EVIDENCE-BASED RECOMMENDATIONS FOR INFECTION CONTROL AND WASTE MANAGEMENT PROCEDURES IN THE NORTH YORK PUBLIC DENTAL PROGRAM

An Evidence-based Report

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1.0 The context for evidence-based recommendations

The North York area of the new City of Toronto is a multi-cultural area of over 540,000 people. Thirty-eight per cent (38%) of children in the North York area report they were born outside Canada. In Ontario, the children born outside Canada are 2.5 times more likely to have experienced dental decay and 2.2 times more likely to have urgent need for care. High levels of dental decay and unmet urgent needs also are common to families living in poverty who often seek care from the public health department. Dental diseases are concentrated in a minority of the population. For example, at age 13, 78% of caries is found in 25% of the North York child population.

The Toronto Public Health, North York Office (formerly North York Public Health Department) has provided dental treatment to children since 1939. Since then, clinical and community-based preventive services, such as fluorides and education, have been added.

Each year the program is allocated a fixed budget from which all program costs must be met. The program operates with core values of:

- Population health - doing the greatest good for the greatest number so as to make a measurable difference to the target population's health
- Prevention - health promotion and primary prevention strategies are favoured over treatment and rehabilitation
- Evidence-based care - scientific evidence of need and the effects of intervention will guide the provision of care; where evidence is lacking, studies may be mounted to develop that evidence
- Equity - care will be allocated directly in proportion to need with urgent and basic needs having priority

- Ethics - the program will adhere to ethical principles of autonomy, non-maleficence, beneficence, justice and collegiality and will be open it its resolution where these principles conflict

Program guidelines have been developed to assist clinicians in making decisions on the management of patient care. The guidelines and the underlying evidence-based report, also assist managers to allocate resources to achieve maximum impact and to assure the quality of patient care. These guidelines assist staff in decision-making for quality care. They also assist the managers in their decisions on allocation of resources to best fit the needs and to maximize the impact of the services provided.

2.0 The need to examine infection control

Since the outbreak of the Human Immunodeficiency Virus (HIV), infection control has become much more of a reality in the world of dentistry. However, HIV is not the only concern in dental practice. Hepatitis B (HBV), Syphilis, Herpes viruses, among others are also concerns.

The transmission of infectious diseases in dentistry is an evolving subject. What appears to be true today can change overnight as new, more seriously infectious agents are discovered. Also, the changing understanding of the way of transmission of certain diseases such as HIV, HBV, and Hepatitis C, necessitates the continual review of infection control procedures.

Therefore, it is important that the North York Public Health Dental Program Guidelines for infection control should be reviewed, updated, and modified if necessary, so that we can have policies and guidelines that contain current directions for infection control.

3.0 Structure of this report

The structure of this review is based on the template proposed at the RCDSO/CDHSRU Workshop (Leake et al. 1996).

The template covers the following areas:

1. Target population
2. Clinical problem
3. Clinical flexibility
4. Search strategies
5. Inclusion criteria
6. Summary of evidence
7. Comparison of costs
8. Relative importance of the potential outcomes
9. Evidence-based recommendations and minority views
10. Comments and suggestions for further research

4.0 Target population

These guidelines apply to staff who provide dental care in the North York Public Dental Program.

5.0 Clinical Problem

The clinical question addressed in this review is: *What are the appropriate infection control procedures to prevent transmission of pathogens in the dental setting?*

The North York program guidelines need to be examined to ensure they meet the current standard of infection control. The aspects that will be addressed are:

1. The use of universal precautions
2. Water-line contamination
3. Hard surfaces disinfection
4. Waste management

5.1 Prevalence of the problem

Dental professionals and dental patients are exposed to a wide variety of microorganisms via blood, oral or respiratory secretions. These microorganisms may cause infectious diseases such as the common cold, pneumonia, tuberculosis, herpes, hepatitis B (HBV), hepatitis C (HCV), Human Immunodeficiency Virus (HIV). Infection can be transmitted through several routes, including: direct contact with blood, oral fluids, or other secretions; indirect contact with contaminated instruments, operatory equipment, or environmental surfaces; or contact with airborne contaminants present in either droplet splatter, or aerosols of oral and/or respiratory fluids.

