The Basic Protocol

Infection Control Guidelines for the Dental Service, Department of Health

2019

Infection Control Standing Committee
Dental Service
Department of Health, HKSAR Government
c/o 7/F, MacLehose Dental Centre, 286 Queen's Road East, Wan Chai, Hong Kong

DISCLAIMER:

This document is intended for internal use in the Dental Service, Department of Health. It is not intended to serve as a regional infection control standard.

For other practising dental professionals, this document contains recommendations for reference only. Adjustments may be required in accordance with the types of dental service provided, patients' needs as well as the actual physical environment, size and structure of individual clinics.

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Infection Control Standing Committee

This document is produced by the Infection Control Standing Committee, Dental Service, Department of Health.

Members:
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Dr. CHIU Chi-kit, Lawrence (Secretary)
Dr. CHAM Kwong-man, Wendy
Dr. AU YEUNG King-sang, Rita
Dr. CHEUNG Julian T
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Dr. NG Sheung-chun, Amy
Dr. POON Hung-wai, Philip
Dr. TSANG Wai-ming

Editorial Board

Drs. Julian T CHEUNG (Chief Editor), Norman LAW, Amy NG, Rita AU YEUNG, Danny NG

Preface

It has been 20 years since the launch of the first version of the Basic Protocol in 1999. The previous versions served the purposes of guidance and reference for internal operations in the Government Dental Service. The recommendations made in the Protocol are based on local and international guidelines, including but not limited to the *Guidelines on Infection Control Practice in the Clinic Settings of Department of Health* (2017) and *Guide to Infection Prevention for Outpatient Settings: Minimum Expectations for Safe Car*e (CDC, 2016). Using these guidelines, we have strived to optimise effectiveness by following evidence-based recommendations, and followed logical approaches to enhance procedural efficiency.

We have rearranged the content to be in line with the 2017 Department of Health guidelines, adding sections on respiratory hygiene, patient triage, sharps and handling of linen. We have also added a section on dental unit waterlines, reflecting our current practice of waterline maintenance.

We paid special attention to the local environment and specific challenges of Hong Kong, which include space constraints and human resource issues. Some of the procedures in the Protocol are specifically tailored for our Service. With the resources available, we need to balance risks and benefits of various infection control procedures. We have strived to achieve maximum beneficial effects using minimal resources without violating infection control principles.

As developments in infection control practice change, there is obviously a need to revise this Protocol again in the future.

The target audience of this Protocol is clinical staff working in the Dental Service of the Department of Health. Other users may use this document as a point of reference and adapt infection control policies to suit their own needs.

Dr. Norman LAW Chi-ming
Chairman, Infection Control Standing Committee
Dental Service, Department of Health

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Introduction

The Basic Protocol was first published in 1999. It is intended to protect all dental health care personnel (DHCP) and patients within the settings of the Dental Service, Department of Health.

The content of the Protocol is based on the concept of 'Standard Precautions' which, as defined by the US Centers for Disease Control & Prevention, are a set of safety measures designed to prevent transmission of bloodborne infectious agents, human immunodeficiency virus (HIV) and hepatitis B virus (HBV) for instance, among the parties involved. Diseases that have other modes of transmission, like airborne spread in active open tuberculosis, may require additional precautions ranging from simple rescheduling of treatment to the employment of extra protective gear as recommended by medical experts in the hospital isolation wards.

The Standard Precautions involve the use of physical barriers including gloves, gowns, masks and protective eyewear, which can reduce the risk of exposure of the DHCP's skin or mucous membranes to potentially infectious materials.

Proper safety measures should also be taken to prevent sharps injuries by needles, scalpels, and other pointed instruments or devices. To prevent transmission of bloodborne pathogens among patients, used or contaminated instruments must be appropriately processed. Single-use items should be properly disposed of after use.

This manual is divided into two sections. Section ONE outlines the basic principles of infection control. Section TWO depicts infection control in practice.

It is essential to bear in mind that there is more than one way to achieve the desirable outcomes. The rationales of our recommendations must be understood and suitable adjustments be carried out to fit different scenarios. Sound knowledge in the epidemiology, natural history, modes of transmission, clinical presentations, and prevention of common bloodborne pathogens certainly facilitate the appreciation of the recommendations in the *Basic Protocol*.

To keep abreast of the latest developments, the *Basic Protocol* will be revised from time to time.

1. The Basic Principles

Transmission of infectious diseases has aroused concerns from both the general public and health care workers in the past few decades because of the emergence of potentially lethal infections such as HIV and HBV infections. The last outbreak of severe acute respiratory syndrome (SARS) in 2003 and the threat posed by the H5N1 virus (Bird flu) have made the importance of proper infection control even more noticeable in the community, clinic and personal levels. Dentistry, in particular, deals with the oral cavity which is inhabited with commensal oral flora. DHCP are at an increased risk of being infected because of the potential presence of bloodborne pathogens in the saliva and blood, and the increased chances of needle-stick injury (Porter et al., 1990; Cleveland et al., 1995).

1.1 Disease Transmission

The general routes for disease transmission in dentistry involve:

a. Direct contact with a lesion, infected body fluids (blood, saliva, etc.) or tissue debris during intraoral procedures; including inoculation injury like needle-stick injury, and splatters of blood, saliva, or nasopharyngeal secretions onto breached or intact skin/mucosa.
b. Indirect contact via contaminated dental instruments, equipment or materials.
c. Inhalation of infectious aerosols generated from procedures such as tooth preparation with high-speed handpieces or ultrasonic scaling, which can remain suspended in the air for some time.

It must be emphasised that the simple presence of a microbe does not necessarily warrant an infection; the following must also be present (CDC, 2003a):

1. a pathogenic organism of sufficient virulence and in adequate number to cause disease;
2. a reservoir or source that allows the pathogen to survive and multiply (e.g. blood);
3. a mode of transmission from the source to the host;
4. a portal of entry through which the pathogen can enter the host; and
5. a susceptible host (i.e. one who is not immune).

1.2 Cross-Infection

Cross-infection is the transmission of infectious agents between patients and health care workers in a clinical environment (Figure 1).

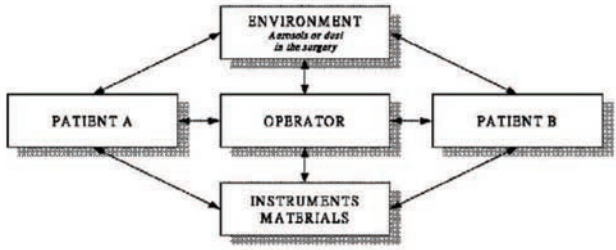


Figure 1: Simplified schematic illustration on the concept of cross-infection. There are inter-relationships among patients, environment, operator, instruments and materials

1.3 Infection Control

Infection control is a multifaceted discipline (Figure 2). **The goal of infection control is to break the chain of disease transmission.**

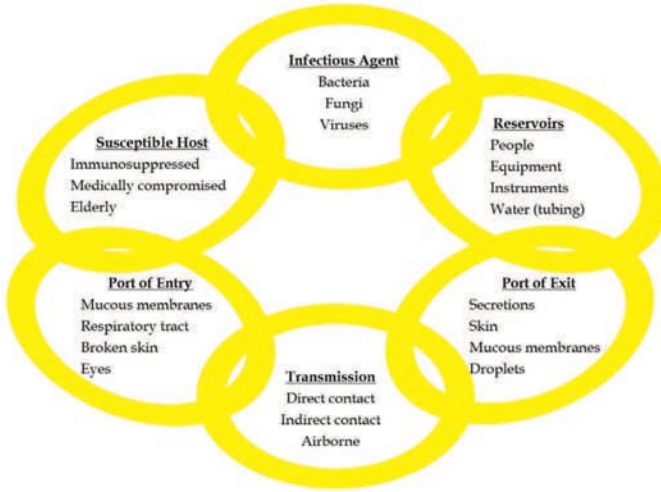


Figure 2. The chain of infection. A break in any of the six links of the chain of infection will stop the spread of an infectious agent.

1.4 Standard Precautions

In the past, infection control in dentistry involved the identification of the 'high risk' (potentially infectious) patients who were then treated with extra precautions (Garner & Simmons, 1983).

However, some patients may be unaware of their infected status, for the reason that they are asymptomatic carriers or the disease has long incubation period. More importantly, some patients are unwilling to tell the dentists their disease status (Perry et al., 1993; McCarthy et al., 1995). These subjects can unknowingly transmit the disease to others.

It was the US Centers for Disease Control & Prevention (CDC), in 1985, that first coined the phrase 'Universal blood and body-fluid precautions' to overcome the many problems related to the 'Identification-and-Isolation' approach. **All patients are considered potentially infectious for bloodborne diseases and, therefore, the same precautions should be applied on everyone**. The approach was then widely known as the 'Universal Precautions' (CDC, 1987).

Universal precautions did not apply to faeces, nasal secretions, sputum, sweat, tears, urine or vomitus unless they contained visible blood. In 1996, CDC revised the 'Universal Precautions' and expanded it further as the 'Standard Precautions' (Garner & HICPAC, 1996).

'Standard Precautions' are applicable to contact with (1) blood; (2) body fluids, secretions and excretions (except sweat) regardless of whether they contain blood; (3) nonintact skin; and (4) mucous membranes. As saliva has always been considered potentially infectious in dental infection control, no actual operational difference exists between the 'Universal Precautions' and 'Standard Precautions' (Bjerke, 2002; CDC, 2003a).

1.5 Transmission-Based Precautions

Transmission-based Precautions can be categorised into:

- ❖ Airborne Precautions,
- ❖ Droplet Precautions and
- ❖ Contact Precautions.

Airborne precautions should be considered for certain respiratory diseases, such as tuberculosis and SARS. It is fortunate that tuberculosis and SARS are not usually infectious before signs and symptoms appear (Chan et al., 2003; Molinari & Terezhalmy, 1996; WHO 2003b; Yu et al., 2004). Though SARS is transmitted by droplets, it is important to bear in mind that droplets could be aerosolised in aerosol-generating procedures.

Airborne precautions should be based on community risk assessment and performed appropriately for the risk level of disease transmission in the facility (CDC, 1994 & 2003a). They are based on a hierarchy of measures, including administrative controls, environmental (engineering) controls, and personal respiratory protection (CDC, 1994 & 2003a).

Administrative controls aim for early detection of a person with active disease and prompt isolation from susceptible persons to reduce the risk of transmission. Appropriate medical history taking and screening are important. For example, temperature check during the SARS epidemic was considered a key measure to control the spread of SARS (WHO, 2003c). A suspected case should be referred for medical evaluation and care without delay. Elective dental treatment should be deferred until he / she is confirmed to be non-infectious. Urgent dental treatment should be performed, preferably, in special operatory with engineering controls on airflow, air filtration, etc. Special PPE such as properly fitted N95 respirator must be worn.

