soap or with an antiseptic solution, and then rinse with water.  
  2. Request a medical consultation to determine the need for chemoprophylaxis.  
  3. Fill out an exposure report.

• Following a cutaneous exposure or when there is blood contact on healthy skin (contact with intact skin generally does not involve a risk of transmission of HIV, HBV, HCV, or other pathogens. But prolonged contact or exposure to a large area of body surface carries a risk of contamination):

  1. Clean the affected area thoroughly with tap water and soap.  
  2. Given that healthy skin is the best protection, chemoprophylaxis is not required. In case of prolonged exposure to blood that may be contaminated, it is best to consult a physician and to fill out an exposure report.

• Following exposure of a mucous membrane or contact of a mucous membrane with blood (the mucous membrane of the eye or the mouth is a port of entry for pathogens when there is contact):

  1. As quickly as possible, rinse the area abundantly for several minutes with tap water.  
  2. Request a medical consultation to determine the need for chemoprophylaxis.  
  3. Fill out an exposure report.

2 - According to the CDC, while there is no contraindication, there is no evidence of risk reduction by encouraging bleeding or by using an antiseptic solution. However, the application of caustic agents (e.g., bleach) or the injection of antiseptics or disinfectants into the wound is not recommended. These recommendations are from the report of the Centers for Disease Control and Prevention (CDC). Public Health Service Guideline for the Management of Health-Care Worker Exposures to HIV and Recommendations for Postexposure Prophylaxis. MMWR 1998: 47 (No. RR-7).

3 - MSSS, Guide pour la prophylaxie postexposition (PPE) aux personnes exposées à des liquides biologiques dans le contexte du travail, 2006, p. 11:…..encourage bleeding of the lesion immediately without traumatizing its immediate surroundings.

4In the case of the ocular mucous membrane, use an eye wash.
Where to consult?
After first aid, the next step is to consult a competent person for follow-up after exposure. To do so, it is strongly recommended that you go to the nearest hospital emergency centre in order to be cared for as soon as possible. These centres have the advantage of being able to administer a chemoprophylactic treatment on the spot. It is important to specify the cause of your emergency and to insist on being seen in less than two hours.

Don’t wait for an emergency to start looking for where to go. Get information at your hospital or from a nearby physician to find out if they are ready to treat you and if they have the appropriate medications for a chemoprophylaxis. In the case of an incident, you will be prepared to refer members of your team.

Public health departments
Aside from an emergency centre, you can call the regional public health departments where their consulting physicians will answer your questions.

Contact information available at Directions de santé publique: www.msss.gouv.qc.ca/reseau

Information pamphlet
The Ministry of Health and Social Services has published the following information pamphlet:

*Accidental exposure to blood or other body fluids potentially contaminated by the hepatitis B virus, the hepatitis C virus, or the AIDS virus—Information for exposed persons.*

This information pamphlet is available in English and in French in four versions:

- Information for the source individual
- Information for exposed persons
- Information for the parents of an exposed child
- Information for healthcare workers

Source: www.msss.gouv.qc.ca/en/documentation
DENTAL CLINIC ACCIDENT REPORT FOLLOWING ACCIDENTAL EXPOSURE TO BLOOD OR OTHER BIOLOGICAL FLUIDS

**Important:** It is essential to report every accidental exposure to blood or other biological fluids and to consult a physician immediately. After medical consultation, this report must be placed in the personnel file of the worker.

**Section I: GENERAL INFORMATION**

1. Worker identification

<table>
<thead>
<tr>
<th>Last name:</th>
<th>First name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job title:</td>
<td></td>
</tr>
<tr>
<td>Office telephone:</td>
<td>Home telephone:</td>
</tr>
</tbody>
</table>

Hepatitis B vaccination

- ☐ No
- ☐ Yes (specify) ______________________________
- ☐ Complete (3 doses)
- ☐ Incomplete (1 or 2 doses)
- ☐ Unknown

Anti-HBs measured

- ☐ No
- ☐ Yes

- Date of serological verification: ____ / ____ / ____ ☐ > 10 IU/L ☐ ≤ 10 IU/L

**Section II: INFORMATION CONCERNING EXPOSURE**

2. Date of exposure: ____ / ____ / ____ (d/m/y) Time: ______________

3. Place where exposure occurred: ____________________________________________

4. Biological fluids involved: (check the appropriate box or boxes)

- ☐ Blood
- ☐ Other fluid or tissue. Specify: __________________________________________

