



AN INFECTION CONTROL PROTOCOL FOR ORTHODONTIC PRACTICES

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Preamble

This document is based upon the principle of standard precautions, and, as such, does not address the specific needs of patients who may present with prion diseases (such as CJD), tuberculosis, and other illnesses which require additional measures to prevent transmission of infection in a dental practice setting.

It is also predicated on the assumption that, in specialist orthodontic practices, surgical procedures (such as pericision, surgical tooth exposure, and exodontia) are not performed, but rather are referred elsewhere. Such procedures involve critical sites and require instruments to be sterile at the point of use, which, in turn, requires packaging of the instruments and validation of the sterilising process used for these packaged items.

This protocol is based, in part, on the 2003 ICG (*Infection control guidelines for the prevention of transmission of infectious diseases in the health care setting*, by the Communicable Diseases Network of Australia), which is © Commonwealth of Australia 2002.

Specific States and Territories may impose additional infection control obligations on clinical dental practice, such as use of personal protective equipment (New South Wales), routine testing of serological status for blood-borne diseases (Queensland), and mandatory compliance with aspects of particular Australian Standards (Victoria).

Moreover, each State or Territory has specific requirements in terms of obligations under Workplace Health and Safety legislation, which may impact on dental practices, for example, in terms of reporting of exposure incidents such as sharps injuries.

Risks of Transmission of Infection in Clinical Practice

There are numerous agents present in health care environments, and health care-associated infections may be serious, or even life threatening. Patients may be infected while receiving health care, and staff may be infected during the course of their duties. To spread an infection requires a source of infectious agents, a susceptible host, and a pathway for transmission to a susceptible host.

Potential sources of infection include:

- Acutely ill individuals, chronic carriers or asymptomatic sources (patients or staff members)
- The normal endogenous microbial flora of patients or staff
- Environmental sources, such as air (aerosols), and water (from dental unit waterlines)
- Materials, equipment and instruments that have become contaminated.

Infection control is a team effort which involves orthodontists, auxiliaries, and reception staff. The purpose of infection control is to limit the possibility of the transmission of infection within the dental environment.

Standard precautions are the procedures that apply to the care and treatment of all patients, regardless of their perceived infectious risk. They include aseptic technique, handwashing before and after patient contact, use of personal protective equipment (gloves, mask, eyewear, gowns), appropriate reprocessing of instruments and equipment, and environmental controls (such as zones and barriers).

Medical History

When corresponding with other health care providers, the personal details of a patient must not be disclosed without the permission of the patient. Clearly, in the situation of an orthodontic practice, the referring dentist provides, in many cases, the initial patient contact. There may be situations where the orthodontist wishes to refer the patient for other procedures, such as for removal of third molar teeth, and a discussion with the patient before this communication begins is both logical and important. Patients should only be referred to another practitioner with the patient's knowledge and consent.

Referring practitioners have an ethical duty to provide relevant clinical information to the new practitioner. Depending upon the purpose of the referral, this may include information about the patient's infectious status, as this may be relevant for the appropriate ongoing care of the patient and to minimise risk to other health care workers and other patients. If the infectious status of the patient needs to be revealed, the patient should be informed and consent obtained.

It is essential to take a thorough medical history for each new patient, which identifies possible infectious diseases as well as risk factors for acquiring infectious diseases (such as immune suppression).

Patients must be informed on the written medical history that the information which is contained within it is regarded as confidential, and they should be offered the opportunity to discuss any issues with the orthodontist in a private and confidential manner.

Medical histories should be updated at major recall visits, and at least once per year. Changes which are made on a written medical history should be initialed by the clinician.

Because of privacy and anti-discrimination legislation, it is essential that all members of the practice staff maintain confidentiality of patient details. It is recommended that staff contracts of employment include specific clauses regarding the need to maintain confidentiality of patient details from the practice.

A routine medical history can be unreliable. Patients may be unaware of their status, or unwilling to divulge it, or to discuss or disclose lifestyle-related risk factors. Infectious patients may not show any signs or symptoms of infection (i.e. are asymptomatic). Patients may be infectious before laboratory tests are positive (the window period: 3 months for HIV; 6 months for HBV and HCV). If the source is in a window period, they may be at a particularly infectious stage of their disease process (viraemia), even though test results are negative.

Standard precautions provide adequate protection for blood-borne diseases. In other words, additional precautions are not required for patients with blood-borne viruses, such as HIV, Hepatitis B virus or Hepatitis C virus, unless there are complicating additional infections, such as pulmonary tuberculosis.

Personal Protective Equipment (PPE)

Staff should wear PPE, including hand, eye and face protection, where aerosols are likely to be generated. In addition, patients should be provided with protective eye wear. The relevant Australian Standards for items of PPE are AS4100 (examination gloves) and AS4381 (face masks).

Gloves and Handcare

Intact skin (with no cuts or abrasions) is a natural barrier against infection. Any breaks or lesions of the skin are possible sources of entry for pathogens. Cuts and abrasions should be covered by water-resistant occlusive dressings that should be changed as necessary. Members of staff who have skin problems, such as exudative lesions or weeping dermatitis, must seek medical advice and must be removed from direct patient care until the condition resolves.

Rings or artificial nails **MUST NOT** be worn beneath gloves. Nails should be short and clean, since sharp fingernails may puncture gloves and will increase the development of porosities and defects during use.

Gloves must be worn when it is likely that contact with saliva, blood or oral mucosa is possible, or where hands will be contaminated with blood or saliva, or come into contact with the mucous membranes of the mouth. Accordingly, gloves should be worn by dental staff for clinical procedures, as well as during change-over.

Gloves must be changed (and hands washed) after each patient procedure, and also during multiple procedures on the same patient if there is a risk of cross-contamination. It should be remembered that new gloves may have defects that are not immediately obvious, and that gloves become damaged during use.

Single use gloves must be discarded as soon as they are damaged (torn or punctured), and before answering telephones or recording patient notes. There should be a defined procedure for dealing with telephone calls and other interruptions during a procedure, so that the principles of asepsis and cross-infection control are not breached.

It should be borne in mind that new gloves may have defects up to a frequency of 4%, and for this reason it is essential that hands are washed before gloving and after de-gloving. Fingertips are the area where most defects in gloves develop, so particular attention must be paid to this area during handwashing.

Gloves do not need to be sterile for general (non-surgical), orthodontic and dental procedures. Sterile gloves must, however, be worn when invasive procedures (e.g. pericisions, incisions into soft tissues, or surgical procedures) are carried out. Bulk supplies of gloves should be stored in a clean, dry, cool area, and opened boxes of gloves should not be kept within the contaminated zone of the surgery.