2. Infection Control in Practice

2.1 Hand Hygiene

Hand hygiene is considered as one of the most critical measures in reducing the risk of transmitting pathogens to patients and health care personnel.

Handwashing reduces bacterial load on hands, which will flourish under the warm and moist environment beneath gloves. The handwashing process may carry more weight than the handwashing agent used. Care should be taken to ensure that all parts of the hands are washed.

Hand jewelry and wrist watches should be removed. Rings are preferred not to be worn, but a plain wedding ring is permitted. Artificial fingernails should be avoided. Special attention should be paid to areas that could be easily missed, such as the fingertips, nails, thumbs, and the dominant hand. When short-sleeved uniforms are worn, the exposed forearms must be included in the handwashing process.

For routine dental procedures, handwashing with plain soap is adequate. For surgical procedures, an antimicrobial (surgical) handscrub, such as Hibiscrub which contains 4% chlorhexidine gluconate w/v, should be used. Skin irritation can come about with frequent use of chlorhexidine gluconate though true allergic reactions are uncommon. Alternative handwashing agents like iodophors can be used for those who are sensitive to chlorhexidine.

At the beginning and the end of each clinical session, handwashing with rubbing action maintained for at least 20 seconds before rinsing is recommended. For invasive surgical procedures, a 2 to 6 minute scrub of the hands and forearms is necessary. The proper hand hygiene regime should also be complied with after each patient treatment.

If the hands are not visibly soiled, an alcohol-based hand rub is considered adequate because of its rapid action and accessibility (CDC, 2003a). The drying effect of alcohol can be reduced or eliminated by adding glycerol (1% to 3%) or other skin-conditioning agents (Rotter et al., 1991). Alcohol-based gels containing emollients have been found to cause less skin irritation and dryness relative to soaps or antimicrobial detergents(Boyce et al., 2000).

Studies have shown that hand rubbing with an alcohol-based solution can actually achieve a greater reduction in bacterial contamination than conventional handwashing with medicated soap (Girou et al., 2002).

Bottles of alcohol-based hand rub and liquid soap should not be "topped up", as this practice can lead to bacterial contamination. If reusable containers are used, they should be washed and dried thoroughly before refilling.

Damaged skin, cuts and wounds should be covered by dressings to guard against bacterial invasion.

Hot water for hand washing should be avoided, as repeated exposure may increase the risk of dermatitis.

Skin loses moisture and chaps easily with frequent handwashing. Regular use of moisturising hand cream helps to prevent dry skin. Petroleum-based lotions, however, can weaken latex gloves and increase permeability.

When sensitivity is apparent, change to another handwashing agent and seek medical advice as soon as possible.

2.2 Personal Protective Equipment

2.2.1 Gloving

Hands should be properly dried with paper towels before donning gloves because moisture trapped under gloves enhances bacterial growth and skin sensitivity. It must be stressed that gloving does not replace handwashing; they are not mutually exclusive.

Gloves serve as a barrier between the patient and operator. Its effectiveness is related to its quality and the way it is used.

Disposable (patient examination) gloves can be used for routine operative procedures. Sterile surgical gloves should be used when surgical asepsis is desirable, e.g. in oral surgery. As for simple dental extraction, the operator may use either disposable or sterile gloves. It has been shown that the use of sterile gloves does not offer an advantage over clean gloves in minimising infection following dental extraction (Cheung et al., 2001). Non-latex or powder-free gloves should be used if either the operator or the patient is sensitive to latex or glove powder respectively.

A new pair of gloves must be worn for every patient. Washing latex gloves with plain soap, chlorhexidine gluconate, or alcohol will produce micropunctures, which can then allow penetration of liquids (wicking) and subsequent hand contamination (Adams et al., 1992; Martin et al., 1988).

Gloves should be changed if their integrity are compromised or when they are grossly contaminated.

2.2.2 Face Masks

Face masks are designed to guard against splatters and aerosols from getting into contact with the mucous membranes of the nose and mouth. (Aerosols are unnoticeable tiny droplets suspended in the air. Splatters are much bigger droplets, 100 microns or more in diameter, which are visible to the naked eye).

Paper masks without filters are inappropriate for patient treatment. **Surgical masks**, with >95% bacterial filtration efficiency, **should be used routinely** in patient treatment and management.

N-95 respirators, particulate-filter respirators certified by the US National Institute for Occupational Safety and Health (NIOSH), are able to filter 1μm particles in the unloaded state, with a filter efficiency of >95% at a flow rate of <50L/min. A properly fitted N-95 respirator protects health care providers from inhaling respiratory pathogens, when treating patients with active TB and SARS. However, it is recommended to defer aerosol generating procedures if the patient is suspected to have airborne infections. **It is a must to FIRST read and understand the users' instructions before use.**

Face masks should be changed at least once every session or when contaminated. The frequency of change depends on the room humidity and the procedure carried out.

When a mask gets 'wet' from exhaled moist air, the resistance to airflow through the mask will increase, causing more air to pass round the edges. A 'wet' mask will also be aspirated against the nose and mouth, which can be hazardous if it is soaked with pathogens. With procedures of long duration, or which generate lots of splatters or aerosols, a more frequent change of mask is justified (even in mid-course of a procedure). Do not place hands over a worn mask as it should be considered a contaminated object. A used mask should be immediately disposed of after use.

2.2.3 Eye Protection

Protective eyewear or face shields should be worn at all times during patient contact when there is a possibility that a patient's body fluids may splash or spray onto the face/eyes (WHO, 2003a).

Proper protective eyewear should have solid side shields. Plain spectacles which commonly lack solid side shields are ineffective protective eyewear. Protective eyewear suitable for eyeglass users is also available.

Face shields offer effective protection against splatters. They cannot, however, safeguard aerosols from entering the nose and must be used in conjunction with face masks.

Face shields and protective eyewear should be cleaned, after use, with water and Hibiscrub, or alcohol. If there is clear blood contamination, they should be disinfected with intermediate-level disinfectants; all traces of disinfectant must then be rinsed off thoroughly to avoid eye irritation.

2.2.4 Protective Clothing

Protective clothing (uniforms, white coats or disposable gowns) prevent contamination of street clothing and protect the skin of DHCP from exposure to blood and body substances (CDC, 2003a).

Care should be taken to minimise splashes and splatters when cleaning instruments and handling disinfectants. A disposable gown is always appropriate in these circumstances.

Disposable caps that completely cover the hair may be used when splashes of blood and body fluids are expected. They are also useful in keeping aerosols from lodging on the hair, which may then be transferred to family members or onto inanimate objects (WHO, 2003a).

Cardigans or sweaters should not be worn over contaminated uniforms; also, they should not be considered as protective tops.

Protective clothing should be changed at least once every day; or when contamination is obvious.

Soiled uniforms (and linens) should be gently handled by personnel fitted with proper personal protective gear including face masks, gloves and protective clothing.

2.3 Respiratory Hygiene and Cough Etiquette

Respiratory hygiene and cough etiquette should be implemented to prevent the spread of respiratory pathogens when there are signs and symptoms of respiratory infection including cough, congestion, rhinorrhea, or increased production of respiratory secretions.

Infection control measures to contain respiratory secretions include:

- covering mouth and nose when coughing or sneezing
- using tissue paper to contain respiratory secretions and dispose it in lidded receptacles
- performing hand hygiene after hands have been in contact with respiratory secretions
- advising persons with respiratory symptoms to wear surgical masks, especially during epidemic periods

2.4 Patient Triage

Early identification and early isolation in outbreak situations are key strategies to prevent spread of infectious disease in clinic settings. It is important to inform Clinic In-Charge immediately if suspected cases are identified.

During patient triage, the following should be observed:

- frontline staff should assess patients for conditions that require additional precautions (i.e. transmission-based precautions) and prioritise those who may require urgent consultation and isolation
- compliance of respiratory hygiene and cough etiquette should be ensured
- provide surgical mask to patients identified with respiratory symptoms
- minimise the length of stay for patients with suspected symptoms by facilitating early consultation and departure

2.5 Surface Asepsis

Surface asepsis is a set of procedures that prevent or remove contamination from surfaces (Miller, 1992). Uncovered surfaces within the confine of the dental operatory are prone to be contaminated by splatters, aerosols, direct touch, etc. Eating, drinking and handling of contact lenses are therefore not advisable in the operative areas.

The logical approach to realise infection control is to:
1. **limit contamination** by proper zoning, suitable aseptic techniques, use of barriers, etc.
2. **disinfect the contaminated surfaces.**

2.5.1 Limit of Contamination

Zoning

The area for cleaning and processing used instruments (**Dirty Zone**), the area for holding sterilised and clean instruments (**Clean Zone**), and the area for patient treatment (**Working Zone**) **must be clearly delineated** from one another. It is essential to **ensure a unidirectional flow of items from the Clean Zone to the Dirty Zone.**

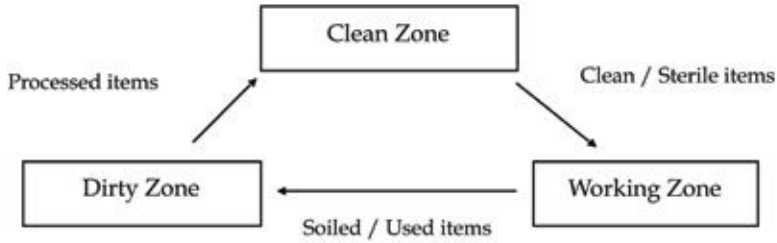


Figure 3: Unidirectional flow of instruments among zones.

Great care must be exercised to **avoid contamination when crossing zones**, as illustrated in the figure below.

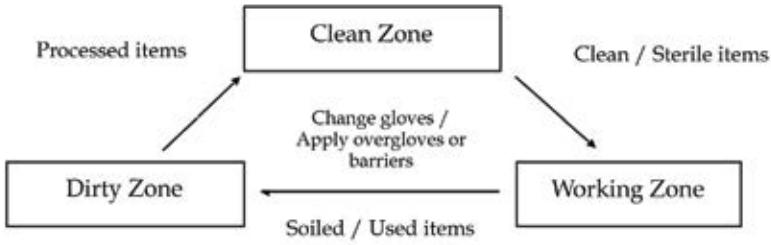


Figure 4: Zone crossing precautions.

Keep away from contamination

The number of items lying open on bench tops, bracket tables, and shelves should be kept to a minimum. Bur stands, cotton roll and gauze dispensers, saliva ejectors, mixing glass slabs / pads should be kept in covered containers or drawers. Only the least amount of stock (inventory and stationery items alike) should be held inside the surgery. Food and drink should be kept away from dental materials or other potentially infectious materials.

Use of barriers

It is more reliable (and much easier) to **prevent contamination with the proper use of barriers** than to disinfect afterwards. Handpieces, 3-in-1 syringes, ultrasonic scalers and suction tubes must be enveloped in barrier sleeves. Disposable plastic covers should be placed on bracket tables, handpiece holders and suction tube holders. Plastic-backed paper bibs should be used to cover patients' clothing.