- Blood-tinged? ☐ Yes ☐ No ☐ Do not know
- ☐ Unknown

5. Type of exposure:

- ☐ Percutaneous (answer questions 6–10)
- ☐ Mucocutaneous (answer questions 11–13)

A. **PERCUTANEOUS EXPOSURE** (If no, go to question 11)

6. Type of exposure:

- ☐ Cut
- ☐ Needlestick
- ☐ Scratch
- ☐ Bite

7. Instrument involved: (check the appropriate box or boxes)

- ☐ Was visibly contaminated with blood before exposure occurred
- ☐ Had been used with a patient, but no blood visible on the instrument
- ☐ Contaminated directly from a blood vessel
- ☐ Unknown
- ☐ Does not apply

- Type of instrument (description): ____________________________________________
8. Depth of the wound:
   - Superficial (with or without bleeding)
   - Deep (with or without bleeding)

9. Did the instrument pierce clothing or a glove?
   - Yes
   - No
   - Do not know
   - Does not apply

10. If a bite is involved, was there blood present originating from the mouth of the aggressor?
    - Yes
    - No
    - Do not know

B. MUCOCUTANEOUS EXPOSURE (If none, go to question 14)

11. Amount of blood in contact with damaged skin or with mucous membranes:
    - A few drops
    - Small amount (≤ 5 ml–1 tsp)
    - Medium amount (≤ 50 ml - 1/4 cup)
    - Significant amount (> 50 ml)
    - Unknown

12. Duration of contact (indicate the approximate time, in minutes): _________

13. In the case of spatter or contact with a wound, what was the size of the surface affected?
    - Less than 1 cm²
    - From 1 cm² to at least 5 cm²
    - 5 cm² or more
    - Unknown
    - Does not apply

Section III: INFORMATION ABOUT THE SOURCE

14. Source individual known or identified:
    - Yes (send contact information in confidence to the treating doctor)
    - No

15. Other relevant information about the source individual:

Worker’s signature: ___________________________ Date: ____d / ____ m/____ y

Sources: DSP de Montréal-Centre  
DSP du Saguenay-Lac Saint-Jean, adapted and updated February 2000
Jean Barbeau¹, Benaïssa El Moualij², Ernst Heinen², Willy Zorzy²

Transmission et résistance des prions: la pratique de la médecine dentaire en sera-t-elle affectée?

» Résumé
Les encéphalopathies spongiformes transmissibles (EST) sont un groupe de désordres rares du système nerveux central qui affectent les humains et certains animaux. Chez l’humain, la forme la plus connue est la maladie de Creutzfeldt-Jakob (CJD) dont l’apparition la plus courante est sporadique et atteint une personne sur 1 000 000.¹ Plus récemment, une forme variant nommée « vCJD », très proche de la forme bovine « ESB » (encéphalopathie spongiforme bovine) ou maladie de la vache folle, a retenu l’attention.¹²

» Summary
Transmissible spongiform encephalopathies are a rare group of disorders affecting the central nervous system in humans and in certain animals. In humans, the most common form is Creutzfeldt-Jakob Disease and whose incidence is sporadic affecting one person in 1,000,000.¹ More recently, a variant form known as ‘vCJD,’ very similar to ‘BSE’ (Bovine Spongiform Encephalopathy) or Mad-Cow Disease, has gained attention.¹²

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l’extérieur de la cellule. Le repliement est un phénomène indissociable du comportement normal de la protéine. Toute anomalie dans la plicature normale peut entraîner un dysfonctionnement de la protéine ou faire apparaître des propriétés différentes de celles appartenant à la protéine normale.

Le prion cellulaire (PrPc) est une protéine normalement retrouvée à la surface de la membrane de plusieurs cellules notamment, les cellules nerveuses et certaines cellules du système immunitaire. La fonction exacte de la PrPc est encore peu connue : certains la décrivent comme ayant une fonction au niveau de synapses lors des stimulations nerveuses.5,6 On sait qu’elle est soumise à un contrôle cellulaire étroit.