For individuals who have a proved hypersensitivity to latex, non-latex glove materials such as Nitrile are a useful substitute. Vinyl gloves are less preferred as a substitute since their reduced flexibility can lead to problems with dexterity, and to occupational overuse injuries.

Hands should be washed:

- before and after significant contact with any patient,
- after activities likely to cause contamination, and
- after removing gloves.

A suitable routine handwash procedure is to:

- Remove any hand/wrist jewellery.
- Wet the hands thoroughly in warm water
- Lather them vigorously using a mild neutral pH liquid soap handwash for 10-15 seconds.
- Rinse all traces off under warm running water.
- Turn the taps off. Do not touch the taps with clean hands – if elbow or foot controls are not available, use paper towel to turn the taps off.
- Pat the hands dry using paper towel. Do not rub, to avoid chapping.

Refillable liquid soap containers and their pumps are a potential source of contamination as bacteria (such as *Pseudomonas*

aeruginosa) can multiply within many products. For this reason, liquid handwash dispensers with disposable cartridges, including a disposable dispensing nozzle, are recommended.

Water-based hand creams can be used before wearing gloves, however oil-based preparations should be avoided as these may cause latex gloves to deteriorate, and may leave oily residues on handled items.

Clinical handbasins (which comply with AS1730.11) that are used for handwashing should be located at a safe distance from patients to avoid inconvenience and splashing patients during procedures. Each procedural room (each operatory) should contain at least one clinical handbasin designated for handwashing only. Note that non-clinical (vanity) handbasins and sinks are not appropriate equipment for handwashing by staff for infection control purposes.

Clinical handbasins should only be used for handwashing, and not for any other purpose. Liquid wastes should be disposed of in a separate sink (e.g. in the sterilising room).

An aerator filter or other anti-splash device fitted to the taps should be cleaned in accordance with the manufacturer's recommendations.

Staff who suffer from skin reactions due to wearing latex gloves should:

- review their handwashing technique to ensure that all traces of detergent are removed by thorough rinsing
- use latex gloves that are powder-free
- consider using alternatives to latex (e.g. neoprene - Nitrile) for medically diagnosed delayed or immediate hypersensitivity.

Eyewear

Staff should wear protective eyewear or face-shields during procedures where there is the potential for splashing, splattering or spraying of blood or saliva. This includes most dental procedures, and manual cleaning of instruments and equipment.

Eyewear must be:

- optically clear,
- anti-fog,
- distortion free,
- close fitting, and
- preferably, shielded at the side.

Eyewear should be either reusable after cleaning, or single-use.

Dental patients must also be provided with protective eyewear to prevent eye injury during dental procedures.

Masks

Clinical staff should wear suitable masks during procedures where there is potential for splashing, splattering or spraying of blood or saliva, or where there is potential for airborne infection. Regular surgical masks prevent a staff member's respiratory secretions from contaminating the patient, and reduce the risk to staff from splashing and spraying of body substances.

Dental procedures can generate large quantities of aerosols of 3 microns or less. Dental staff should wear masks or facial barriers that conform to AS 4381 and can block particles of this size. Staff should change their masks after 20 minutes in an aerosol environment.

Regular surgical masks, which do not give an airtight seal, do not provide absolute protection in preventing the wearer inhaling airborne particles. They do not provide sufficient protection for the safe treatment of patients with active respiratory infections, including influenza, measles, SARS, and pulmonary tuberculosis.

Masks must:

- not be worn loosely around the neck,
- not be touched by hand while being worn;
- cover both mouth and nose;
- be removed once they become moist or visibly soiled;
- be removed by touching the strings and loops only;
- be discarded after use.

The recommended technique for removing a mask is by pulling on the strings, to avoid touching the front surface of the mask, which is the most heavily contaminated area.

During treatment, masks should not be touched, since this can increase the degree of wetting of the mask from both within and from without. Once a mask becomes damp or moist, its protective value declines considerably, because of capillary effects within the mask's structure.

Gowns and Clothing

Clinical staff should wear gowns (and plastic aprons as appropriate) to protect their clothing and skin from contamination. Facilities for changing soiled uniforms should be provided. Plastic aprons worn over uniforms will avoid undue contamination in the sterilising area where staff are exposed to blood or saliva.

Gloves should be worn when handling soiled linen. Care should be taken to ensure that sharps and other objects are not inadvertently left in gowns. A hot water and detergent solution is adequate for cleaning most items using regular laundry methods.

Clinical staff should wear enclosed footwear that can protect them from injury or contact with sharp objects (e.g. if sharps are accidentally dropped).

Long hair should be tied back or covered, and beards covered when undertaking aseptic or sterile procedures.

Sharps Handling

Sharps injuries constitute a significant hazard in orthodontic practice because of the frequency of cutting and adjusting orthodontic wires. In addition to wires, there are numerous other small items of a sharp nature which may cause skin penetrating injuries, such as ligature wires.

It is a key principle of infection control that sharps are handled by one person only. The person who uses the sharp item is responsible for its disposal. For this reason, sharps should never be passed by hand between staff members.

Sharps must be disposed of by the operator (i.e. the orthodontist) as the very first part of the changeover process. A practical means of doing this is to have a small collecting bowl at the chairside where residues of wire are collected, and these can then be placed directly into a nearby sharps container. Following this, the dental assistant can then proceed with the routine clean-up.

The changeover procedure used must distinguish clearly between any sharps which must be disposed of, and those which may be reusable. For example, a scaler that is used to remove residues of orthodontic bonding resin from teeth is a reusable sharp, as opposed to fragments of wire which are to be disposed of as sharps waste.

During the clean-up procedure, the dental assistant must check that all sharps have been removed from the treatment area. This includes burs which may be present in handpieces, since these are a common cause of sharps injury.

Each surgery area should have located within it, or close by, an approved sharps container which is:

- puncture proof,
- sturdy,
- labelled appropriately with a bio-hazard symbol, and
- able to withstand handling without rupture or breakage.

If the sharps container is relatively small, it should be fixed using a clamp or other device to a wall or cupboard to prevent it tipping over. Sharps containers should not be located near the floors, since children may be tempted to insert their hands into them. Once filled to the three quarter mark, sharps containers must be sealed and disposed of by high temperature incineration by a clinical waste contractor.

Loading and removing blades from scalpels is a particularly high risk procedure. One way of minimizing the risk of sharps injuries to staff is to use single-use disposable scalpels where the blade and the handle come already pre-prepared as one device. These can then be disposed of in total into the sharps container. If metal

reusable scalpel blades are used, then a purpose built scalpel blade remover is highly recommended, such as the *Qlicksmart* blade removal device. Blades should never be removed by hand or with artery forceps, since this is likely to result in a sharps injury.