To prevent contamination of equipment and office items, consider putting on a pair of clean gloves over the contaminated gloves (overgloving) when crossing zones in the middle of a treatment procedure.

Overgloves can be used when adjusting chair/light positions, holding light curing unit or suction, taking instruments out of the drawer, mixing dental materials, or answering phone calls.

Be sure to put on the overgloves only when you are about to proceed and remove them straight afterwards. Overgloves are meant for interim use and hence can have a loose fit. A plastic examination glove or simply a plastic bag can conveniently and adequately serve as an overglove.

Limit contacts

It has been clearly demonstrated that contact and subsequent spread of a patient's oral fluid occurs frequently during dental procedures.

Adjustment of the dental light and bracket table should be completed before operation. Both operator and assistant should refrain from inadvertently laying hands on objects with contaminated gloves. High vigilance on differentiating 'clean' from 'unclean' is required and efforts should be paid to prevent contaminating the 'clean' by the 'unclean'.

Under the right circumstances, a DSA can change his/her position from being a 'chair-side nurse' to a 'scout nurse'. He/She then limits his/her role to instrument or material transfer to the operator. Good co-ordination between the dental officer and the DSA, together with proper workflow, is needed.

Control aerosols and splatters

Aerosols and splatters are often generated during dental treatment and instrument cleaning. High volume suction, positioned close to the mouth, significantly reduces the number of aerosolised particulates by as much as 90% (Jacks, 2002). Handpieces, ultrasonic scalers, etc. should be operated with an efficient high-volume suction.

Bacterial counts in aerosols can be greatly decreased if patients perform pre-treatment mouthrinsing or brushing. Even rinsing with water can cause a substantial reduction in bacterial counts (Fine, 1992). Rinsing with chlorhexidine gluconate (0.12% to 0.2%) is better for its residual action, but there are concerns regarding hypersensitivity reactions. Rubber dam application effectively isolates the operating field and reduces the bacterial counts in aerosols significantly (Cochran et al., 1989; Samaranayake et al., 1989).

Good work plan

It is good practice to **do more in a single appointment** than to schedule multiple appointments. A good work plan avoids rush and hurry which are rivals to effective infection control. Prior set-up of instruments in a tray **(tray-system)** with necessary materials ready **(pre-dispensing)** for a treatment procedure reduces zone crossing and thus the chance of contamination.

2.5.2 Surface disinfection

Different instruments/equipment/surfaces require different disinfection regimes. In the dental operatory, environmental surfaces can be divided into *clinical contact surfaces* and *housekeeping surfaces* (CDC, 2003a). Examples of clinical contact surfaces include bench tops, drawer surfaces and dental units. Housekeeping surfaces (e.g. floors, walls and sinks) have limited risk of disease transmission. They can be decontaminated with less rigorous means than those used on patient-care items and clinical contact surfaces (CDC, 2003 a & b).

Surface disinfection can be achieved with either intermediate-level or low-level disinfectants. Intermediate-level disinfectants are those registered with the US Environmental Protection Agency (EPA) as "hospital disinfectants" with "tuberculocidal" activity. They include phenolics, iodophors, and chlorine-containing compounds. Low-level disinfectants are those registered with EPA as “hospital disinfectants” exclusive of “tuberculocidal” activity (e.g. alcohol, quaternary ammonium compounds).

Surface disinfection is a two-step procedure. The first (pre-cleaning) step aims to reduce the organic loads which interfere with the action of disinfectants. The second step allows time for the disinfectant to take effect.

When and what to disinfect

If waterproof surface barriers are used properly, and carefully removed and replaced, there is no need to disinfect protected surfaces in between patients.

Intermediate-level disinfection should be applied on unprotected clinical contact surfaces, or housekeeping surfaces with obvious blood/saliva contamination. A low-level disinfection of the clinical contact surfaces is sufficient once daily. Door handles should also be disinfected at least once a day.

Gloves, protective eyewear, face mask, and protective clothing must be worn when handling disinfectants.

How to disinfect

The soak-wipe-soak technique can generally be adopted in most situations. The first soak, and wipe, with disposable paper towels, is the pre-cleaning step that lowers the bioburden. Disinfection *per se* is brought about by the second soak.

The "wetting" time of the second soak should follow the manufacturer's recommendations. For intermediate-level disinfection, 10 minutes are usually required. Residual disinfectant should then be removed with water (and paper towel).

Some disinfectant wipes combine pre-cleaning and disinfection steps into one.

Do not soak gauze or paper towels in disinfectant containing sodium hypochlorite in advance, as its organic component will affect the activity of the disinfectant. Using the same agent for pre-cleaning and disinfection will decrease the number of stock items needed.

Choice of agents

Household bleach (5-6% sodium hypochlorite) diluted to 10 parts is a generally accepted surface disinfectant for intermediate-level disinfection. (Intermediate-level disinfectants differ from low-level disinfectants in that they are tuberculocidal and virucidal.) Ten-minute contact time is recommended. Its action on micro-organisms is well documented (Rutala & Weber, 1997). However, being unstable at this concentration, it must be freshly prepared every day. Its corrosive effect on metals and bleaching effect on fabrics demand its use with caution. Do note that proper barrier application will greatly reduce the need for intermediate-level disinfection in-between patients.

Alcohol is not accepted for intermediate-level surface disinfection because it vaporises rapidly (and the contact time will thus be inadequate for effective surface disinfection).

2.6 Taking and Processing of Dental Radiographs

Barrier application and surface disinfection should be extended to the taking and processing of radiographs. Use barriers to align the cone, set the control panels and start off film exposure. Gloves should be worn and appropriate personal protective equipment should be used for possible blood/body fluid splatters.

Film processing in clinics using darkrooms

Remove any saliva/blood on the film pack with paper towels. Open the film pack (dirty) inside the dark room and let the exposed film drop onto a clean paper towel or surface barrier. **Be sure not to contaminate the film.** Put on a new pair of gloves and take the clean film for development.

Film processing in clinics not using darkrooms

The developing and processing of films in clinics not using darkrooms require extra attention to prevent cross-infection.

Wrap and seal the film pack with a barrier before exposure. Remove the barrier and let the clean film pack drop onto a clean surface afterward. Put on a new pair of gloves and take the film for development.

Processing of digital radiographic plates

Wrap and seal the digital plate with barrier(s) before exposure. Remove the barrier(s) and let the clean plate drop onto a clean surface afterward. Put on a new pair of gloves and take the plate for scanning. In case of plate contamination, follow manufacturers' instructions for disinfection.

2.7 Disinfection of Impressions, Prostheses and Appliances

Impressions and appliances (from patient's mouth) are contaminated items. They must be appropriately disinfected before sending to the dental laboratories, with suitable disinfectant and disinfection time to ensure dimensional stability. Good communication with the dental laboratories should be maintained to avoid a skip or unnecessary duplication of disinfection procedures in practice (ADA, 1996; CDC, 2003a; Merchant, 1996; OSAP, 1998),

- ❖ Firstly, remove saliva, blood and organic debris by thorough rinsing in water.
- ❖ **Immersion in 1:10 sodium hypochlorite for 10 minutes or Dip & Store* with 1:10 sodium hypochlorite for 10 minutes.** The corrosion of metal parts caused by sodium hypochlorite is a theoretical possibility that may not happen with the few disinfection cycles in the entire fabrication process (Merchant, 1996).
- ❖ Immersion in 70%-80% alcohol for 10 minutes is a viable alternative for ceramic and metal items.
- ❖ All disinfected items should be rinsed and dried, packed properly and transferred to the laboratories.

*Dip & Store: The item is first dipped in disinfectant, then stored moist inside a covered container.

2.8 Instrument Sterilisation and Disinfection

Instruments or clinical items can be divided into 3 categories according to CDC/ Spaulding classification (CDC, 2003a; Spaulding, 1968).

Critical items are those which are used to penetrate soft tissues or bone. The risk of disease transmission is high. They must be sterilised before and after use. These include forceps, surgical instruments and scalers.

Semi-critical items are those which come into contact with mucous membranes but are not used to penetrate soft tissues or contact bone; examples include mirrors, amalgam condensers and hand instruments for operative procedures. The risk of disease transmission is intermediate. These items should be sterilised in the same way as critical items.

Non-critical items are those that touch intact skin only. The risk of disease transmission is low. Intermediate-level disinfection should be applied after use, with or without the visible presence of blood. As mentioned before, proper barrier application will greatly reduce the need for post-operative disinfection.

Items not designed to be reused or cannot be satisfactorily sterilised should be disposed of after use. Plastic saliva ejectors, paper cups, brushes and prophylaxis cups, scalpel blades, needles, LA cartridges, sutures, gloves and matrix bands all fall into this category.

2.8.1 The Sterilisation Sequence

The entire management of used / soiled instruments is made up of several steps:

Pre-sterilisation cleaning

This is the most important step, but can easily be overlooked. It removes substantial numbers of microbes and organic remnants (blood, saliva, etc.) from instruments, which may otherwise inactivate disinfectants or insulate the microbes from heat.

Do note that it is more difficult to clean an instrument when contaminants are allowed to dry on it. If cleaning is delayed, it is advisable to keep soiled instruments in a holding solution which could simply be detergent in water, disinfectant, ultrasonic cleansing agent, or any proprietary product for pre-cleaning.

Ultrasonic cleaners must be used for pre-sterilisation cleaning. Such practice cuts down the need for hand processing and minimises the chance of getting injured by contaminated instruments or sharps. The manufacturer's instructions on operation should be followed. To avoid generating aerosols, **secure the lid before switching the cleaner on.** Proprietary ultrasonic cleansing agents usually contain ingredients effective in dissolving organic matter, but detergent-in-water is a low-cost and effective alternative. Cleansing agent should be changed once a day or when it has turned murky with use. The basket and tank of the ultrasonic cleaner should also be cleaned at the end of the day. Effectiveness of ultrasonic cleaner should be monitored regularly.

Washer-disinfectors are a better alternative as the cleaning process can be validated and instruments can be considered as disinfected at the end of the cycle.

Cleaned instruments should be rinsed thoroughly in water to get rid of all remaining cleansing agent. They should **then be checked for residual debris and hand-cleaned as necessary.** To avoid sharps injury, heavy duty utility gloves, protective eyewear, face mask and protective clothing should be worn in the process. Being more puncture resistant and less affected by chemicals, utility gloves provide better protection than examination gloves. Utility gloves should be cleaned at the end of the day and can be reused unless they are worn out.