Infection via any of these routes requires the presence of three factors: a susceptible host; a pathogen with sufficient infectivity and numbers to cause infection; and a portal through which the pathogen may enter the host. Effective infection-control strategies are intended to break one or more of these factors, thereby preventing infection (1).

HBV, HCV and HIV are important blood borne pathogens which should be carefully considered in dental practice. Although the potential for HBV transmission in the workplace setting is greater than for HCV or HIV, the modes of transmission for these three viruses are similar (1). All have been transmitted in occupational settings (1). Blood is the single most important source of these viruses in dental practice.

As reported by Molinari (1993), there have been 33 occupational HIV transmissions as of April 1993 and another 69 cases are still under investigation. The majority of these transmissions occurred as a result of needlesticks or other sharps. No documented cases of transmission to dentists have been noted (4).

For people who have not had prior Hepatitis B vaccination or post exposure prophylaxis, the risk of hepatitis B infection following parenteral (i.e., needle stick or cut) exposure from an individual who is Hepatitis B-positive is 6%-30% (1). The risk of infection with HCV following one needle stick exposure to blood from a patient known to be infected with HCV is approximately 3-10%; for HIV, the risk is even lower at 0.3%. The rate of transmission for HIV is considerably lower than that for HBV, probably as a result of the significantly lower concentrations of a virus in blood of HIV-infected persons (2).

There are no documented cases of transmission of HBV in North America, however; there are documented cases of transmission of HBV in dental settings from other parts of the world. Hepatitis B vaccine is an excellent way of prevention of HBV infection. The use of effective infection control procedures and universal precautions is deemed essential to reduce or eliminate exposures to microbes in dental practice and to prevent cross-contamination among patients and the dental team.

Tuberculosis has been a major scourge of mankind, and it continues to be a common cause of morbidity and mortality, especially in developing countries. It is a reasonable assumption that, during the first half of this century, the tubercle bacillus was a relatively common pathogen of dental patients. Although minimal, if any, precautions were taken to prevent its transmission, there is no historical or epidemiological evidence that tuberculosis was a significant infectious disease of dental practice. Canada is one of the few countries in the world reporting fewer than 10 TB cases per 100,000 population. Since 1987, the Canadian TB rate has stabilized at 6.9 to 7.4 cases per 100,000 persons (1,947 to 2,108 cases per year) (62). Transmission of TB in dental settings can be prevented by good ventilation of the office and by wearing surgical masks while performing intra-oral procedures.

Dentists must also deal with disposal of pathological waste, heavy metals and solutions with chemicals not able to be processed by municipal waste treatment plants.

6.0 Clinical flexibility

The waste management recommendations are specific to clinics in the City of North York.

7.0 Evidence for efficacy

7.1 Search strategy

A computer search for relevant articles of the 1994-1997 MEDLINE database was performed.

1. Subject heading = infection control
   Yield = 161 articles
2. Subject heading = infection control in dentistry
   Yield = 142 articles
3. Subject heading = management of biomedical waste and hazardous waste
   Yield = 430 articles

The results of the search were limited to the English language and to local holdings. Of 733 Medline listings on infection control and biomedical waste, a total of 66 listings, related to infection control, were identified with this search.

In addition, the following documents were reviewed:

- current North York's infection control and waste management policies and procedures;
- the current infection control guidelines and procedures of the Canadian Dental Association (CDA), Ontario Dental Association (ODA), Royal College of Dental Surgeon of Ontario (RCDSO), Centers for Disease Control (CDC) and Laboratory Center for Disease Control (LCDC);
- infection control procedures for the City of Toronto; the Faculty of Dentistry, University of Toronto; Canadian Association of Orthodontists; American Dental Association (ADA); and the Association for Professionals in Infection Control and Epidemiology (APIC); the Ontario Ministry of Environment Recommendation for Handling and Disposal of Biomedical Wastes; and
- articles identified by hand searches and by pursuing bibliographies from appropriate sources.