A strict protocol is necessary for sharps injury follow-up (*see Appendix 3 for the Sharps Injury Protocol*). At the first point, this should distinguish between contaminated sharps injuries and those which are sustained by items which have not become clinical contaminated through contact with saliva or blood. Serological follow-up is only necessary where the sharps injury has involved contamination. Nevertheless, all sharps injuries must be recorded because of Occupational Health and Safety legislation. It is also valuable to determine the factors which lead to sharps injuries, since this identifies the areas where prevention can be effectively employed.

An appropriate medical practice should be identified which can undertake any follow-up testing of staff and patients following an exposure incident. This medical practice should be aware of the sharps injury protocol in the practice and particularly their requirements for baseline serology for anti-HBS, HBc antigen, HBe antigen, anti-Hepatitis C and anti-HIV as the initial series serological tests for the injured staff member. In all cases, the patient should be approached as the source, and asked to agree to blood testing. The patient would normally be screened for Hepatitis B surface antigen, anti-HBS, Anti-HBc and antibodies to Hepatitis C and to HIV. If the patient is unknown, or refuses to undergo testing, then they must be treated as positive and the blood tests on the injured staff member repeated in three months and again in twelve months time. The same is true if the testing of the source patient is indeterminate.

Radiography

In radiography procedures, there should be defined areas for positioning the X-ray equipment which are touch zones. These can be covered with a disposable barrier, such as adhesive cling film, or can be cleaned with detergent after contact.

Handling of intra-oral films can involve either using film envelopes or cling wrap to cover an intra-oral film, or digital sensor. Films which are plastic enveloped can be disinfected by immersion in sodium hypochlorite and then rinsing with tap water.

Laboratory Work

For items of laboratory work, such as impressions, it is the responsibility of the clinician to ensure that appropriate decontamination of these has been performed at the chairside prior to their transport to the laboratory area. This decontamination involves thorough washing in water followed by application of a detergent/surfactant agent. **The use of high potency disinfectants for impressions and laboratory work is no longer recommended as a routine measure.**

With careful planning, the need to take items to the laboratory for trimming and adjustment can be reduced, and in many cases it is much more effective to do adjustment at the chairside.

Because of the potential for environmental contamination within the laboratory setting, items of laboratory work coming from the laboratory back to the clinic, such as orthodontic appliances, should be similarly washed and treated with detergent. Where appliances are being sent to the laboratory for adjustment or repair, any visible deposits of calculus or plaque must be removed from these as part of their decontamination. The laboratory may also require treatment in a disinfectant, and this is a matter where clear communication between the clinician and the laboratory is needed. A sticker should be placed onto the plastic bag containing the item informing the laboratory of the treatments which have been undertaken at the chairside. This will remove the need for re-treatment at the laboratory.

Care should be taken to prevent the contamination of study models. If saliva-contaminated gloves are applied to study models, transfer of microorganisms can occur by capillary action onto the surface of a cast. A cast can be decontaminated by placing it within a solution of sodium hypochlorite (e.g. Miltons), which has been diluted (1:5) into slurry, for approximately 2 minutes.

All materials transported to and from a dental laboratory should be cleaned using cold running water and diluted detergent, until all visible traces of visible saliva and blood are removed, after which they can be placed in a sealed container for transport. In the laboratory area in the practice, standard precautions should be used in the receiving area.

Reusable containers used to transport laboratory work should be cleaned with detergent and then disinfected. The receiving area should be cleaned with detergent between cases. Placing a single-use impenetrable barrier (i.e. plastic or plastic-backed paper) on the surface is recommended. On completion of the laboratory work, items should be cleaned, dried or disinfected and placed in a sealed container for dispatch.

Individuals working in the laboratory on appliances that have already been in the mouth should wear a clean uniform or laboratory coat, single use gloves, protective eyewear or face shield, and a mask if necessary.

In the laboratory area, hands should always be washed before leaving the work area. Food or drink should not be allowed.

Zones, Barriers and Change-over

Within the orthodontic practice, there must be a clear demarcation of the various zones. For example, the clean zone includes the reception area, the patient records area, whereas the contaminated zone includes the sterilizing room and the treatment areas. Within the treatment area, it is often useful to define the boundaries of the zone if these are not immediately obvious, using differential

markings or colour patterns, or in some cases, marking tape or lines. These boundaries are designed to reduce the need to treat surfaces with detergents during patient changeover. Contaminated items, including instruments, must not be placed in clean areas during treatment. Similarly, patient charts and radiographs must be kept within the clean zone, and should never enter the contaminated zone.

If there is an interruption during the clinical procedure, and staff need to move from the contaminated zone to the clean zone, they will need to remove their gloves and wash their hands. An example of such interruption may be an urgent telephone call. Upon returning, the staff member can re-glove with fresh gloves, and then continue treatment.

When planning procedures, a unit dose concept should be applied, so that items such as cotton rolls and gauze squares, etc., can be dispensed in defined amounts, so that the need to retrieve additional materials during the procedure is minimized. Items of equipment or supplies, which are used infrequently, should be kept away from the treatment area. These can be retrieved by a staff member who is operating as a scout. Alternatively, the dental assistant can leave the chairside, wash her hands, remove her gloves, and retrieve the necessary items. Transfer forceps provide another useful alternative. With careful planning, the need to retrieve additional items can be minimized considerably.

During changeover between patients, a standardized procedure should be followed. It is recommended that this procedure be documented using photographs, since this is of great assistance in training new staff to be consistent with the established procedures in the practice. The changeover procedure should include the flushing of water lines, for example, from the triple spray, to reduce the accumulation of biofilm within these.

The changeover procedure must deal with all surfaces which will be touched during the procedure, for example, the bracket table and the operating light. These pre-selected surfaces can either be covered with appropriate removable barriers such as adhesive cling film, or cleaned using a detergent-based product. The detergent-based product can be dispensed using a small pump onto paper toweling. Spraying directly onto dental units and other items equipment is not recommended, since this can result in penetration of the cleaning agent and failure of components on circuit boards within the dental unit. A useful sequence is to treat the light handle, the bracket table, handpiece cradles, the suction tube cradles, and then any ancillary devices such as cosmetic mirrors, curing lights, scalers, and finally the spittoon.

- Operatories must be cleaned and dried between patients. It is important that the treatment areas be kept clean and free of clutter as much as is possible to assist routine housekeeping. Equipment that is rarely used should be stored in a cupboard and not left on a benchtop. All areas of bench space which are

within the treatment area, i.e. the contaminated zone, must be cleaned after patient appointments. Areas of benchtops which are outside this contaminated zone should be cleaned on a daily basis using a detergent-based product to remove any splattered material and environmental dust.