Il peut arriver de façon sporadique chez un animal (BSE) ou chez l’homme (Creutzfeldt-Jakob) que la PrP subisse un changement dans son repliement. Dans le cas des maladies à prions, la PrP acquiert des repliements sous forme de feuillets qui changent son comportement (fig. 1a).7 La nouvelle entité appelée prion scrapie (PrPSc) possède de nouvelles propriétés lui permettant d’échapper en partie au contrôle normal de l’organisme et s’accumule dans certains de ses tissus. Le temps de demi-vie est alors fortement augmenté car le processus de dégradation, que subit normalement une protéine, ne parvient plus à éliminer l’agent PrPSc. Une importante particularité de cette PrPSc est donc une résistance plus importante aux protéases endogènes et exogènes. Cette nouvelle protéine (même structure en acides aminés que la PrP mais repliée différemment) a une capacité particulière à affecter les protéines normales environnantes (PrPc) et à induire, par un mécanisme de transconformation, leur repliement sous la forme anormale du PrPSc. Les PrP néotransformées deviennent des PrPSc pouvant à leur tour causer la transformation d’autres PrPc et ainsi de suite9,10 (fig. 1b). Dans le cas de personnes contaminées par voie orale par l’agent vCJD ou BSE, l’accumulation de ces PrPSc se produit dans certains organes comme les organes lymphoïdes (glandes lymphatiques, rate, appendice) dès les stades précoces de la maladie. L’accumulation dans le tissu nerveux se fait plus tardivement et concoure à l’installation de la maladie; ceci se traduit par des manifestations pathologiques et histologiques observées dans les encéphalopathies spongiformes transmissibles.11

faisant fonctionnement du prion, il faut se rappeler qu’une protéine est l’assemblage de blocs constituant que l’on appelle acides aminés, dont le nombre et la séquence sur la chaîne protéique donne l’identité et les caractéristiques fonctionnelles de la protéine. Des niveaux de complexité supplémentaires sont apportés par le repliement de la chaîne sur elle-même, l’ajout de résidus supplémentaires (p. ex., sucres dans le cas de glycoprotéines) lui confère des propriétés pour les fonctions qu’elle aura à exercer dans la cellule, au niveau des membranes ou à
Transmission et résistance des prions…

dénaturation ou les cassures de l’ADN, la destruction des membranes ou la dénaturation de la machinerie enzymatique cellulaire.

La chaleur, sèche (four Pasteur ou Poupinel) ou sous forme de vapeur d’eau (autoclave, Statim) ou chimique (chémiclave), est le procédé de stérilisation le plus répandu. Bien que ce mode de stérilisation soit reconnu et utilisé depuis plus d’une centaine d’années, son mode d’action exact sur le vivant est encore un sujet de discussion. L’hydrolyse des protéines et des acides nucléiques, la coagulation des protéines et/ou leur oxydation sont des mécanismes proposés. Quoi qu’il en soit, la chaleur, lorsqu’elle est appliquée suivant des paramètres précis (température, pression et temps) est apte à tuer toute forme de vie (virus, bactérie, champignons et protozoaire).

Une résistance impressionnante à la stérilisation

La stérilisation est le procédé, chimique ou physique, que cette destruction puisse être efficace, les dommages doivent être importants et irréversibles.

Ainsi, les procédés de stérilisation visent la

<table>
<thead>
<tr>
<th>Tableau I. Degré d’inactivation des prions par diverses procédures (selon l’OMS et Taylor\textsuperscript{16,17})</th>
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</thead>
<tbody>
<tr>
<td><strong>Pas d’infectivité détectable</strong></td>
</tr>
<tr>
<td>Hypochlorite de sodium non dilué (15 500 ppm de chlore disponible)</td>
</tr>
<tr>
<td>Autoclave à 121 °C après traitement au NaOH 1 N</td>
</tr>
<tr>
<td>Autoclave à 121 °C dans NaOH 1 N</td>
</tr>
<tr>
<td>Ébullition dans NaOH 1 N</td>
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</tbody>
</table>
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Le glutaraldéhyde, le peroxyde d’hydrogène et l’oxyde d’éthylène ont des propriétés reconnues pour la stérilisation. Ils agissent à divers niveaux dans les cellules ou les virus en induisant des dommages irréversibles. Bien que moins fréquemment utilisés, ces procédés sont des alternatives à la chaleur dans le cas d’instruments thermosensibles.