Sterilisation of Handpieces

Most handpieces cannot withstand ultrasonic cleaning. Their inner recesses, however, have to be cleaned prior to sterilisation because oral debris/microbes may be retracted into the turbine space and waterline. The general guidelines on handpiece processing are as follows:

1. Leave the handpiece attached after patient treatment. Remove visible debris from the handpiece. **Run, to flush the waterlines, for 20 to 30 seconds** into a container or absorbent material.
2. Remove it from the coupling and clean the outer surface thoroughly with water or disinfectant, rinse and dry. Do not soak unless recommended by the manufacturer.
3. Clean/lubricate the inner recesses as recommended by the manufacturer. Some handpieces require lubrication before, after, or before and after sterilisation, or not at all. Check with the manufacturer's instruction. Use separate cans of lubricants for pre- and post-sterilisation lubrication.
4. Wipe residual lubricant away from the outer surface. For handpieces fitted with fibre-optics, be sure not to leave any lubricant on the fibre-optic contact.
5. Package in pouch, bag or container.
6. Follow the manufacturer's recommendations on sterilisation.
7. If post-sterilisation lubrication is required, handle the sterilised handpiece aseptically.

Drying

Instruments must be dried (and oiled if necessary) before sterilisation. Most hand instruments can be toweled dry. For hinged instruments or instruments with inaccessible small parts, they can be blown dry with compressed air. It is a misconception that sterilisation by means of an autoclave is a wet process and thus instruments can be left wet in the sterilisers. The vapourisation of water on wet instruments takes extra time. More importantly, water trapped in small spaces such as the hinges of instruments may be unable to vapourise completely. Effective sterilisation may not be achieved within the set time. The chance of corrosion is also increased.

Packaging

Before disinfection by washer-disinfector or sterilisation, instruments should be handled as though contaminated. Packaging should be done in the Dirty Zone unless washer-disinfector is used. Critical instruments not for immediate use should be packaged to prevent recontamination after sterilisation. Operative hand instruments that are used frequently can be put in perforated aluminium trays with or without wrapping (tray-system). Handpieces can be packaged in pouches or perforated trays. **All packages must be dated. The autoclave used for each package should be identifiable** to facilitate recall when ineffective sterilisation is presumed in the event of spore test failure.

Sterilisation

Moist-heat should be used for sterilising instruments. **Autoclaves are the most reliable tools in instrument sterilisation.** Effective sterilisation can be achieved in a relatively short period of time. The chamber of the autoclave should not be overloaded and regular monitoring is necessary to ensure efficacy of the machine. All critical and heat tolerant semi-critical instruments should be autoclaved. It is important to operate and maintain the autoclaves in accordance with the users' manuals. Do not take short-cuts in any case.

The gravity displacement and the pre-vacuum (vacuum assisted) autoclaves are both available in the Government Dental Service. For the gravity displacement models, air is displaced by steam physically. Improper packaging and loading could prevent the escape of air, leading to ineffective sterilisation. Their use should only be limited to sterilisation of unwrapped solid items. In pre-vacuum autoclaves, air is first drawn out (to create a vacuum) before the chamber is filled with steam. Effective steam penetration could thus be attained for different types of loads including solid, hollow and porous, pouched, and single/double wrapped items (Joslyn, 2001).

Storage

Sterilised items should be properly stored to ensure sterility.

Packaging simplifies storage. The storage condition is vital. The sterility of wrapped items can be maintained indefinitely unless an occurrence (e.g. torn or wet wrapping) causes contamination. (CDC, 2003a; Mayworm, 1984). Instruments in compromised wrappings should be re-cleaned, repackaged and re-sterilised promptly. For quality assurance, **wrapped instruments should be re-sterilised within two years.**

The date of sterilisation must be clearly marked on the package.

For unwrapped frequently used operative items, they should be stored in covered containers with no perforations, or cabinets with tight doors. Instruments autoclaved and kept in perforated trays should also be considered as unwrapped items. **Unwrapped items should be re-sterilised at least every three months, with the storage cabinets and containers for such items disinfected** with low-level disinfectant (or sterilised if applicable) at the same time.

2.8.2 Sterilisation monitoring

There are a number of reasons for ineffective sterilisation to occur (Miller, 2001), for instance:

- ❖ Overloading in a cycle.
- ❖ Improper equipment maintenance.
- ❖ Damaged door seal.
- ❖ Improper sterilisation time.
- ❖ Inappropriate packaging (e.g. instruments in non-perforated trays).

Therefore, it is crucial to monitor the effectiveness of a sterilisation process with the use of physical, chemical and biological indicators.

Physical indicators

The temperature and pressure finally attained and the time then elapsed should be noted. They should be in accord with the users' manual. Some autoclaves provide printouts with regard to the changes of the physical conditions during the cycle, which are certainly useful for documentation purpose.

Chemical indicators

Chemical indicators are heat-sensitive materials that display definite colour or physical changes in response to temperature rise and/or contact with steam over time. They could be turned out as pads, cards, strips, vials and most commonly tapes.

A chemical indicator designed solely to indicate heat change in a sterilisation cycle is known as a process indicator. The bands on an autoclave tape or the markers on a sterilisation pouch are process indicators; they change colour, in a given time, at a definite temperature. Process indicators, albeit being the most basic chemical indicator, can be conveniently used to differentiate processed from unprocessed items.

A Class 4 or 5 chemical indicator should be put in the most inaccessible part of every load (commonly the centre of an autoclave chamber). The result should be verified by two clinical staff before unloading, and properly entered onto the log sheet (Sterilisation Monitoring Summary) which should be kept, as other medical records, for seven years before disposal.

Biological indicators

Biological monitoring conclusively demonstrates that effective sterilisation is achieved, though physical and chemical monitoring provide factual information on the sterilisation conditions. The use of calibrated biological indicators (spore test) is the most important assurance (Miller, 2001; Molinari et al, 1996) on the sterilisation process.

Biological indicators are live, nonpathogenic bacterial *(Geobacillus stearothermophilus)* spores that are highly resistant to heat, much more so than the viral, fungal and bacterial pathogens (including HIV, HBV and Coronavirus); and present in greater number than the common microbials found in contaminants on patient-care equipment. Therefore, if the spores are inactivated after a sterilisation cycle, no other organism should survive and the related load is sterile.

Spore test should be performed at least weekly. After new installation, relocation, sterilisation failure and major repairs, steam steriliser should be tested by running three consecutive empty cycles with biological indicators, one right after the other. **The spore test result summaries should be kept for seven years at the clinic level.**

To conduct a spore test in the Dental Service, Department of Health,

- Pouch a vial (ensure that the glass ampoule is intact) and place it in the most inaccessible area of a load. Start the sterilisation cycle as usual.
- At the end of the cycle, check if the process indicator on the pouch and on the vial has changed colour. Check the integrity of the ampoule again.
- Fill in the request form (DH2544).
- Pack and dispatch to Public Health Laboratory Centre (PHLC), Department of Health for incubation.

If a spore test fails, the following steps should be taken:

1. Stop using the autoclave in connection. Use other autoclaves in the clinic.
2. Recall and re-sterilise all the items autoclaved since the last successful spore test.
3. Repeat the spore test immediately.
4. Check temperature, time, pressure and procedures in 3.
5. Request the second spore test with the (pink) DH 2544 Form stamped with the assigned clinic chop.
6. If the second spore test fails, ask EMSD to check the autoclave.
7. Ensure negative spore test result for the serviced autoclave before resumption of use. **Three consecutive empty cycles** with spore tests should be run, one right after the other.

2.9 Waterlines / Suction Asepsis

Waterline asepsis

Dental unit waterlines (DUWL) refer to the pipeline system that delivers water to handpieces, 3-in-1 syringe, and ultrasonic scaler. Studies have shown that DUWL promote both bacterial growth and the development of biofilm (CDC, 2003a). Oral debris of patients can also enter the DUWL even when the dental units are fitted with anti-retraction valves which may clog due to biofilm deposition and fatigue (Pankhurst et al, 1998). Although no epidemiologic evidence suggests that DUWL poses a public health concern, exposing patients and DHCP to water of uncertain microbiological quality is inconsistent with the infection control principle (CDC, 2003a). Therefore DUWL have to be treated to achieve desirable water quality.

Dental Unit Waterlines treatment

Microbial level in dental unit water should be minimised through a range of measures depending on the decontamination protocol:

- ❖ Removal of biofilm accumulated in DUWL by chemical treatment;
- ❖ Dental unit water quality maintenance by chemical dosing of water;
- ❖ Flushing waterlines for 20-30 seconds after each patient use;
- ❖ Flushing waterlines for a minimum of 2 minutes at the start of the day;
- ❖ Purging of DUWL until the bottle is empty when prolonged period of equipment non-use is anticipated.

Clinical staff should comply with the technical details stipulated in *"Decontamination of Dental Unit Waterlines in Government Dental Service"* (Appendix IV).

Water quality

Sterile irrigants/coolant such as sterile water or saline are required for surgical procedures such as dento-alveolar surgery, dental implant placement and all dental procedures performed in operating theatre (OT).

According to CDC recommendation, water quality for routine non-surgical dental treatment (such as irrigants/coolant for cavity preparation and ultrasonic scaling) should be of no less than potable drinking water standard (i.e., ≤500 Colony Forming Units per mL (CFU/mL) of heterotrophic water bacteria).

Bacterial levels should be tested according to the details stipulated in *"Arrangement of Water Test for Dental Unit Waterlines in Government Dental Service"* (Appendix V).

If the water test result indicates bacterial level more than 500 CFU/mL (Action Level), the steps below should be followed:

1. Review the process of DUWL decontamination
2. Until re-shock treatment is started, all DUWL should be flushed at the beginning of each working day
3. Perform the re-shock treatment as soon as feasible
4. Re-arrange water test for the dental unit
5. Inform ICSC for further investigation if bacterial level is still above the Action Level

The significance of heterotrophic water bacteria count on human health should be treated with caution. WHO expert panel reached a consensus that heterotrophic bacteria count is not a water safety indicator. (Bartram et al 2003). There is lack of clinical evidence to suggest that elevated population in the water flora pose an increased health risk to any segment of the population. (Allena et al 2002). In Dental Service, the heterotrophic bacteria count is used as a tool to indicate the effectiveness of water treatment processes.

Suction / Evacuation system

This is different from the dental unit waterlines in that contents along the suction system typically do not go back to a patient's mouth. Intermittent flushing with water during treatment and in-between patients can help to prevent the tubing from clogging. At the end of a working day, rinse the system with appropriate agent as recommended by the manufacturer, or a litre of water. The use of suction cleaning devices such as “Oro-cup” helps to create the necessary turbulence for more effective cleaning. The detachable suction filters and hoses should be cleaned with reference to the manufacturer's instructions.

Do not advise patients to close their lips tightly around the tip of a saliva ejector to evacuate oral fluids, as this may lead to suction backflow.

2.10 Vaccination

Healthcare workers are at risk of acquiring and transmitting infections through occupational exposure with potential contact with patients, their blood or body substances in health care settings. Protection against some infectious diseases can be achieved through vaccination.