- The formation of droplets, splatter and aerosols should be minimised during treatment.
- All articles within the operative field should be deemed contaminated by the case in progress, and **MUST** be removed, cleaned, and disinfected or sterilised before the next case can begin.
- Appropriate use of high-volume evacuation and proper patient positioning should minimise the formation of droplets, splatter and aerosols during treatment.

The following equipment should be cleaned or barrier protected after each patient use:

- any hand-operated control in the operating field, the operating light handle,
- the X-ray head,
- the suction tubing and the cradles they rest in,
- any intra-oral light source e.g. fiber-optic illuminators, intra-oral cameras,
- the polymerising light and the handle of its light shield,
- the bracket table and its handle.

Protective covering using either plastic wraps, sterile drape or preformed plastic covers may be applied to surfaces which have been cleaned at the beginning of each day.

- Materials, equipment and instruments must be kept covered (with an impermeable material) or in closed drawers or cabinets until use, to protect them from contamination by aerosols created in the dental environment.
- All environmental surfaces, apart from those deemed as contaminated in the operatory, must be cleaned at least weekly.

Dispensing and Retrieval Procedures

- Materials should be routinely pre-dispensed.
- Pre-cut supplies of some materials (e.g. floss, elastic chain, and articulating paper) can be stored in the drawers and pre-dispensed before procedures, or retrieved with transfer tweezers.

If retrieval of additional instruments and materials from outside the operative area is required, the following procedures should be followed:

- Gloves must be removed and hands washed to dispense materials from their containers into the field, OR
- Over-gloves can be used, OR
- Drawers opened by elbow touch, OR
- A suitable no-touch technique employed (e.g. use of transfer tweezers or single-use barriers on handles);
- Retrieval of instruments or materials from drawers must be

by transfer tweezers that are kept separate from other instruments;

- Transfer tweezers may be handled with gloved or ungloved hands during a case, and should be sterilised at the end of the appointment.

Management of Water Lines

- Air and water lines should be flushed for a minimum of two minutes at the start of the day and for 30 seconds between patients.
- For those dental units equipped with an independent water supply, the manufacturer's instructions must be closely followed for disinfection procedures.
- All dental equipment that supplies water to the oral cavity must be fitted with non-return valves. Routine maintenance of non-return valves is necessary to ensure their effectiveness. Manufacturers should be consulted to establish an appropriate maintenance routine.

Environmental Cleaning

- For environmental cleaning, a written protocol should be prepared, including methods and frequency of cleaning.
- During surface cleaning, standard precautions (including wearing of PPE) are required.
- Floors should be cleaned daily, e.g. by damp dusting or using dust-retaining mops. Brooms disperse dust and bacteria into the air, and should not be used in clinical areas.
- A neutral detergent and warm water solution should be used for all routine and general cleaning. Detergents used for environmental cleaning should physically remove dirt/soils, suspend it in water and rinse free with little or no residue. Detergents should be low irritant to minimise skin problems for staff. Neutral pH detergents are best for environmental cleaning because they are less likely than acid or alkali detergents to damage metals such as stainless steel, or to cause skin irritation

Physical Facilities of the Practice

- Treatment and instrument cleaning areas should be separated, and work flow should be from clean to contaminated areas. The path from the surgeries to the sterilising area should be free from obstacles and clutter, and should not pass through office areas or the waiting room.
- Both treatment areas and the sterilising room should have smooth impervious surfaces without crevices, adequate lighting, good ventilation (to reduce the risk of infection transmission from aerosols) and suitable receptacles for the disposal of clinical waste (AS 403112 and AS 426113).
- Floors in clinical, laboratory and sterilising areas should be non-slip, and covered with a smooth, impermeable seamless material, such as welded vinyl. Treatment areas in the practice should not be carpeted.
- The surfaces of bench tops should be smooth, non-porous, and impervious.
- Fixtures and fittings should be designed to allow easy cleaning and to discourage the accumulation of dust.
- Blinds that are easy to keep clean, and do not allow the

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- accumulation of dust, are preferable to curtains.
 - Staff eating and recreation areas must be separate from work areas and patient treatment areas.
 - Ventilation, air-conditioning, cooling towers and water systems must meet Australian Standards. Temperature, humidity and air purity (to minimise dust, infectious agents and gases) should be maintained within prescribed limits (AS 1668.2).

Waste Handling

Waste streams include:

- General waste
- Clinical waste, which includes:
 - discarded sharps;
 - human tissues, including material or solutions containing free-flowing blood.

Clinical waste **MUST** be placed in yellow containers bearing the international black bio-hazard symbol and clearly marked 'clinical waste'. Clinical waste must be placed in appropriate leak-resistant bags or containers. These should not be overfilled, and **MUST NOT** be compacted by hand.

Differences between States in Australia in terms of EPA and local council requirements mean that there is not one universal protocol for handling waste from a dental practice. However, most local authorities utilize a waste segregation system which involves a separation of regular household type waste from clinical waste, and from sharps waste. In addition, the orthodontic practice may have chemical waste, for example from the processing of radiographs, and this requires the services of a registered chemical hazardous waste contractor.

Management of clinical and related waste must conform to:

- relevant State/Territory EPA regulations,
- *Australian Standard AS3816 (1998)*, and
- *NH&MRC (1999) National Guidelines for Waste Management in the Health Care Industry*.
- Waste should be segregated at the point of generation using appropriately colour-coded and labelled containers.
- Staff should wear gloves and protective clothing when handling clinical and related waste bags and containers.
- Staff who handle waste should be trained in the correct handling procedures, and in the management of clinical waste spills.
- All waste should be handled with care to avoid injuries from concealed sharps (which may not have been placed in sharps containers).

Instrument Recirculation and the Sterilising Room

To facilitate instrument cleaning, it is recommended that, during procedures which use adhesives, the instruments are wiped at the point of use to minimize the drying of materials such as resin bonding agent and glass ionomer cement on to the surface of the instruments. This can be done effectively using stick-on adhesive-

backed sponge squares which can be applied onto the bracket table, such that it is not necessary for the dental assistant to hold the sponge in her hands. If cement has been left to dry on cement spatulas or band seaters, these will require additional treatment, for example, using special solutions in the ultrasonic cleaner. This takes additional staff time, and for this reason, wiping of these at the time of use is time efficient.

According to the Spaulding Classification, contact sites for instruments may be classified as critical, semi-critical, or non-critical, which dictates the processing of instruments. Non-sterile mucosa (such as the oral cavity) is classed as a semi-critical site, while intact skin is a non-critical site. Instruments and equipment used in semi-critical sites must be sterilised between patients, or as a minimum, processed using high-level disinfection (thermal or chemical). For items which contact intact skin, cleaning alone with water and detergent is sufficient.

All instruments and equipment contaminated with blood or saliva MUST be cleaned as soon as practicable after leaving the chairside.