Finally, the Director of Quality Assurance at the Royal College of Dental Surgeons of Ontario and the Director of Professional Affairs of the Ontario Dental Association were interviewed.

7.2 Inclusion criteria

Two inclusion criteria were imposed when conducting the computer search: 1) studies on short-term (<3 years) and 2) studies published in English. References were evaluated based on the five-category classification system for assessment of quality of evidence developed by the Canadian Task Force on the Periodic Health Examination (1994). Where clinical studies where not available, review articles and expert opinion were included.

7.3 Evidence on the effectiveness of infection control & waste management procedures

7.3.1 Universal precautions

Universal Precautions are measures intended to prevent transmission of blood-borne pathogens. Because of the prevalence of asymptomatic compared to symptomatic carriers of HIV and HBV, Universal Precautions are applicable to all patients and all blood specimens. They do not eliminate the need for other disease- specific precautions, including transmission of non-blood-borne pathogens (2).

Recent literature suggests that the likelihood of contracting AIDS in the dental office is very small (U of M. School of Dentistry); following Universal Precautions would make the probability of HIV transmission in dental practice extremely low (3,4,5,6).

Universal Precautions are also needed to prevent transmission of other blood borne pathogens such as HBV and HCV, along with vaccination for HBV.
The RCDSO Guidelines for infection control recommend that universal precautions should be implemented.

7.3.1.1 1993 Report

Protective equipment, devices and clothing

1. Equipment
   - Hand pieces must be sterilized after each patient and cleaned and lubricated as per manufacture's guidelines.
   - Instruments must be sterilized in appropriate quantities or groups in autoclave bags.

- Autoclaves shall be used to sterilize all heat resistant instruments and supplies.

2. Devices
   - Masks and glasses will be worn by all providers. Patients will be appropriately draped, and be provided with protective glasses.

3. Clothing
   - Uniforms will be provided to all clinical dental staff. Uniforms should be laundered in a moderately high temperature wash cycle.

Personal hygiene

1. Hand washing should be a routine of at least 15 second washes between patients.
2. Wash hands and other skin surfaces immediately after removing gloves and after each patient.
3. Keep finger nails short, do not wear nail polish, and wash thoroughly under nails.
4. Do not wear jewelry nor rings when treating patients.

Staff/patient interaction

1. Screening by the hygienist
   - Gloving is not required, unless the hygienist has a lesion or a wound on her hands. Thorough hand washing and a no touch technique should be used.
2. Surveying
   - Gloving is recommended if operator's skin contacts blood, blood-contaminated with saliva, or mucous membranes. However, intact skin of the hands is an important barrier against the invasion of micro-organisms. It is imperative providers examine their hands routinely for the presence of lesions or breaks in the skin. If either of these conditions exists, gloves must be worn.
3. Dental procedures
   - Universal precautions apply. All personnel must wear uniform gowns, gloves, glasses and masks.

7.3.1.2 This review

Medical History

A thorough medical history should be obtained for all patients at the first visit and updated at subsequent visits.

Barrier techniques

1. Gloves

The incidence of Health Care Workers (HCW) contacting blood is lower among those who wear gloves (7,8). The volume of blood from a needle stick injury may be reduced by at least 50% when the needle passes through a glove(9). In some Hepatitis B outbreaks, requiring HBV-infected HCWs to wear gloves decreased or eliminated HBV transmission to patients undergoing surgical or dental procedures (10).

Gloving is recommended in surveying *only if a lesion or a wound exists on the examiner's hand.*(11).

While performing intra-oral dental procedures, gloves are to be worn. After contact with each patient, gloves must be removed and hands must be washed. *Gloves should not be used when greeting patients, handling records or radiographs* (12,13).

The use of latex has been associated with adverse reactions. In order to minimize exposure to latex allergens, low protein, unpowdered latex gloves should be considered when latex gloves are chosen (11). Also, nylon glove liners for use under latex, rubber or plastic gloves can be used to reduce the possibility of latex allergy(14).