According to Department of Health Circular No. 2/2018, the Dental Service follows the recommendations stated in the “Summary Statement on Vaccination Practice for Health Care Workers in Hong Kong” issued by the Scientific Committee of Vaccine Preventable Diseases in September 2017 as below:

a. HCW should be immune to hepatitis B and post-vaccination serological status should be ascertained.
b. HCW should be immune to measles and rubella, by either vaccination or medical evaluation.
c. HCW should be immune to varicella. HCW with negative or uncertain history of receiving two doses of varicella vaccines or disease of varicella or herpes zoster should be serologically tested. Vaccines should be offered to those without varicella zoster antibody.
d. All HCW should receive seasonal influenza vaccination annually once the vaccine is available.

2.11 Waste Management

Similar to the cleaning of used instruments and handling disinfectants, proper personal protective equipment are required in handling wastes.

Clinical waste

Clinical waste, domestic waste and chemical waste should be segregated at the sources of production. Covered waste receptacles should be used in clinical areas.

Clinical waste including sharps box that contains used/contaminated needles and blades, dressing dribbling or caked with blood or containing free-flowing blood, etc. should not be kept for more than 3 months. **All clinical waste must be disposed of in red plastic bags conspicuously marked with 'Biohazard' symbol and labelled as 'Clinical Waste' in both Chinese and English on the outside.** A second red bag is indicated if leakage is suspected. Waste bags for clinical waste should be securely fastened when reaching 70-80% of maximum volume. The bags filled with clinical waste should be tied up using the "swan neck" method of sealing (Appendix VI). Clinical waste bags should not be compacted by hand. Special management by licensed clinical waste collectors is required (Environmental Protection Department, 2001).

Non-clinical waste

All trash, other than clinical waste, could be disposed of as domestic waste in black plastic bags. Liquid waste, except chemical waste, can be emptied into the drain and flushed down with water.

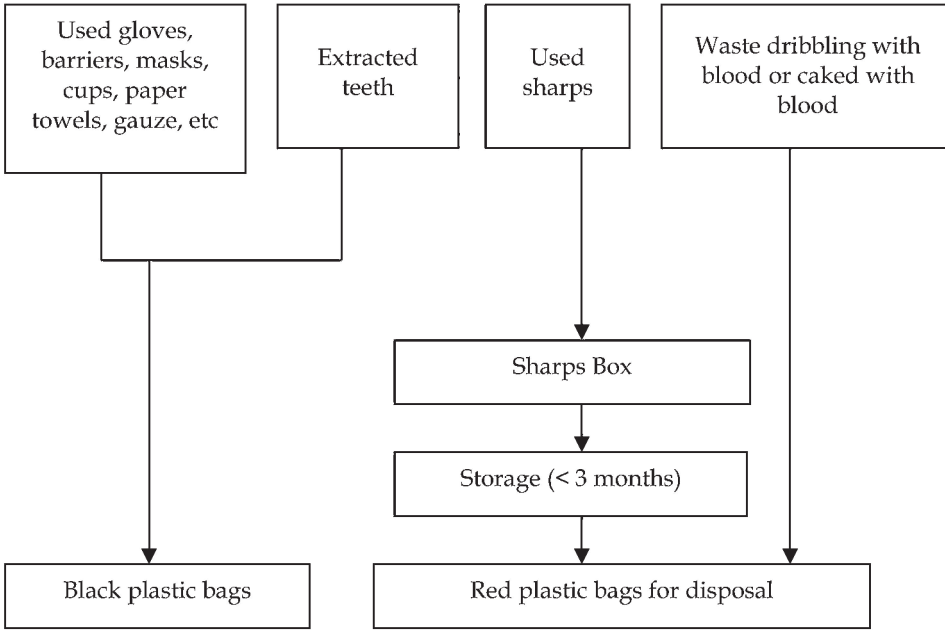


Figure 5: Outline of waste management

2.12 Safe Injection Practice and Sharps Handling

Sharps injury, especially involving disposable needles, is a well-known risk in all healthcare settings. Safe handling, use and disposal of sharps are necessary to prevent injury and the possible transmission of bloodborne diseases, including hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV).

Engineering controls and work-practice controls could be employed to prevent sharps injuries. Engineering controls remove or isolate a hazard in the workplace and are frequently technology-based. Examples are sharps containers and recapping devices. Work-practice controls are behaviour-based and are intended to reduce the risk of blood exposure by changing the way DHCP perform tasks, and include the following:.

Contaminated needles and other contaminated sharps should not be bent, recapped, manipulated or removed unless such action is required by a specific procedure. If recapping of needles is inevitable, use recapping devices or the one-handed scoop technique.

Burs should be removed before disassembling the handpiece from the dental unit.

Instruments should be used in place of fingers for tissue retraction or palpation during suturing and administration of anaesthesia.

Used needles and sharps (burs, scalpel blades, orthodontic bands etc.) should be discarded into the sharps box. Sharps box must be placed in a safe position within the surgery to avoid accidental tipping over and should be out of reach of small children.

Sharps box should not be overfilled and should be disposed when it reaches the warning line (~70-80%) of the maximum volume. Sharps box should be sealed and placed into a heavy duty red plastic bag with biohazard sign for proper disposal.

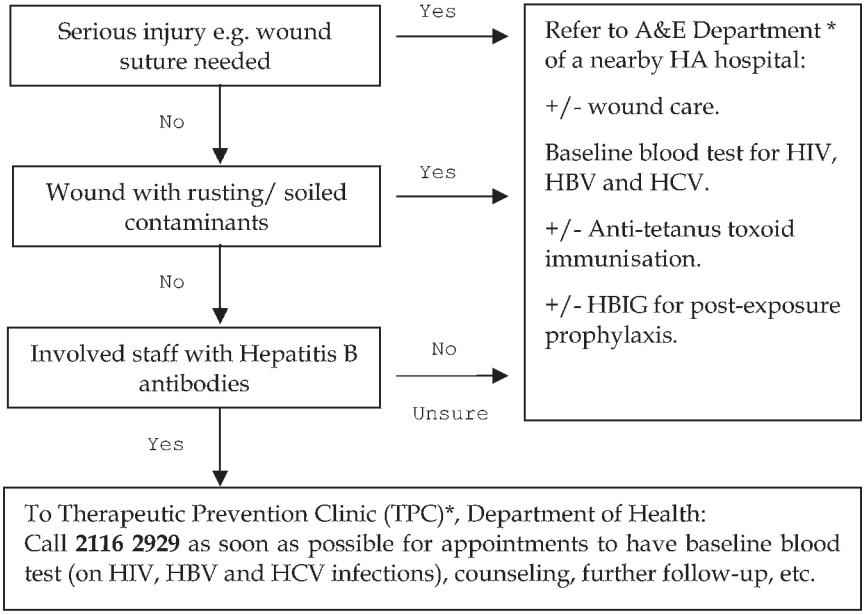
2.13 Occupational Exposure to Infectious Materials

Occupational Exposure is defined as the contact of nonintact skin, eyes, mucous membranes or parenterally with blood or other potentially infectious materials (CDC, 2003a). Management measures include:

First aid

- ❖ Wash wounds with soap and water; flush mucous membranes with water.
- ❖ Dress wound if necessary.

Referral



* Be sure to have a completed ***Referral*** (Appendix VIII) when attending A&E or TPC.

Establish the serological status of source patient

If the source patient belongs to the "high-risk" groups, refer him/her (with informed consent) for blood test as the related dental instruments/needles normally contain too little source material for laboratory tests. This will facilitate arrangement for follow-ups. (Some hotlines are available to provide additional information on specific medical conditions, e.g. 2112 9911 for Hepatitis B, 2780 2211 for AIDS)

Reporting

Complete the *Surveillance Form for Sharps Injury or Mucocutaneous Exposure to Blood / Body Fluid* (Appendix IX) and report respectively to Infection Control Branch, Centre for Health Protection and Infection Control Standing Committee, Dental Service.

2.14 Handling of Linen

A policy on the management of linen should be in place wherever applicable. Clean linen should be handled, transported and stored separately from used linen.

Principles of handling used linen are as follows:

- Soiled textiles, including bedding, towels and working clothes may be contaminated with pathogenic microorganisms. Standard precautions should be applied when handling used linen.
- Appropriate PPE should be worn during handling of soiled linen.
- All used linen should be handled as little as possible and with minimal agitation to avoid contamination of environment and persons.
- Sorting or pre-rinsing of used linen in dental surgeries is not recommended.
- All used linen should be contained in a laundry bag or designated bin.

2.15 Collection and Handling of Specimens

Adherence to standard precautions and hand hygiene is crucial during specimen collection. Transmission-based precautions may be required according to patients' conditions.

Specimens should be taken correctly and placed in a leak-proof specimen container. The cap should be securely closed. The specimen container should be packaged appropriately in a sealed bag to prevent leakage during transport.

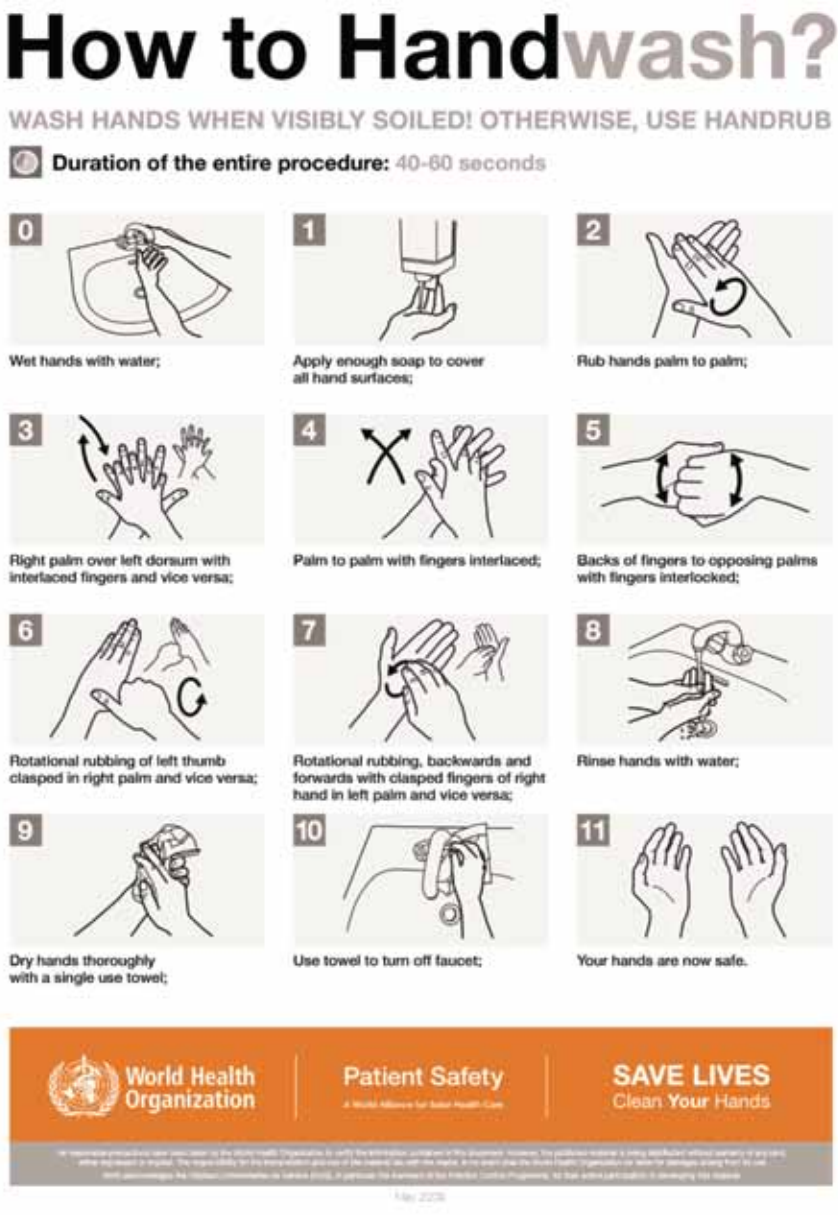
The outside of specimen containers should not be contaminated. If the container is visibly contaminated, clean and disinfect the outside of the container before placing it into the transport bag.