Le niveau d’assurance stérilité (NAS) est un concept qui permet de contrôler les paramètres de la stérilisation. Ce niveau d’assurance est mesuré grâce à des indicateurs biologiques. Ainsi, l’endospore, qui est une structure de dormance de certaines bactéries, représente le standard de la stérilisation. Jusqu’à maintenant les prions, en raison de leur résistance à la dégradation, ont bouleversé nos certitudes; l’endospore était considérée comme la structure la plus résistante du vivant.

La transmission iatrogène des prions plaide pour une décontamination d’instruments destinés à être réutilisés. Or, l’expérience démontre clairement que la stérilisation conventionnellement utilisée dans le domaine hospitalier et destinée à éliminer la plupart des agents infectieux de type conventionnel tels que les virus, les champignons et les bactéries est inefficace ou seulement partiellement efficace pour détruire le PrPsc14. Le Tableau I présente un résumé des moyens de destruction des prions.

Transmission et résistance des prions…

L’explication de cette formidable résistance trouve sa source dans la structure même du PrPsc de même que dans ses interactions avec les composantes de son environnement. La plicature particulière du PrPsc lui permet de développer un fort caractère hydrophobe. Cette hydrophobicité favorise son agrégation sous forme d’amas (les dépôts d’amyloïde dans les tissus affectés) et filaments qui sont intrinsèquement plus réfractaires aux agressions chimiques, physiques et protéolytiques. Lors de leur purification, les PrPsc sont en association avec des éléments de leur environnement organique (ADN, débris cellulaires, autres protéines) ou inorganique (surfaces métalliques ou polyémiques). Ces interactions accroissent considérablement la résistance des prions en rendant les sites d’attaque moins disponibles. Par exemple, il a été bien démontré qu’un traitement avec des fixateurs comme les aldéhydes (glutaraldéhyde) ou les alcools augmente la thermostabilité des prions en durcissant la surface des agrégats de prions, protégeant ainsi les éléments internes de ces agrégats.15

Une problématique particulière

Les patients atteints de CJD classique, ont un âge moyen qui varie entre 50 et 75 ans. La PrPsc se concentre principalement au niveau du système nerveux. Les patients vCJD sont plus jeunes avec une moyenne d’âge d’une trentaine d’années. Lorsque la contamination a été effectuée par voie périphérique (ingestion d’aliments contaminés par l’agent ESB), cette dernière forme engendre d’abord une phase asymptomatique caractérisée par une accumulation de l’agent infectieux dans les organes lymphoïdes périphériques. Ainsi, la PrPsc est détectée au départ dans les organes lymphoïdes avant de se retrouver dans le système nerveux. La figure 2 est une représentation de l’évolution du titre infectieux dans le temps.18 Pendant la période où le PrPsc se trouve dans les organes lymphoïdes, le patient ne démontre aucun signe de la maladie mais il est à risque de transmettre, lors ou à la suite d’une intervention médicale invasive, l’agent infectieux à d’autres patients, si des précautions particulières ne sont pas prises.

Lorsque les premiers symptômes de la maladie apparaissent, le décès survient dans un délai d’environ un an19. Il est fort probable que durant cette période où l’état du patient s’aggraverà inexorablement, les interventions dentaires ne constitueront pas une priorité. Il faut cependant attirer l’attention sur le fait que le diagnostic d’une maladie...
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s’agit ici de la variante de la MCJ, où le prion montre une distribution périphérique plus importante que dans les cas de MCJ classiques.

Les prions et la dentisterie
La transmission iatrogène des encéphalopathies spongiformes est un phénomène rare. Jusqu’à maintenant, elle a impliqué essentiellement les procédures chirurgicales du système nerveux, les greffes de dure-mère et de cornée et l’utilisation d’hormone de croissance humaine provenant de cadavres. Il n’existe aucun cas démontré de transmission d’EST par l’intermédiaire de traitements dentaires. Les études chez des souris transgéniques exprimant la PrP de hamsters contaminés après intervention chirurgicale dentaire réalisée avec des instruments contaminés par l’agent infectieux 263K ont démontré la présence du PrP au niveau du tissu gingival et de la pulpe dentaire. Qui plus est, ces tissus se sont montrés infectieux chez le même animal.