1. Protective Clothing

Gowns, aprons, lab coats, clinic jackets or similar outer garments must be worn when clothing or skin is likely to be exposed to body fluids. Uniforms should not be worn outside the work area. Protective clothing should be changed when visibly soiled or penetrated by fluids.

3. Masks

Surgical masks should be worn to protect the face, the oral mucosa and the nasal mucosa when spatter of body fluids is anticipated. Masks should be changed when visibly soiled or wet.

4. Protective Eyewear

Protective eyewear in combination with a mask should be worn to protect the eyes when spatter and splash of body fluids are anticipated (e.g., when using compressed air or handpiece). Eyewear should be cleaned as necessary.

5. Rubber Dam

Rubber dam provides an effective barrier to the spread of disease. The dam, by isolating an area of the mouth, protects dental personnel from exposure to blood, saliva and aspiration of oral microorganisms.

Sterilization, disinfection and cleaning

Sterilization is the complete elimination or destruction of all forms of microbial life. It is accomplished by either physical or chemical processes. The term sterilization is intended to convey an absolute meaning, not a relative one (1,12).

Disinfection describes a process that eliminates many or all pathogenic microorganisms, with the exception of bacterial spores, from inanimate objects. The efficacy of disinfection is affected by the previous cleaning of the object which achieves approximately a 4 log reduction of contaminating organisms, the organic load on the object, the type and level of microbial contamination, the concentration of and exposure time to the germicide, the physical configuration of the object, and the temperature and pH of the disinfection process (15).

Disinfection is classified into three levels:

1. ***High Level Disinfection*** can be expected to destroy all microorganisms, but not all bacterial spores are killed (sporicidal);
2. ***Intermediate-Level Disinfection*** inactivates Mycobacterium tuberculosis, vegetative bacteria, most viruses, and most fungi, but it does not necessarily kill bacterial spores; and

3. ***Low-Level Disinfection*** can kill most bacteria, some viruses, and some fungi, but it can not be relied on to kill resistant microorganisms such as tubercle bacilli or bacterial spores.

Cleaning is the removal of all foreign material from objects. *Failure to remove foreign matter (e.g., lubricants, soils) from an object before a disinfection or sterilization process is likely to render the process ineffective.* Studies have shown that manual and mechanical cleaning of endoscopes achieve approximately a 4 log reduction of contaminating organisms. Thus cleaning alone is very effective in reducing the number of microorganisms present on contaminated equipment (1,11,15).

The choice of decontamination should be determined as follows (see Table 1):

1. ***Critical Items*** are those instruments that penetrate oral tissues (mucosa, skin, bone) e.g., all surgical instruments, scalers, etc. Critical items should be sterilized.
2. ***Semi-critical Items*** are those instruments that come in contact with intact mucous membranes, e.g., air/water syringes, amalgam carriers, etc. should be sterilized if possible; if instrument is susceptible to heat damage, subject to high level disinfection (1,11,15). Although no documented cases of disease transmission have been associated with *dental handpieces*, sterilization between patients is recommended (12,16).
3. ***Non-critical items*** are those instruments, surfaces and equipment that come in contact with intact skin but not with mucous membranes e.g., mixing slabs, spatulas, etc. There is generally little risk of transmitting infectious agents to patients by means of non-critical items; however, these items could potentially contribute to secondary transmission by contaminating hands of Dental Care Worker or by contact with patients. Items in this category may by disinfected by low-level disinfectants (1,11,15).

Conclusions and recommendations

1. The current standards are consistent with the recent literature.
2. Dentists should continue to implement Universal Precautions in dental settings.

7.3.2 Waterline contamination

Reports in the scientific literature suggest that the microbiological quality of water used in dental treatment frequently may not be acceptable for dental care delivery. Levels of microbial contamination as high as 10,000 to 10,000,000 (Colony-Forming Units) CFUs/ml have been documented (17). In Canada, the acceptable level is 500 CFU/ml or less. The current problem with the water quality primarily centers around the formation of microbial biofilm along the walls of the long, narrow-bore tubing that provides cooling and irrigating water to dental hand instruments. *Biofilm* is defined as a mass of microbes attached to a surface exposed to moisture. Microbial existence in biofilm is very common, for biofilms form just about anywhere there is a moist, nonsterile environment. Both waterborne and human oral microbes have been found in dental unit water, indicating that both the incoming community water and patient's mouths are sources of these microbes.