Refrigerator(s) used for specimen storage should be clearly labelled and should not be used for food, drinks or medications.

Specimens should be kept upright as far as possible to prevent leakage during transport to the laboratory. Specimens should be transported in individual leak proof bags marked with "BIOHAZARD". Request forms should be placed outside the plastic bag.

Hand hygiene should be performed after taking any specimen. Gloves must be worn when handling pathology specimens and specimen containers.

Appendix I - Poster: How to Handwash? (WHO)



Summary Table: The Use of Disinfectants & Antiseptics in Infection Control
Dental Service, Department of Health

Product	Agent	Category	Usage	
Bleach	0.5% Sodium Hypochlorite *(1 part Sodium Hypochlorite in 9 parts water)* 5000ppm	**Immersion** & **Surface** Disinfectant	• Risk of metal corrosion • Prepare fresh daily • Require 10 min. contact time • For surface disinfection : - Do not pre-soak gauze before use - Use 'Spray-wipe-spray', 'Soak-wipe-spray' or 'Soak-wipe-soak' method - Wipe surface with water after contact time to remove residue	• For disinfection of clinical contact surfaces* & housekeeping surfaces** (**with** visible blood / saliva contamination) • For immersion disinfection of laboratory items without concern for dimensional instability; and dip-and-store technique for impression materials • For disinfection of the following items if inadvertently contaminated # : - selected non-autoclavable patient care items (e.g. lead apron, X-ray tube) - analog X-ray packets
	0.05% Sodium Hypochlorite *(1 part Sodium Hypochlorite in 99 parts water)* 500ppm	**Surface** disinfectant		• For daily disinfection / cleaning of housekeeping surfaces**
Ethanol (Ethyl Alcohol)	70 - 80% v/v Ethanol / Ethyl Alcohol	**Immersion** disinfectant	• Require 10 min. contact time • Leave to dry after immersion (No rinsing) • Discard solution in the covered container at the end of the day	• For immersion disinfection of the following items if inadvertently contaminated # : - shade guide, the only LOW-RISK semi-critical items - selected non-autoclavable patient care items (e.g. divider, wire-cutter, alginate mixing spatula) - analog X-ray packets
		Surface Antiseptic		• General purpose disinfection • Extra-oral skin antisepsis
Disinfectant Wipe	Didecyldimethylammonium chloride	**Surface** disinfectant	• Disposable wipe	• For daily disinfection / cleaning of clinical contact surfaces
Hibiscrub (Zeneca,UK)	Chlorhexidine Gluconate 4% w/v	Antimicrobial hand cleaner	• Pre-surgical handwash • Antiseptic handwash before routine dental procedures	
Chlorhexidine mouthrinse	Chlorhexidine Gluconate 0.12 – 0.2%	Antiseptic	• Pre-procedural mouthrinse for 1 minute (beware of allergic reactions)	

* clinical contact surfaces include bench top; dental chair; stools; barrier-covered working surfaces such as headrest, arm rests, dental light handle, metallic bracket table, light-switches, suction / handpiece tubings.

** housekeeping surfaces include floor, toilet.

Means to prevent contamination of such items should be employed as far as possible.

ICSC 2018

Appendix III - Infection Control Measures for Non-Autoclavable Patient Care Items

Rule 1

- **The best way is to prevent contamination.**
  e.g. Barriers, disposables, autoclavable instruments, etc

Rule 2

- **Intermediate level disinfection is the last resort.**
- **Pre-cleaning process: most important.**

Infection Control Measures for Non-Autoclavable Patient Care Items (NAPCI)

NAPCI	Means to prevent/ manage contamination	Intermediate Level Disinfection
Shade guide #	Barrier/ Avoid touching patient's mouth	Immersion in 70-80% alcohol for 10 min.
Alginate mixing spatula Wire cutter Divider	Barrier/ Use other autoclavable instruments	Immersion in 70-80% alcohol for 10 min.
X-ray tube & Lead apron	N/A	Soak-wipe-soak with 0.5% NaOCl
Impression materials (alginate, impregum, ZOE) Stone casts, Wax, Special trays Removable orthodontic appliances Acrylic dentures, Cobalt chromium dentures* Crown & bridge works*		Immersion in 0.5% NaOCl for 10 min. dimensional accuracy is **NOT** clinically significant with short disinfection time i.e. 10 min.
X-ray packets (Plastic)	Barrier/Use dark room technique	Immersion in 0.5% NaOCl or 70-80% alcohol for 10 min.
X-ray packets (Paper)		N/A (leakage will occur for the recommended immersion time)

 # unlike shade guides, other items that contact mucosa, if contaminated, must be heat sterilized or disposed of after use.

70-80% Alcohol (10 min. immersion) is acceptable alternative for **ceramic and metal works ONLY.*

(Revised 2018)

Appendix IV - Decontamination of Dental Unit Waterlines in Government Dental Service

Decontamination of Dental Unit Waterlines

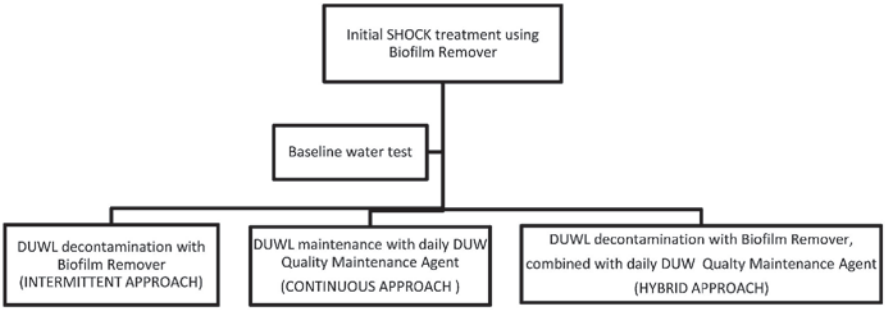
in Government Dental Service

Dental Unit Waterlines (DUWL) were found to be contaminated with biofilm, a bacterial reservoir, within five days after initial installment. Therefore, chemical SHOCK treatment, a procedure intended to eliminate the existing biofilm, should be carried out on all dental units followed by routine DUWL maintenance in order to contain the Dental Unit Water ≤500 Colony Forming Units per milliliter (CFU/ml) of Heterotrophic Plate Count.

An initial SHOCK treatment using Biofilm Remover and a baseline bacterial water test should be performed on all dental units. Following a successful biofilm removal, different maintenance approaches could be employed:

1. Intermittent use of Biofilm Remover
2. Daily use of DUW Quality Maintenance Agent or Device
3. Daily use of DUW Quality Maintenance Agent plus intermittent use of Biofilm Remover

One of the above approaches may be employed depending on the consumption rate of bottle water and practice profile of the clinics. Please use the approach as suggested by ICSC.



Initial SHOCK treatment using Biofilm Remover

1. Measure the volume of Biofilm Remover needed for a particular dental unit by the following method:

   - Empty the independent water bottle;
   - Collect all water being flushed out from waterlines of 3-in-1 syringe, all handpieces, ultrasonic scaler, and cup filler into a measuring jar and measure the total volume; and
   - Add 20 % to the volume measured and record it.

2. Decontaminate the DUWL of 3-in-1 syringe, all handpieces, ultrasonic scaler, and cup filler with Biofilm Remover (e.g. Sterilex Solution). Treat the DUWL for 3 consecutive nights starting on Monday or Tuesday at the end of session (at 4:45pm).

3. Fill the independent bottle *(high density polyethylene bottle with a minimal thickness of 0.08 inches)* with appropriate amount of Biofilm Remover.

   Each set of Sterilex Liquid Ultra (Solution 1 and 2 mixed together at the time of use) produce 180 ml of Sterilex solution. Some dental units may require more than 1 set of Sterilex Liquid Ultra for decontamination of DUWLs.

4. Remove the 3-in-1 syringe tip, scaler insert, all couplings and motors from the hoses.

5. Run Sterilex solution until pink solution appears at the end of all the DUWL.

   Note: All DUWL, including those without water supply (e.g. straight handpiece), should be decontaminated with Biofilm Remover during SHOCK treatment.

6. Small amount of Biofilm Remover should be left at the bottom of the bottle so that the pick-up tube can contact the solution during the disinfection process.

At the beginning of the next working day, discard the remaining Biofilm Remover from the bottle. Rinse the bottle and then fill it with tap water. Flush-out all Sterilex solution from ALL the DUWL (in the order of cup filler, 3-in-1 syringe, handpieces and ultrasonic scaler). To ensure complete removal of Biofilm Remover, flushing should be continued until colorless water appears at each outlet and the whole bottle of water is consumed.

P.S. Full PPE must be worn during SHOCK treatment procedures

Routine DUWL maintenance with intermittent use of Biofilm Remover (INTERMITTENT APPROACH)

After SHOCK treatment and a successful baseline water test, treat DUWL WEEKLY with Biofilm Remover.

1. Fill-in of Sterilex solution should be carried out at 4:45pm on a working day except Friday and flush-out of Sterilex Solution should be carried out at 8:45am on the next working day. The fill-in and flush-out procedures of Biofilm Remover are the same as described for initial SHOCK treatment, but should be performed for one overnight only (NOT three consecutive nights).

2. ALL waterlines should be flushed for at least 2 mins (including cup-filler, for 5 cups of water) at the beginning of every working day.

3. ALL handpieces (including straight and polishing handpieces), scaler and 3-in-1 syringe should be flushed for 20-30 seconds after each patient treatment.

Routine DUWL maintenance with daily use of DUW Quality Maintenance Agent (CONTINUOUS APPROACH)

1. Add DUW Quality Maintenance Agent e.g. ICX, or other similar agent, carefully to an empty 2-litre bottle and fill up the bottle with tap water.