L’inoculation du prion au niveau de la pulpe dentaire était aussi apte à causer l’infection du système nerveux chez le hamster. Dans ce modèle, le PrP semblait suivre le trajet du nerf trigéme. Les hamsters dans cette étude ont été inoculés avec la souche 263K de la tremblante du mouton. Les auteurs émettent donc une précaution dans l’interprétation de leurs résultats en mentionnant qu’il est actuellement impossible de dire si le modèle est applicable à l’humain. Toutefois, ces résultats soulèvent cette possibilité, qui serait à vérifier avec d’autres souches de PrP dont une vMCJ. En effet, la vMCJ démontre une distribution périphérique du PrP, et une infectivité, plus importante que dans le cas de la MCJ classique. La recherche de PrP dans les tissus buccaux chez les patients infectés n’a, jusqu’à présent, pas permis de concrétiser cette crainte. Encore une fois, la PrP devrait être recherchée chez les sujets humains ayant développé la vMCJ pour les raisons mentionnées plus haut. Il n’existe actuellement aucune recommandation en dentisterie en ce qui concerne le traitement des patients atteints de MCJ, les risques étant considérés comme négligeables. La règle de base est de toujours maintenir des standard optimaux pour la gestion des risques infectieux. Toutefois, certaines précautions pourraient être instituées, uniquement dans les cas où un patient serait fortement suspecté d’avoir une maladie à prion. Vraisemblablement, ce genre de situation ne serait susceptible d’être rencontrée qu’en milieu hospitalier.

Les banques de sang
Jusqu’à tout récemment, la transmission des EST par le sang n’avait jamais été rapportée chez l’Homme. Toutefois, le risque théorique, même en absence de preuves scientifiques, a contraint certains pays à recourir au principe de précaution pour protéger leur banque de sang. Au Canada par exemple, dans la foulée du scandale du sang contaminé par le VIH et le virus de l’hépatite C, les personnes ayant passé, depuis 1980, au total, soit trois mois plus au Royaume-Uni, soit trois mois plus en France, soit cinq ans ou plus dans une autre région d’Europe de l’Ouest, ne sont pas admissibles à donner du sang ou du plasma. De même, les personnes ayant reçu une transfusion sanguine au Royaume-Uni, depuis 1980, ne sont plus autorisées à donner du sang ou du plasma. Ces normes qui peuvent à prime abord sembler arbitraires sont en fait basées sur un calcul tenant en compte la réduction maximale d’unités de sang que le Canada pourrait se permettre de perdre, soit 3% sans mettre en danger ses réserves de sang. Depuis 2004, les trois premiers cas de transmission de vMCJ par transfusion ont été rapportés chez l’Homme. La preuve, bien qu’indirecte, est maintenant scientifiquement admise et le temps d’incubation se situerait entre 5 à 8 ans après la transfusion. Il convient toutefois de préciser qu’il
Les scénarios suivants pourraient servir de guide et sont inspirés de l’article de Smith et al.²⁷

**Scénario #1 : Un cas probable de CJD**
La patiente A a récemment reçu un diagnostic probable de maladie de Creutzfeldt-Jakob. Cette patiente se présente à votre bureau pour y recevoir des soins dentaires de base et vous fait part de son état de santé.

**Gestion du cas.** Il est peu probable que ce genre de patient se présente à une clinique dentaire privée pour y recevoir des soins. Au stade où la patiente cherche une aide médicale, les signes cliniques de l’affection neurologique sont déjà apparents. Il est à prévoir que cette patiente serait référée à une clinique associée à un centre hospitalier. Toutefois, les lignes directrices suivantes sont suggérées. La directive principale affecte la notion de précautions universelles. Dans un cas de MCJ suspectée ou confirmée, tous les instruments dentaires devraient être à usage unique. Ce qui, dans le cas d’une suspicion de MCJ, implique que les instruments devraient être placés en quarantaine dans un contenant fermé et bien identifié jusqu’à la confirmation du diagnostic. Il est bien entendu, qu’avant cette quarantaine, tous les instruments doivent être nettoyés et stérilisés suivant les standards de base. Si le diagnostic est confirmé (probablement après le décès de la patiente) les instruments devraient être incinérés. Dans le cas où la MCJ est exclue, les instruments peuvent reprendre leur place dans le roulement de l’instrumentation. Mise à part la gestion de l’instrumentation, aucune précaution particulière n’est nécessaire et les précautions universelles s’appliquent.