Tap water often has less than 50 CFU/ml. The chlorine content of municipal water supplies maintains a low level of microbial activity but the further the water goes down the pipeline and the longer it stays there, the less the antibacterial activity. Buildings such as hospitals and medical-dental buildings have detrimentally long waterlines. Most of the microbes detected are of very low pathogenicity or are opportunistic pathogens that cause harmful infections only under special conditions or in immunocompromised people (17,18,19,20).

The CDC has not identified any evidence of a public health risk due to dental waterline contamination. Also, bloodborne viruses such as HIV, HBV, HCV are unable to reproduce outside their living host, and therefore, unlike bacteria and fungi, can not multiply in water systems (18).

The CDC has recommended that:

- High-speed handpieces should be flushed to discharge water and air for a minimum of 20 to 30 seconds after use on each patient;
- Use of an enclosed container or high-velocity evacuation should be considered to minimize the spread of spray, splatter and aerosols generated during discharge procedures;

- There is evidence that overnight or weekend microbial accumulation in water lines can be reduced substantially by removing the handpiece and allowing water lines to run and discharge water for several minutes at the beginning of each clinic day; and
- Sterile saline or sterile water should be used as a coolant/irrigator when surgical procedures involving the cutting of bone are performed (17).

Conclusions and recommendations

1. On daily basis, DHCW should drain, air purge and flush waterlines for several minutes at the beginning of each clinic day.
2. After each patient DHCW should run high speed handpieces for a minimum of 20-30 seconds to discharge water and air, and to flush out patient material that may have entered the waterline.
3. Flush water lines for several minutes at the end of every day.
4. DHCWs should comply with manufacturer's instructions to maintain optimal functioning of all components of dental waterlines.

7.3.3 Hard surfaces disinfection

7.3.3.1 1993 Report

Potentially, infective patients must be seen at the end of the day. All instruments must be autoclaved. All hard surfaces shall be cleaned and disinfected with a disinfectant.

7.3.3.2 This Review

Protection

The CDA recommends that all high risk areas (e.g., bracket table, light handles, x-ray unit heads, counter tops, etc.) are protected by disposable covers or cloths which are washed prior to reuse. The protection should be removed by gloved hands and safely discarded, after each patient (12).

Cleaning

High-risk sites are cleaned with soap and water, to remove all visible debris.

Disinfection

Surfaces are then wiped a second time with the surface disinfectant until wet. The surfaces should not be dried, but the liquid allowed to evaporate.

The Royal College of Dental Surgeon of Ontario suggests that on making decisions about whether to cover or disinfect hard surfaces we should consider the likelihood of the surface becoming contaminated, cost of disposable coverings, time-consuming requirements and damage to equipment and surfaces by disinfectant (13).

The Laboratory Center for Diseases Control (LCDC) recommends that counter tops and surfaces that may have become contaminated with blood or fluid capable of transmitting bloodborne pathogens should be cleaned using an appropriate cleaning agent and water as necessary (e.g., after each procedure, after treatment of each patient, at the completion of daily work activities, and after any spill). Surfaces then should be disinfected with a suitable chemical germicide (11).

Studies have shown that HIV is inactivated rapidly after being exposed to commonly used chemical germicides at concentrations much lower than those used in practice. Embalming fluids are similar to the types of chemical germicides that have been tested and found to completely inactive HIV. HBV is also inactivated by common chemical disinfectants, including 500 ppm sodium hypochlorite (1:100 dilution of household bleach) and some quaternary ammonium compounds (11). Other chemical disinfectants (e.g., iodophors, phenols) may also be effective against HBV.