2. ICX tablet should be added into the water bottle in each re-fill.

3. It is not necessary to flush the DUWL at the beginning of the day, but flushing used DUWL (including straight and polishing handpieces) for 20-30 seconds after each patient treatment is still needed. For individual waterlines, the ICX solution should be refreshed at least once every 2 weeks.

4. The residual effect of ICX to maintain waterline during periods of non-use can only last up to two weeks. If the dental chair is anticipated to be idled for more than two weeks, all DUWL should be purged dry at the end of the last working day. A freshly mixed ICX solution should be used for treatment on resumption of working day.

Ideally bottled water (with ICX tablet) should be used for mouth rinsing, albeit tap water is acceptable. When tap water is used, clinical staff should flick the city/bottle water switch and fill up the DUWL for the cup filler by discharging 5 cups of ICX water at the end of each working day. The purpose is to avoid building up of biofilm in the DUWL for cup fillers overnight.

Routine DUWL maintenance with daily use of DUW Quality Maintenance Agent and monthly SHOCK treatment (HYBRID APPROACH)

All procedures for the HYBRID APPROACH are same as the above described except that the interval for the SHOCK treatment would be monthly and for one night only

Handling of ultrasonic scaling units not in use

Existing units that will not be used within 2 weeks (due to closed surgery or send out for repair) or units put aside for standby use should be **purged dry**. When these units are re-used, the DUWL should be flushed and routine decontamination protocol resumed. No additional shock treatment or water test is needed until the routine scheduled test.

Steps to purge dry an ultrasonic scaling unit:

1. Empty the water bottle
2. Connect the water tube and turn on the dental unit
3. Turn the power to minimum and water supply to maximum
4. Activate the foot switch until no water comes out
5. Disconnect the water tube
6. Use 3-in-1 syringe to blow out residual water from the tube
7. Put aside for 1-2 days to allow complete drying before packing

Some standby ultrasonic scaling units were put aside for a long time, and may not have shock treatment performed. These units are expected to have bacterial biofilm contamination. Therefore, they should have initial shock treatment and a baseline water test performed when these units are re-connected for use.

Stock up

Biofilm Remover and DUWL Quality Maintenance Agent would be supplied through Dental Supplies Office. Other items (e.g. measuring jars, funnels) could be obtained from CAPS.

Documentation

1. For every dental unit, the SHOCK treatment should be logged onto the **Records of DUWL Decontamination with Biofilm Remover**.

2. The subsequent decontamination records should be documented according to whether intermittent, continuous or hybrid approach is used:

- For clinics using the intermittent approach, weekly decontamination should be logged onto the **Records of DUWL Decontamination with Biofilm Remover**.

- For clinics using the continuous approach, the number of DUWL Quality Maintenance Agent used should be recorded on the **Records of use of DUW Quality Maintenance Agent**.

- For clinics using the hybrid approach, both of the above should be recorded.

3. The above stated records should be **kept in the clinics** and **retained for at least 7 years**, as a component of the overall infection control program.

DVD training program

New clinical staff should study this document carefully with the aid of a DVD provided.

ICSC Aug 2018

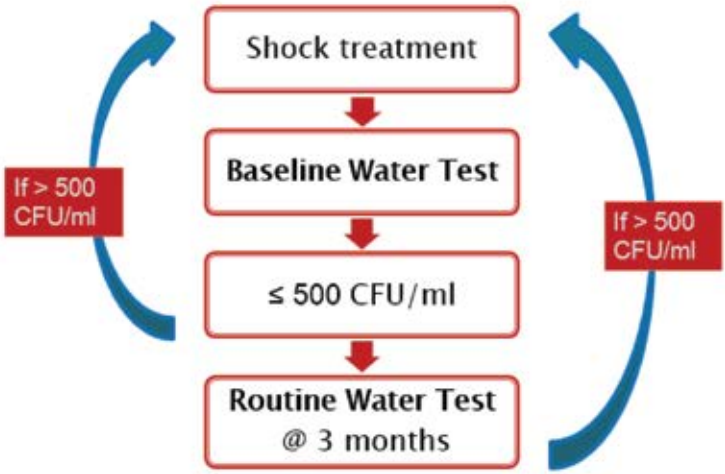
Appendix V - Arrangement of Water Test for Dental Unit Waterlines in Government Dental Service

Arrangement of Water Test for Dental Unit Waterlines (DUWL) in Government Dental Service

There is increasing global and local concern about biofilm formation and water quality in the dental unit waterlines (DUWL) which may harbour large amount of various micro-organisms. So far, there are very limited documented cases of infection resulting from exposure to the water from DUWL. According to the current evidence, it is safe for most patients but it may pose potential health hazard to medically compromised patients. Therefore, Infection Control Standing Committee (ICSC) of the Dental Service has determined to raise the water quality standard of the DUWL.

Aerobic heterotrophic bacteria are the most frequently encountered microorganisms found in DUWL water. American Dental Association (ADA), Center for Disease Control and Prevention (CDC) and other authorities have recommended that DUWL water should contain ≤ 500 Colony Forming Units per milliliter (CFU/ml) of aerobic heterotrophic bacteria, which is equivalent to drinking-water standards.

Regular microbiological examination (water test) of dental unit water helps monitor and facilitate the control of water quality standard. Accordingly, ICSC has procured water test service as a complement to the effective implementation of DUWL decontamination regimen. Our Action Level is > 500 CFU/ml. When the water test result indicates "Above Action Level", action is required i.e. shock treatment should be performed for the concerned dental unit.



Water Test Arrangement

- **Routine Water Test** is conducted every 3 months for all operating dental chairs and is arranged by ICSC. Only **1** particular type of water sample is collected as specified by ICSC.
- **Baseline Water Test** is conducted only after completion of shock treatment i.e. decontamination of a new dental chair or unprocessed dental chair or water test report indicates "Above Action Level". **3** water samples are required including Cup Filler, Ultrasonic Scaler, and 3-in-1 Syringe and Handpieces.
- Water samples should be collected before the end of morning session and would be picked up by the Contractor in the afternoon.
- If a surgery is closed, arrangement should be made to have the water test carried out by another clinical staff e.g. DSA.
- The Contractor is subject to change in the procurement exercise. The details in Appendix 1 will be reviewed from time to time.

Procedures for conducting Baseline Water Test

1. Prepare 3 sterile bottles (100ml) and alcohol gauzes. Label the 3 bottles as (with clinic name and surgery number):
    - 3-in-1 Syringe and Handpieces
    - Ultrasonic Scaler
    - Cup Filler

2. Full PPE should be worn
3. Remove ultrasonic scaler insert, all handpieces including couplings and adaptors, and 3-in-1 syringe tip from DUWL

4. Flush all the DUWL (including cup filler, ultrasonic scaler, all handpieces, and 3-in-1 syringe) for 2 – 3 minutes
5. Wipe all the DUWL outlets with alcohol gauzes

6. Collect 30 ml or more of water (about 1/3 of bottle) from DUWL into respective bottles. Avoid touching the DUWL outlet with the sampling bottle while water is being collected

7. Secure the caps of sampling bottles

8. Pack all the 3 sampling bottles into a transparent plastic bag, together with the completed *Request Form for Microbiological Examination*

9. Immediately refrigerate the water samples until the Contractor collects them

Procedures for conducting Routine Water Test

- Perform the same procedures as for conducting Baseline Water Test, except only 1 water sample (as specified by ICSC) is collected for Routine Water Test.

Stock up

- Sterile bottles and plastic bags are provided by the Contractor. Contact the Contractor (see Appendix 1) if the materials are not ready before the scheduled date of water test.

When water test result indicates "Above Action Level"

- **Individual Clinic** should contact the Contractor to arrange the delivery of sampling bottles and the collection of water samples.
- Perform shock treatment for the concerned dental unit **within 2 weeks** of receipt of the water test report. Shock treatment should start on the earliest available Monday or Tuesday, for 3 consecutive days.
- A **Baseline Water Test** should be conducted before the end of the morning session following completion of shock treatment.
- In addition, during the time elapsed between the receipt of water test report and before commencement of shock treatment, all DUWL (including cup filler, ultrasonic scaler, handpieces and 3-in-1 syringe) should be flushed for 2 - 3 minutes at the beginning of each working day
- Use the **PINK** Request Form for repeat water test and **fax a copy to ICSC** before sending to the Contractor.


REPEAT

What to do in case of repeated "Above Action Level"?

- In case of repeated (2 or more consecutive) "Above Action Level", please contact Dr. Amy NG for **investigation**.
- Perform the same procedures as "Above Action Level" **as soon as possible**. If the surgery is closed, arrangement should be made to have the shock treatment carried out by another clinical staff.

Documentation

- Reports of water tests will be sent to clinics **by fax.**
- All the water test results must be entered into the **Water Test Result Summary Sheet**.
- They have to be **kept in the surgeries** and **retained for at least 7 years**, as a component of an overall infection control program.

ICSC June 2016

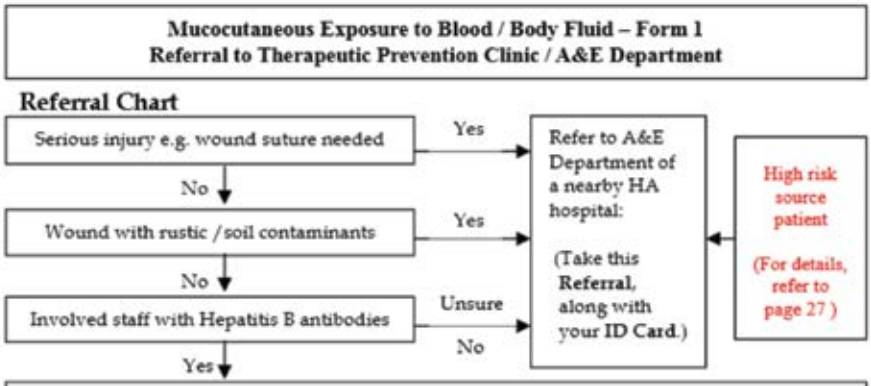
Appendix VI - Sealing and Tagging Methods for Clinical Waste Bags

When clinical waste bags are filled to the warning line, the "Swan-neck" method of sealing should be used.