The instrument cleaning area must be dedicated for that purpose only. There should be at least one stainless steel sink deep enough to accommodate instruments and other equipment requiring cleaning (double sinks are preferred). These sinks should be used only for cleaning equipment and instruments (NOT handwashing). Where filters or anti-splash devices are fitted to taps, they should be cleaned regularly.

Staff undertaking instrument cleaning in the sterilising room are required to wear the following specific items of PPE:

- a plastic apron above their normal uniform,
- general purpose thick utility gloves,
- protective eyewear,
- a mask or face shield.

It cannot be stressed too strongly that if an item cannot be cleaned, it cannot be disinfected or sterilised.

According to the NH&MRC Infection Control Guidelines, for instrument cleaning and autoclaving, all the steps outlined in Australian standards AS 4187 and AS 4815, or an equivalent protocol, MUST be followed, including process validation.

A suggested protocol is presented in Appendix 4. The following points are of importance:

- Pre-cleaning (by wiping during use) should be undertaken to reduce build-up of materials (such as cements) on instruments.
- Gross soil should be removed by carefully rinsing the instruments in warm (15-18 degrees C) water.
- To preserve the surfaces and composition of the instruments, dissimilar metals should be separated before cleaning.

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- Use of abrasive materials should be avoided.
 - Staff who clean instruments and equipment **MUST** be trained formally in all the necessary procedures in equipment cleaning and processing, disinfection and/or sterilisation.

Ultrasonic cleaners and automated washing appliances reduce the handling of instruments and are recommended for cleaning most basic instruments. Studies of dental instruments/appliances indicate that pre-soaking in diluted detergent, followed by cleaning in ultrasonic or automated washer-disinfectors with thorough rinse cycles, eliminates almost all traces of contamination on the equipment.

Thermal Disinfection

Has several important features. It:

- can be achieved in an automated thermal washer-disinfector by choosing the appropriate cycle.
- does not kill all bacterial spores and therefore does not sterilise instruments.
- provides an acceptable level of disinfection when instruments are thermally treated under well-defined and controlled time and temperature parameters.
- must not be carried out as a convenient substitute for autoclaving. If it is possible to sterilise items to be used in semi-critical sites, then this should be done.
- should be used in preference to chemical disinfection whenever practicable.

Ultrasonic Cleaning

- works by subjecting instruments to high frequency, high energy sound waves, causing soil to be dislodged from instruments and drop to the bottom of the tank, or to be sufficiently loosened to be removed during the rinsing process.
- can be used to assist with cleaning of jointed and serrated stainless steel instruments.
- can be used with a cassette system, to minimise handling of sharp instruments.
- is not effective for cleaning rubber and other flexible materials, nor is it effective for cleaning the internal surfaces of hollow or cannulated instruments.
- does not disinfect instruments. Thus, utility gloves must be used when loading items into the autoclave chamber.
- cannot be used to process dissimilar metals in the same load, since electrolytic corrosion may occur.

The use of ultrasonic cleaners and testing procedures are given in AS 4187 (2003). This includes a DAILY aluminium foil perforation test (AS 2773).

Ultrasonic cleaners should not be operated without a close-fitting lid in place, because of the risk of:

- damage to hearing
- infective aerosols escaping from the unit.

Staff should not submerge their hands or any other part of their body in the ultrasonic cleaning unit when it is operating

At the end of the day, the solution in the ultrasonic chamber must be decanted, and the chamber cleaned and left dry, to prevent the development of biofilm.

Detergents used for manual cleaning of specialised instruments (which cannot be cleaned in other ways) should be alkaline surfactants.

Following cleaning, all instruments must be inspected carefully under good lighting to ensure that all traces of cement, saliva and other material have been removed. This requires good lighting in the sterilizing area, and for this reason, under bench fluorescent lights are strongly recommended.

All dental handpieces should be cleaned according to the manufacturer's instructions and sterilised after each patient use. The manufacturer's instructions regarding the choice of lubricants should be followed, and care taken to choose a lubricant that does not compromise the sterilisation process. If the handpiece is re-lubricated after sterilising, then that lubricant system should be for post sterilisation use only.

After cleaning, items should be thoroughly rinsed. Items must be dry to allow inspection, to establish that the item is clean before further processing or storage. To assist this drying, items can be rinsed in hot water to assist the drying process, unless contraindicated.

Chemical Disinfection

High-level instrument grade disinfectants provide the minimum level of processing for instruments used in semi-critical sites (contact with non-sterile mucosa or non-intact skin). Any disinfectant used to reprocess instruments must be registered on the Australian Register of Therapeutic Goods (ARTG). If users of high-level disinfectants are unsure of the TGA-approved status of a product, they should ask the manufacturer to supply the product's AUST R code number.

Autoclaves

It would be rare in orthodontic practice that packaged instruments which are **intended to be sterile of point of use** would be processed, since surgical procedures are rarely undertaken in an orthodontic practice. One possible exception is pericision, and in this event, a fully disposable sterile scalpel could be used.

During use, autoclaves must not be over packed with instruments or with cassettes since this causes formation of air pockets, which are cold spots where there will be inadequate penetration of steam. Pre-vacuum autoclaves are less prone to the development of air pockets because of the removal of air by vacuum pump before the steam is introduced into the chamber. Pre-vacuum autoclaves are also preferred since they offer fast efficient air removal, and if packaged items are required, they can reliably dry packs to

complete dryness. If packaged items are used, then a full validation of the packaging cycle parameters must be undertaken in accordance with the requirements of Australian Standard 4187, 2003. This involves multiple runs using biological indicators placed at various parts within the pack to ensure that the parameters used are adequate. In the majority of orthodontic practices, packaging of items will not be undertaken, so this requirement is unlikely to have an impact.

If a pre-vacuum autoclave is used in the practice, there are additional requirements for testing including an air leak test and an air removal test. The air removal test will either use a Bowie Dick challenge device or a Helix test device, and these must be run at the start of each day in a dedicated cycle, before the first clinical load.

Orthodontic practices intending to purchase new bench-top sterilisers for the sterilisation of wrapped instruments and porous loads should check that a built-in drying cycle is featured and that the sterilisers are listed by the TGA. Newer models of bench-top sterilisers also have printout facilities for monitoring temperature and pressure (as applicable) and holding time.

Recycled water from previous cycles causes deterioration in the water quality for each successive cycle. In addition, accumulated debris (*and lubricants*) in recycled sterilising feed water may compromise sterility (*e.g. superheated steam*). For these reasons, the water reservoir in the autoclave should be emptied, cleaned and flushed each week, then filled with a fresh supply of distilled or deionised water, unless the autoclave has a two tank, single flow direction water system.