Certains auteurs suggèrent d’employer des systèmes de succion et des conduites d’eau indépendantes de l’unité dentaire principale. Toutefois, ces dernières recommandations ne font pas l’unanimité et seraient probablement inutiles.

**Scénario #2 : Un membre de la famille d’une personne décédée de MCJ**
Un de vos patients réguliers se présente à votre clinique pour vive douleur à une dent. Lors du questionnaire de routine, vous apprenez que le père de votre patient est décédé de MCJ. Vous entreprenerez les traitements d’urgence, mais vous vous demandez si des précautions particulières doivent être prises.

**Gestion du cas.** Bien que des cas de MCJ puissent avoir un lien génétique familial, ils représentent moins de 15 % de tous les cas rapportés. Ainsi, un simple lien familial avec une personne diagnostiquée ou décédée des suites d’une MCJ ne représente pas un facteur de risque suffisant pour changer ses pratiques en regard du contrôle de l’infection. Cette situation ne requiert donc aucune précaution particulière.

**Scénario #3. Un patient âgé dans un centre d’hébergement, suspecté d’avoir une MCJ, a besoin d’une nouvelle prothèse**

**Gestion du cas.** La salive ne représente pas un vecteur de transmission de la MCJ. Dans le cas de la confection ou de la réparation d’une prothèse, il n’y a pas de procédure invasive anticipée. L’instrumentation n’entrera en contact ni avec le sang ni avec le tissu nerveux. Aucune précaution particulière n’est nécessaire. Tout au plus, la prothèse ou les empreintes devraient être lavées à l’eau et ensuite désinfectées dans un désinfectant compatible avec les matériaux. Ainsi, une immersion peut être envisagée ou, ce qui est recommandé, la pièce peut être vaporisée avec le désinfectant (p. ex., eau de Javel diluée 1 : 10) et enfermée dans un sac étanche pendant au moins 5 minutes. Ces procédures devraient de toute façon être entreprises pour toutes les prises de prothèses.

**Considérations générales.** Les prions sont des protéines très hydrophobes. De par cette nature, les prions adhèrent fortement aux matériaux et particulièrement à l’acier inoxydable. Une des règles fondamentales consiste à éviter que les contaminants (salive, sang, tissus) sèchent sur l’instrumentation. Le nettoyage rigoureux est donc d’une importance cruciale. Il ne faut jamais commettre l’erreur de stériliser un instrument souillé dans le but de le rendre sécuritaire à la manipulation (fig. 3). Ainsi, certains articles comme les fraises et les limes endodontiques ont tendance à retenir les prions.
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contaminants dans leurs aspérés et sillons. Ces articles ne devraient pas être réutilisés; la plupart sont à usage unique et devraient être traités comme tel, peu importe le patient ou la procédure. Les procédures classiques de désinfection, asepsie et stérilisation peuvent être utilisées en toute confiance sauf dans le cas particulier et rare où vous êtes en présence d’un cas confirmé de MCJ. Pour ce qui est de la stérilisation, un autoclave à vacuum devrait être préféré. Ces autoclaves permettent d’atteindre plus efficacement les aspérés, les fins conduits et les articles poreux et ont démontré une meilleure performance pour la destruction des prions.

Bibliographie

APPENDIX XI

Laboratories Offering Biological Validation of Sterilizers

Contrôle des stérilisateurs (Evaluation of sterilizers)
Faculté de médecine dentaire de l’Université de Montréal
5122 Côte-des-Neiges
Box 49635
Montreal, Quebec H3T 2A5

Telephone: 514-343-2274
Fax: 514-343-2233

Laboratoire de contrôle microbiologique (Laboratory for microbiological evaluation)
Faculté de médecine dentaire
Université Laval
2420 Rue de la Terrasse
Quebec City, Quebec G1V 0A6

Telephone: 418-565-2131, ext. 8038
Fax: 418-656-2861

Laboratoire médical Mont-Royal inc.
Box 48852, Station Outremont
Montreal, Quebec H2V 4V2

Telephone: 514-878-3775
Fax: 514-397-1344