Source: Environmental Protection Department, the Government of the HKSAR

Appendix VII - Poster: Avoid Sharps Injury

Appendix VIII - Mucocutaneous Exposure to Blood / Body Fluid - <u>Referral Form</u> to TPC / A&E



To: Therapeutic Prevention Clinic, DH / A&E* Department (*Delete as appropriate)

Request for Post-exposure Management / Follow-up

Name: _____ **Post:** _____ **ID No:** _____ ( )

Date of incident: _____ **Dental Clinic:** _____

Contact source:
☐ LA needle ☐ Suture needle ☐ Irrigation needle ☐ Wire
☐ Probe ☐ Bur ☐ Elevator ☐ Scalpel blade
☐ Blood / Body fluid splatter (on mucosa)
☐ Others, please specify: _____

Contact process:
☐ Recapping used needle ☐ Disposal of sharps
☐ Tidying up bracket table, trays ☐ Pre-sterilization cleaning
☐ During treatment, please specify: _____
☐ Others, please specify: _____

First-aid on site: ☐ Yes ☐ No

Other information: _____

Referring Dental Officer's Signature: _____
Name: _____
Date: _____

ICSC/SF1 (07)
Dental Service, Department of Health, HKSAR Government (772007)

Appendix IX - Surveillance Form for Sharps Injury or Mucocutaneous Exposure to Blood and Body Fluid

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Surveillance Form for Sharps Injury or Mucocutaneous Exposure to Blood and Body Fluid

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For Clinic Internal Use: Case No:

A. Particulars of Injured/Exposed Staff

(1) Discipline of the Injured / Exposed Staff **(Please ✓ the appropriate box)**

(a) ☐ Doctor	(b) ☐ Nurse	(c) ☐ Inoculator	(d) ☐ Paramedical (e.g. OT, PT, Dietician, ST, Clin.Psy, Rad.\#
(e) ☐ Dentist	(f) ☐ Dental Therapist	(g) ☐ DSA#	(h) ☐ Medical Technologist
(i) ☐ Workman	(j) ☐ Others, please specify (e.g., Dental Hygienist, clerical / admin staff., etc) _____		

(2) Service / Division / Branch Where the Injury / Exposure Occurred (code) **5** **(see Dept Code in Annex 1)**

B. Particulars of the Injury/Exposure Event

(1) Date of Injury/Exposure ___/___/_____ (dd/mm/yyyy) (2) Time of Exposure ___:___ am/pm **(please circle the appropriate)**

(3) Location Where Exposure Occurred **(Please ✓ the appropriate box)**

(a) ☐ Autopsy / pathology laboratory	(b) ☐ Clinical laboratory
(c) ☐ Consultation room	(d) ☐ Service / utility area (laundry, sluice room)
(e) ☐ Treatment room	(f) ☐ Waste disposal area / room
(g) ☐ Others, please specify _____	

(4) Was the source patient identifiable? (a) ☐ Yes (b) ☐ No

(5) Nature of Event and Type of Exposure

(a) ☐ Percutaneous Contact (e.g. a needlestick or cut with a sharp object) **(Please ✓ one of the following)**
(i) ☐ Superficial (e.g. scratch, no or little blood) (ii) ☐ Moderate (e.g. penetrated through skin, bleeding wound)
(iii) ☐ Deep (e.g. intramuscular penetration) (iv) ☐ Not sure
(b) ☐ Mucosal Contact (e.g., eye, nose, mouth)
(c) ☐ Non-Intact Skin Contact (e.g. uncovered wound)
(d) ☐ Human bite: skin surface broken (i) ☐ Yes (ii) ☐ No
(e) ☐ Others, please specify _____

(6) Body Part Injured/Exposed

(a) ☐ Arm (b) ☐ Back (c) ☐ Chest (d) ☐ Eye (e) ☐ Face
(f) ☐ Fingers (g) ☐ Hand (h) ☐ Lower Extremities (i) ☐ Mouth (j) ☐ Wrist
(k) ☐ Other Site _____

C. Circumstances When the Injury or Exposure Event Occurred

For sharps injury: answer question 1-11 except 6
For mucocutaneous exposure: answer question 6-11

(1) Types of Sharps **(Please ✓ the appropriate box)**

(a) ☐ Angiocath	(b) ☐ Broken glass	(c) ☐ Butterfly needle
(d) ☐ Dental instrument e.g., probe	(e) ☐ Hollow-bore needle	(f) ☐ Lancet
(g) ☐ Retractable needle	(h) ☐ Scissors	(i) ☐ Surgical blade
(j) ☐ Suture needle	(k) ☐ Other, please specify _____	

(2) Was the injury self inflicted? (a) ☐ Yes (b) ☐ No (c) ☐ Unknown

(3) Purpose of the Sharps Originally Used **(Please ✓ one or more boxes if appropriate)**

(a) ☐ Autopsy	(b) ☐ Blood taking
(c) ☐ Containing specimen or pharmaceutical	(d) ☐ Cutting
(e) ☐ Drilling	(f) ☐ Extraction
(g) ☐ Fingerstick / heelstick (e.g. Haemo stick)	(h) ☐ Injection (local anaesthesia)
(i) ☐ IV line related procedure	(j) ☐ Obtaining body fluid or tissue sample
(k) ☐ Suturing	(l) ☐ Unknown
(m) ☐ Others (please specify) _____	

(4) Sharps Injury Occurred When **(Please ✓ one or more boxes if appropriate)**

(a) ☐ Colliding with co-worker	(b) ☐ Disassembling device or equipment
(c) ☐ During use of sharp item	(d) ☐ Injured by item left on or near disposal container
(e) ☐ Patient movement / patient violence	(f) ☐ Perforation of sharps container
(g) ☐ Inappropriate placement of sharps (location where the sharps was placed. Please specify _____)	(h) ☐ Struck by item protruding from sharps container (e.g. sharps container too full)
(i) ☐ Sharps protruding from trash	(j) ☐ While recapping a needle
(k) ☐ In preparation for reuse of reusable instrument	(l) ☐ Withdrawing a needle from rubber or other resistant material (e.g. rubber stopper, I.V. port)
(m) ☐ Others (Please specify) _____	

Please fax the form(P.1 & 2) to ICB at 3523 9741 or mail to Infection Control Branch, G/F., Centre for Health Protection, 147C Argyle Street, Kowloon, Hong Kong within 4 days. For enquiries, please contact ICB at 2125 2913.

Ref: August 2008

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Surveillance Form for Sharps Injury or Mucocutaneous Exposure to Blood and Body Fluid

(5) Did the device being used have engineered-sharps injury protection? (i) ☐ Yes (ii) ☐ No
(For example: retractable needle, needle with blunt end) (iii) ☐ Unsure/unknown (iv) ☐ Not Applicable

(6) Mucosal and/or Non-intact Skin Exposure Occurred When (Blood and Body Fluid Exposure Only)

(a) ☐	Direct patient contact	(b) ☐	Feeding/ventilator/other tube separated/leaked
(c) ☐	Human bite	(d) ☐	I.V. tubing/bag/pump leaked/broke
(e) ☐	Specimen container broke	(f) ☐	Specimen container leaked/spilled
(g) ☐	Splash of body fluid	(h) ☐	Touched contaminated drapes/sheets/gowns, etc
(i) ☐	Touched contaminated equipment/surface	(j) ☐	Unknown
(k) ☐	Others (Please specify) _____		

(i) Please indicate, if there was an equipment failure _____

(7) Types of Blood or Body Fluids Exposed
(a) ☐ Blood / blood products
(b) ☐ Deep body fluid
(i) ☐ Amniotic fluid (ii) ☐ Cerebrospinal fluid (iii) ☐ Pericardial fluid
(iv) ☐ Peritoneal fluid (v) ☐ Pleural fluid (vi) ☐ Semen/vaginal secretion
(vii) ☐ Synovial fluid (viii) ☐ Others (specify) _____
(c) ☐ Saliva (visibly contaminated with blood?) (i) ☐ Yes (ii) ☐ No
(d) ☐ Others, please specify _____

(8) Personal Protective Equipment Used When the Exposure Incident Occurred
(a) ☐ Face shields (b) ☐ Goggles (c) ☐ Gown (d) ☐ Gloves
(e) ☐ Masks (f) ☐ None (g) ☐ Others _____

(9) First Aid Given on Site
(a) ☐ Wound care / Water Flush (splatter on mucosa)
(b) ☐ No

(10) Medical Consultation
(a) ☐ Received (b) ☐ Arranged (c) ☐ Not arranged

(11) Is the event reported to the Departmental Administration Section (DAS) as for the Injury on Duty (IOD)?
(a) ☐ Yes (b) ☐ No

Name of Person for Enquiry _____ Contact Number _____
(Block Letter) *(for data entry clarification only)*

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Surveillance Form for Sharps Injury or Mucocutaneous Exposure to Blood and Body Fluid

CHP 衞生防護中心

Annex 1

Code of Services / Division

Code	Services / Division
1.	Child Assessment Service
2.	Chinese Medicine Division
3.	Clinics (Correctional Institutions)
4.	Clinical Genetic Service
5.	Dental Service
6.	Elderly Health Services
7.	Emergency Response and Information Branch
8.	Family Health Service
9.	Forensic Pathology Service
10.	Infection Control Branch
11.	Narcotics & Drug Administration
12.	Pharmaceutical Service
13.	Port Health Office
14.	Professional Development and Quality Assurance
15.	Programme Management and Professional Development Branch
16.	Public Health Laboratory Services Branch
17.	Radiation Health Unit
18.	Social Hygiene Service
19.	Special Preventive Programme
20.	Student Health Service
21.	Surveillance and Epidemiology Branch
22.	Tuberculosis and Chest Service
23.	Others, please specify: _____

Remarks:

Occupational Exposure: A specific eye, mouth, other mucous membrane, or non-intact skin, or parenteral contact (e.g., sharps injury) with blood or body fluid or other potentially infectious materials that may result from the performance of an employee's duties (e.g., healthcare delivery, handling of specimen).

Sharps Injury: Percutaneous injury caused by any sharps objects including, but not limited to, hypodermal needles, suture needles, lancets, blades, scalpels, any surgical / dental instruments and so forth, contaminated with blood or body fluid or other potentially infectious materials.

Mucocutaneous Exposure: Contacts with blood or body fluids of patients, or other potentially infectious materials through mucous membrane (such as eye, mouth) or non-intact skin.

Other Potentially Infectious Materials:
- The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate
- Any unfixed tissue or organ (other than intact skin) from a human (living or dead)
- HIV-containing cell or tissue cultures, organ cultures, and HIV-, HBV-, or HCV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV, HBV or HCV
- Feces, nasal secretions, sputa, tears, urine and vomitus are not implicated in the transmission of HIV, HBV, and HCV unless visibly contaminated with blood.

Engineered Sharps: A physical attribute built into a needle device used for withdrawing body fluids, accessing a vein or artery, or administering medications or other fluids, which effectively reduces the risk of an exposure incident by a mechanism such as barrier creation, blunting, encapsulation, withdrawal or other effective mechanisms. It is also a physical attribute built into any other part of needle device or into a non-needle sharp, which effectively reduces the risk of an exposure incident.

Footnote#:

Clin Psy : Clinical Psychologist
DSA : Dental Surgery Assistant
PT : Physiotherapist
Rad : Radiologist
OT: Occupational Therapist
ST: Speech Therapist

Please fax the form(P.1 & 2) to ICB at 2523 0741 or mail to Infection Control Branch, G/F, Centre for Health Protection, 147C Argyle Street, Kowloon, Hong Kong within 4 days. For enquiries, please contact ICB at 2125 2015.

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