Newer autoclaves typically have a single-use water system where there is a storage tank at the top of the autoclave, and a collection tank at the base of the autoclave, or a dump line into the sanitary sewer. If the autoclave recycles its water, it is necessary that the water in the storage tank is completely drained each week and replaced with deionized water. If this is not done, build-up of contaminants in the water reduces the efficiency of the autoclave because of altered steam wetness.

Existing, older-style bench-top sterilisers should be fitted with a mechanism to allow the observation and immediate transfer of information (eg time at temperature, temperature, pressure) to an electronic data storage facility.

Records produced from the autoclave cycle must be kept for a period of time in accordance with Commonwealth and State/Territory regulations (e.g. 7 years).

The following points are important for the proper operation of autoclaves:

- The chamber of the autoclaves must not be over-packed.

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- Thermocouples must be calibrated annually, and a log kept of servicing and calibration for each individual autoclave.
 - Type 1 chemical indicators should be used on the exterior of all pouches of instruments, and the packs marked with the date of processing, and batch number.
 - Physical indicators (gauges, displays and print-outs) should be checked for every cycle for signs of malfunction of the autoclave.
 - A dedicated drying cycle must be used for any bagged items.
 - Formal validation of processing parameters for bagged items must be undertaken annually (according to AS4187:2003), and written records kept of the results.
 - Validation using spore tests must be undertaken for new packaging materials or techniques.

An operating log book must be retained for each autoclave in the practice, and for each cycle of unwrapped items, an entry will be made which records:

- the date,
- the autoclave identification,
- the type of load (in terms of contents),
- cycle parameters,
- result from the printout,
- result from a class 4, 5 or 6 chemical indicator placed within the load, and
- the identification of the person who has physically sighted the chemical indicator and the printout, and who is certifying that the load is safe for use.

Dry Heat Sterilizers

If a dry heat sterilizer is used in the practice, the validation and calibration requirements are specified in Australian Standards 4187 and 4815. Calibration of the thermocouple is essential in a dry heat sterilizer, and this must be done during the annual servicing.

In relation to the use and operation of dry heat sterilizers:

- items which can be autoclaved should be processed by autoclaving, rather than by dry heat sterilization.
- cycles must not be interrupted during use.
- the calibration of the thermocouple must be checked during annual servicing, and a log kept of servicing and calibration.

Clean Instrument Storage

Materials, equipment and instruments must be protected from contamination by aerosols created in the clinical environment and from vapours, splashing or aerosols produced during handwashing, equipment washing, or ultrasonic cleaning.

This storage may employ:

- Storage in bags,
- Covering instruments with an impermeable material,
- Storage in closed drawers, or
- Storage in dedicated covered containers.

APPENDIX 1.

Duties of Care (based on the *ICG, Section 5*)

Responsibilities of the Practice

The orthodontic practice has a duty of care to minimise exposure to infectious agents and to protect the health of :

- clinical and non-clinical staff working in the practice,
- patients and their guardians (such as parents) attending, or visiting the practice,
- service technicians, trade representatives and other casual visitors to the practice.

As a consequence of this, the practice has a legal and ethical responsibility to provide staff members with:

- a safe working environment,
- induction training and ongoing education about infection control procedures,
- induction health screening and ongoing vaccinations,
- ongoing monitoring and evaluation of infection control procedures.

The practice also has a responsibility to protect the privacy and confidentiality of both patients and staff in the practice.

Practice owners have obligations to provide the facilities, staff and equipment necessary to ensure that the practice and its employees can comply with current infection control guidelines. In some States/Territories, this obligation extends to both registered and non-registered practice owners.

Civil liability for damages to a patient or staff member may arise where insufficient care has been taken to prevent transmission of infection or breach of confidentiality. There is legislation in each State and Territory about the spread of infectious diseases under which such liability for damages may arise.

Key responsibilities of the practice principal include:

1. To appreciate the risks posed to self, staff, patients and visitors by infectious agents.
2. To inform and educate staff about the infectious hazards they will face during their employment. This information should be provided when they are first appointed, and before rostering to hazardous areas (such as the sterilising room).
3. To implement work practices that prevent the transmission of infection, such as environmental cleaning, and instrument re-processing.
4. To develop the Infection Control protocol for the practice.
5. To train staff in handwashing techniques and the use of personal protective equipment.
6. To supervise staff.
7. To implement management systems that support effective work practices.
8. To communicate and protect patients' rights.

-
9. To prevent discrimination against patients or staff with infections.

It should also be stressed that all dentists have a responsibility to know their infectious status with regard to blood-borne viruses. Moreover, within the practice, access to confidential medical information (relating to both patients and members of the staff) should be strictly limited to only those staff who need to access the information for the better clinical treatment of the patient.

Staff who have no clinical contact (such as receptionists and dedicated clerical staff) have no greater exposure to infectious diseases than does a member of the general public. These employees do not need to be included in vaccination programs or other programs aimed at protecting staff who have clinical contact.

Staff members who may be occupationally exposed to blood or saliva include the orthodontist, dental hygienist/therapist, dental chair-side assistant, maintenance personnel who service clinical equipment, staff working in the sterilisation area, and staff involved in cleaning and waste management.

Responsibilities of Employees

- To follow the practice's specific infection control policies, as part of their contract of employment.
- To ensure that the standard of care they provide, and the procedures which they adopt, are sufficient to prevent transmission of infection to patients or other staff members.
- To report potential exposures to blood and/or saliva.
- To be aware of their individual requirements for immunization against infectious diseases.
- To maintain personal immunization records.

Failure to follow infection control policies and procedures may be grounds for disciplinary action, including dismissal.

APPENDIX 2.

Induction Program for New Staff

New staff joining the practice will need to complete an induction program which should include:

- the physical layout of the working area, particularly the identification of different clean and contaminated zones.
- practical procedures for infection control, such as instrument recirculation and sterilization, change-over, and management of interruptions such as spills and equipment breakdown.
- the particulars of follow-up for sharps injuries and other incidents.
- the importance of compliance with infection control procedures.
- information about personal health conditions (such as acute respiratory infections, and skin conditions) that may place staff or patients at risk (detailed below).
- occupational health and safety issues, such as the procedures for handling fires and other emergencies.
- staff expectations in terms of the confidentiality of patient records, and the rights and responsibilities of patients, including the implications of breaches of confidentiality.
- reporting requirements for sharps injuries.
- the specific policy of the practice in terms of wearing and cleaning uniforms.
- the appropriate use of personal protective equipment.
- safety rules in terms of jewellery, length of hair and footwear, and
- protocols for handling clinical waste.

They should be requested to read the written infection control protocol of the practice, and should be questioned to ensure that they are familiar with its contents.