Conclusions and recommendations

1. The current standards for hard surfaces disinfection meet or exceed current standards of care and comply with literature and current best practice, and thus there is no need to schedule patients with known infectivity at the end of the day. Hard surfaces should be cleaned with soap and water then disinfected after each patient, at the completion of daily work activities, and after any spill;

2. High risk areas (e.g.. bracket table, counter tops, light handles, X-ray unit heads) should be protected by disposable cover, or should be pre-cleaned to remove extraneous organic matter and then disinfected with an EPA-registered disinfectant;
3. EPA-approved surface disinfectants, such as iodophors, synthetic phenolics, and chlorine compounds, represent examples of chemical agents that can both clean and disinfect; and
4. The product must display an EPA number on the label of the product, be used in strict compliance with the printed instruction, and state on the label that it kills Mycobacterium tuberculosis;
5. Select the product category appropriate for the level of disinfection needed
6. Compare the products with properties of an ideal disinfectant (see table 2).

7.3.4 Waste Management

7.3.4.1 1993 Report

All wastes must be correctly categorized and disposed of appropriately. Sharps must be disposed of into a puncture resistant container.

7.3.4.2 This Review

1. All wastes from dental office should be disposed of according to applicable municipal, provincial or federal regulations.
2. Handling of sharps and needles:
   - Needles must be recapped, and this can be accomplished, using one hand technique; by lying the cap on the instrument tray and then guiding the needle into the cap until the cap can be completely seated, or by placing the cap in a special holder, by using a forceps or other appropriate instrument to grasp the cap (1,15); and
   - All sharps should be kept into puncture-proof containers, collected and disposed of through an approved receiver (1,12,13).

NOTE:

The Laboratory Centre for Disease Control has an integrated recommendation for the management and follow up of the health care worker with potential occupational exposure to bloodborne pathogens (63). The immediate post-exposure activities include: 1) Remove the contaminated clothes. 2) Allow immediate bleeding of the wound. 3) Wash the injured area well with soap and water, and apply an antiseptic (if available) 4) If the eyes, nose, or mouth are involved, flush them well with large amounts of water. The exposed HCW should report the injury to a designated person. Details of the accident should be documented and the significance of the exposure assessed. In light of revised chemoprophylaxis recommendations for HIV, it is urgent for the HCW to be assessed as soon as possible after exposure. If post-exposure chemoprophylaxis is to be implemented, it should begin as soon as possible - preferably within 1 to 2 hours after exposure (63).

3. Biomedical waste

   Biomedical waste includes pathological waste and infectious waste. Pathological waste includes: any human anatomical waste including any part of human body with the exception of extracted teeth (CDC), hair, nail clipping and the like (1,11,21). Infectious waste is waste of any type that is contaminated or suspected to be contaminated with the causative agents of infectious disease or their toxic products and capable of infecting or causing disease in susceptible individuals or animals exposed to them (21). Biomedical waste should be collected from clinics and disposed of properly, or decontaminated on-site so that generators can certify it is not biomedical (and nonhazardous) (22,23).

4. Non-Infectious Waste

   - All other waste generated from dental offices excluding office, kitchen and mechanical plant waste (e.g., Kleenex, medical wipes, cotton waste, paper waste, etc.) can not be disposed of through household garbage according to the City of North York Garbage By-Law. It should be collected from clinics and taken to Industrial Garbage Container (21,23).
   - Regular garbage generated from clerical office procedures or kitchen waste should be disposed of within the usual garbage system (23).

5. Human blood and fluids

   These can be discharged directly to sanitary sewer with permission from regional municipality; or use approved carrier to approved receiver (22).

6. Amalgam

   Collect amalgam, keep it in used fixer solution and dispose of properly through an approved receiver (22).

7. Lead-foil X-ray film packets

   Collect and use metal recycler, who can haul lead-foil as recyclable material for processing or make other use of it.; or collect from clinics, and approved receiver (22,23).