At the commencement of employment, new staff members should be informed of the practice's health screening policies, and should be counselled about appropriate work placement in accordance with these policies

The personal medical history of staff members should include details relating to:

- Tuberculosis
- Rubella
- Measles
- Mumps
- Chickenpox
- Herpes simplex
- Hepatitis B
- Immune disorders (including medication such as immunosuppressants), and
- Exfoliative and weeping skin conditions.

There are several situations when, because of their medical situation, members of the staff should be excluded from clinical duties:

- depressed immune function which predisposes to infection, e.g.
 - neutropenia, which is often associated with cancer chemotherapy.
 - disseminated malignancy.
- Non-infectious shedding or weeping skin conditions
 - allergic eczema;
 - psoriasis; and
 - exfoliative dermatitis.
- Where the staff member suffers from a serious blood-borne virus infection, i.e. where they are HIV antibody positive; Hepatitis B e antigen (HBeAg) positive; and/or HBV DNA positive at high titres; or Hepatitis C virus (HCV) antibody positive and HCV RNA positive (by the polymerase chain reaction or a similar test).

When new staff members join the practice, they should complete an immunization record. The practice should develop, maintain and regularly update immunization/health screening cards and/or records for all staff during the period of their employment. These records should be maintained in accordance with the practice's policy for the retention of medical records (*e.g. 7 years*).

Staff should have access to their individual medical screening records on request and extracts of these screening records should be available to staff whenever they change their place of employment. It is recommended that staff maintain their own personal records of all immunizations and screening.

The program of immunizations for new members of staff should include:

- Influenza vaccination (annually), and
- Tetanus diphtheria booster (as required).

Staff who have not been previously immunised or naturally infected should be offered:

- Hepatitis B
- MMR (Measles, mumps, rubella)
- Varicella (chickenpox).

Boosters should be given as recommended in the most recent edition of The Australian Immunization Handbook (NH&MRC 2000). Refusal to comply with the recommended vaccination program should be documented, together with a reason for such refusal, if provided.

Staff who have not previously been immunized against Hepatitis B will require the first of the series of three injections before they

start work in the clinical environment. Following the full course of immunizations for Hepatitis B, it is essential to have a follow up test to establish that immunity has been achieved.

For female staff members of child-bearing age, rubella immunity is an important issue. Confirming rubella immunity is part of routine ante-natal screening, because serious congenital abnormalities can occur when rubella infection occurs in the first trimester of pregnancy. For this reason, rubella antibody status should be checked for female staff at the commencement of their employment. If rubella antibody is absent or below protective levels, then the staff member should be offered vaccination on beginning employment. Rubella vaccination should be avoided in early pregnancy, and conception should be avoided for two months following vaccination.

A tuberculin skin test should be part of routine testing for all new staff with patient contact. Staff who initially test negative should be regularly re-tested, or if exposed to a patient with TB. Bacille Calmette Guerin (BCG) vaccine is of uncertain value, but may be offered to tuberculin skin test-negative staff at high risk. Tuberculin skin test positive staff should be followed up with a chest X-ray and medical review.

APPENDIX 3.

Protocol for Exposure Incidents (including sharps injuries)

The definition of an exposure is:

- *an injury that involves direct skin contact with blood or saliva visibly contaminated with blood AND there is compromised skin integrity such as an open wound (including a skin penetrating injury), abrasion or dermatitis, OR*
- *direct mucous membrane contact (eye or mouth) with blood or blood contaminated saliva .*

For exposure to skin, the larger the area of skin exposed and the longer the time of contact, the more important it is to verify that all the relevant skin area is intact.

An exposure incident record must be completed, and this should include the following details:

- name of the injured person,
- their date of birth,
- exposure details (body site affected, extent of the exposure, severity of the injury),
- nature of the exposure (percutaneous or mucous membrane exposure),
- location in the practice,
- activity or procedure being undertaken at the time,
- implement causing the injury (e.g. instrument, ligature wire),
- identifying details of the source patient and their blood borne virus risk,
- infectious agent involved if known,
- details of treatment and prophylaxis given,
- procedures for investigating the circumstances of the incident and measures to prevent recurrence (this may include changes to work practices, changes to equipment, and/or training),
- outcome of the incident.

The exposure should be documented on a standard incident or accident reporting form AND reported to the practice principal. This documentation ensures a record for the employer and the insurer, should there be a later claim. It also provides valuable information about potentially unsafe practices, environments, or equipment.

The practice principal should bear in mind that they MUST fulfill reporting obligations under Workplace Health and Safety legislation (e.g. in some States, a contaminated sharps injury from a patient who is known to be positive, or later found to be positive, for blood-borne viral disease is a notifiable dangerous event, and must be reported to the state government WPH&S office within a prescribed time, such as 24 hours).

Staff should be educated to report occupational exposures immediately after they occur, whether or not they involve contamination. Sharps injuries may occur which do not involve

contamination, e.g. *when setting up fresh instruments prior to a patient visit, or when handling orthodontic wire which has not been in contact with the oral environment.* Such “clean” sharps injuries must be documented and followed up with investigation of the causes, but it is NOT necessary to undertake serological testing of the injured person.

Testing should be offered following all occupational exposure to blood or body substances, particularly all “contaminated” sharps injuries, e.g. *those involving exposure to blood or blood-contaminated saliva via an instrument, bur, or contaminated wire.* Baseline serum should be collected from the injured staff member AND the patient, and expert counselling provided on the implications of the event.

The practice principal should ensure that there is access to appropriately experienced counselling services for staff who may become anxious about their health as a result of exposure to a potential hazard, whether actual or perceived.

This counselling and the collection of blood samples would normally be undertaken outside the practice, e.g. at a nearby hospital by an infectious diseases physician.

e.g. Following a sharps injury and other blood or body fluid incidents, it is essential to know the following key pieces of information:

1. Who is the physician, medical officer or other suitably qualified professional who will be contacted?

(INSERT NAME AND TELEPHONE NUMBER HERE)

2. Who is the alternative on call / after-hours provider (e.g. an on-call infectious diseases physician)?

(INSERT NAME AND TELEPHONE NUMBER HERE)

3. What is the local sharps injury hotline information service (recorded information)?

(INSERT TELEPHONE NUMBER HERE)

4. Which pathology laboratory will process the blood samples?

(INSERT NAME AND TELEPHONE NUMBER HERE)

5. Which pharmacy stocks prophylactic medication?

(INSERT NAME AND TELEPHONE NUMBER HERE)

SHARPS INJURY PROTOCOL

Step 1 - Administer First Aid

- Clean the wound/site with soap and water.
- Further management of wound is dependant on nature of injury (e.g. suturing, application of a dressing).
- Consider whether a booster immunization for tetanus is indicated (e.g. If the exposure involves an injury from an object which may be contaminated with soil or dust).
- There is no advantage to the use of a stronger solution than soap and water for cleaning, as some disinfectants may inhibit wound healing.
- For a splash to the eyes or mouth, flush the mucous membranes/conjunctiva with copious volumes of normal saline or water. If contact lenses are worn, remove after flushing the eye and clean as usual.