8. X-ray processing developer and fixer
   - If developer is not mixed with fixer, discharge to sanitary sewer or use approved carrier to approved receiver.
   - If developer is mixed with fixer, reclaim silver in fixer to below 5ppm in silver recovery unit on-site, discharge liquid to sanitary sewer and send recovered silver for recycling; or discharge fixer solution to sanitary sewer directly, with permission from regional municipality; or use approved carrier to approved receiver (for disposal or silver recovery and regeneration) (21,23).
9. X-ray film
   - If undeveloped, collect from clinics and use approved receiver (for disposal or processing)
   - If developed, collect from clinics and use approved processor or landfill site (22,23).

Conclusion and recommendations

The existing standards for waste disposal are consistent with the City of North York's by-law, and with the Ontario Ministry of Environment's Guidelines for handling and disposal of biomedical wastes from health care facilities.

7.4 Summary Recommendations

1. The existing standards, policies and procedures for infection control should be maintained and that staff compliance with all components be monitored.
2. Dentists should continue to implement Universal Precautions in their practice.
3. Gloves should be worn while performing dental procedures, cleaning and handling contaminated instruments.
4. Gloves are recommended in dental surveying.
5. High risk areas should be pre-cleaned properly with **soap and water** to remove extraneous organic matter and then disinfected with EPA-approved surface disinfectants such as iodophors, synthetic phenolics, or chlorine compounds.
6. Waterlines should be flushed for several minutes at the beginning and the end of each clinic day.
7. Hand pieces should be flushed for 20-30 seconds after each patient.
8. Waste should be correctly categorized, collected from clinics, and disposed of properly according to the city of North York's garbage by Law and the Ontario ministry of environment Guidelines for waste management.
9. Sharps should be kept into puncture-proof containers, collected and disposed of through an approved receiver.
10. Biomedical waste (pathological waste and infectious waste) should be collected from the clinics and disposed of properly through an approved receiver or decontaminated on-site so that generators can certify it is not biological
11. Non-Infectious waste should be collected and disposed of in an industrial waste container
12. Regular garbage disposed of within the usual garbage

13. Amalgam should be kept in used fixer collected from clinics and disposed of through an approved receiver
14. X-ray fixer and developer, x-ray film and x-ray film packets should be collected and disposed of through an approved receiver.

Table 1. Classification of devices, processes, and germicidal products

Device classification	Devices (examples)	Spaulding process classification *	EPA product classification +
Critical (enters sterile tissues or vascular system)	Implants, scalpels, needles, handpieces, other surgical instruments, etc.	Sterilization-sporicidal chemical; prolonged contact	Sterilant/disinfectant
Semicritical (touches mucous membranes)	Air/water syringes, amalgam carriers, etc.	High-level disinfection-sporicidal chemical; short contact	Sterilant/disinfectant e.g., Glutaraldehde (CIDA-steryl28)
	Mixing slabs, spatulas, etc.	Intermediate-level disinfection	Hospital disinfectant with label claim for tuberculocidal activity e.g., Quaternary ammonium (ASPTI-steryl Brand)
Noncritical (touches intact skin)	Tabletops, stethoscopes, etc.	Low-level disinfection	Hospital disinfectant without label claim for tuberculocidal activity e.g., Alcohol, (Asepticare)

Notes:

* E. H. Spaulding classification of disinfection according to degree of risk of infection involved in the use of instruments and items for patient care (critical, semicritical, and noncritical) 1968.

+ Environmental Protection Agency (EPA) classifies disinfectants according to their microbicidal efficacy.

Table 2: Properties of an ideal disinfectant

1. Broad Spectrum Should always have the widest possible antimicrobial spectrum.
2. Fast Acting Should have a rapidly lethal action on all vegetative forms and spores of bacteria and fungi, protozoa and viruses
3. Not Affected by Physical Factors Active in the presence of organic matter such as blood, sputum and feces. Should be compatible with soap, detergents and other chemicals encountered in use.
4. Non-Toxic
5. Surface Compatibility Should not corrode instruments and other metallic surfaces Should not cause the disintegration of cloth, rubber, plastics, or other materials
6. Residual effect On Treated Surfaces
7. Easy To Use
8. Odorless An inoffensive odor would facilitate routine use
9. Economical Cost should not be prohibitively high

Source: Molinari. Fundamentals of Environmental Surface Disinfection,

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