Step 2 - Assess the Severity of the Exposure

- The risk assessment will determine if post-exposure prophylaxis (PEP) is warranted. The risk assessment is urgent, as initiation of PEP may potentially prevent a life-threatening disease. On the other hand, PEP is also expensive and may have significant side effects, so an accurate risk assessment is also important in ensuring PEP is only recommended when warranted.
- Because this step is crucial to the management process, the exposed person must be **immediately relieved from duty to be assessed**.
- The practice principal must be aware of how to access a person who is able to assess risk. *The initial risk assessment may be by telephone.*

Factors which influence whether an exposure has the potential to transmit a blood-borne virus (BBV) infection include:

- the type of exposure (mucosal splash vs. a deeply penetrating skin injury)
- the type of body substance (e.g. how much blood is present in the saliva)
- the volume of blood or body fluids
- the length of time in contact with blood or body fluids
- the time which has elapsed since the exposure

In addition, after a sharps injury, the following factors should be considered:

- the presence of visible blood or body substance on the device causing the injury
- the type of device involved
- whether a hollow bore needle or solid sharp object was involved
- the procedure for which the device was used (for example, into a vein or artery)
- the gauge of the needle or device
- whether the injury was through a glove or clothing

Step 3 - Test the Injured Staff Member (baseline tests)

- whether a deep injury occurred in the exposed person; and
- whether the source patient is viraemic, e.g. with advanced / terminal HIV disease or a high viral load.

The exposed person (staff member) should be tested at the time of the injury, to establish their serological status at the time of the exposure for:

- **HIV antibody**
- **HCV antibody**
- **antibody to Hepatitis B surface antigen (Anti-HBs).**

This testing should be done as soon as possible after the injury (ideally the same day), and certainly within 2 weeks, bearing in mind the window period of the tests.

These baseline test results are essential for the purposes of enabling Work Cover insurance in the unlikely event of transmission of infection.

If the staff member has ever had a blood test which demonstrates Hepatitis B immunity (anti-HBs antibodies > 10 IU/mL) (whether from vaccination or past infection), they are protected, and there is no need for hepatitis B immunoglobulin after a potential or confirmed exposure to Hepatitis B.

In the event of sero-conversion for Hepatitis C or HIV, all reasonable attempts should be made to confirm that the virus strain transmitted is identical in both the patient and the source.

If the source patient is found to be positive, additional testing of the injured staff member will be required, and other matters will need to be addressed. This point is expanded upon below.

Step 4 - Test the Source Patient

- If a situation arises where there is a need to know the infectious status of a patient (such as a sharps injury), the NH&MRC Infection Control Guidelines state that “*the patient has a responsibility to provide information or consent for testing that enables the practice or responsible health professional to ensure the safe management of the injured staff member.*”
- A designated person in the orthodontic practice should explain to the source patient the reasons for the tests, and advise them of the types of tests that may be needed and the necessary arrangements (e.g. that they will need to see a medical practitioner).
- Informed and voluntary consent must be obtained before taking a blood sample to test for any purpose. When the responsible medical practitioner is obtaining this consent, the patient should be offered pre-test counselling to provide details on the test procedure, and the long- and short-term consequences to the patient of the test results. Post-test counselling may also be required, particularly if the result is positive.

The Source Individual Should be Tested for:

- **HIV antibody,**
- **HBsAg (hepatitis B surface antigen), and**
- **HCV antibody (hepatitis C antibody).**

If the source individual tests positive for either of these hepatitis B or C markers, additional tests would usually then be ordered to assess infectivity, e.g. Hepatitis B “e” antigen, and Hepatitis C RNA (the latter by polymerase chain reaction assay).

If the Source is Unknown

- Reasonable efforts should always be made to identify the source. The source individual may sometimes not be identifiable, *e.g. when a staff member is injured by an instrument in the sterilising room and it is not known on whom it was used.*
- If the source remains unknown, appropriate follow-up should be determined on an individual basis depending on:
 - the type of exposure;
 - the likelihood of the source being positive for a blood pathogen; and
 - the prevalence of HIV, HBV and HCV in the community of the likely source on whom the instrument or item was used. The prevalence of HCV antibody positivity in random blood donors in Australia is 0.3 %.

If the Source Refuses Testing

- Patient refusal for testing should be documented.
- In this case, treat the situation the same as the “positive patient” scenario below, and consider whether post-exposure prophylaxis and appropriate long-term follow-up should be offered.

If Blood Tests Show that the Source Patient is Negative

If the source person is found to be HIV, HBV and HCV negative, no further follow-up of the exposed person is generally necessary, unless there is reason to suspect the source person:

- is sero-converting to one of these viruses, or
- was at high risk of blood-borne viral infection at the time of the exposure (because they have recently engaged in behaviours that are associated with a risk for transmission of these viruses) (ICG Section 23.5.4).

The window period causes a FALSE NEGATIVE test result. The patient may be infectious, but this is undetectable by testing. The window period for HIV is usually three months but it can, very rarely, be longer. The use of the polymerase chain reaction (PCR) testing for HIV/viral RNA can identify 90% of infections within four weeks, significantly reducing this window period. The window period is 6 months for Hepatitis B and Hepatitis C.

If the source is KNOWN or SHOWN to be positive for Hepatitis B surface antigen (HBsAg)

If the staff member is immune to Hepatitis B (anti-HBs antibodies > 10 IU/mL), they are protected. If levels of immunity are relatively low (i.e. between 10 and 100 IU/mL), a booster injection would be prudent.

If the staff member is NOT IMMUNE (e.g. has never been immunised, did not seroconvert to the vaccine (a non-responder), or has antibody levels to HBsAg less than 10 IU/mL), the correct treatment is to:

1. Give a single dose of Hepatitis B immunoglobulin (**HBIG**) within 48–72 hours, **AND**
2. Start a course of HBV immunization. **HBV vaccine** should be given within 7 days of exposure, and then repeated at 1–2 months and again at 6 months after the first dose. Following the final vaccine dose, the level of immunity (antibodies to surface antigen) should be checked 2-4 weeks later.

If this HBV prophylaxis is not undertaken, the risk of transmission of HBV is 6.3% if the source is “e” antigen negative, but more than 30 % if the source is hepatitis B ‘e’ antigen positive.

If the Source is KNOWN or SHOWN to be Positive for Antibodies to Hepatitis C

- There is no effective post-exposure prophylaxis (PEP) for Hepatitis C, however interferon alpha and ribavirin may be employed to intercept HCV infection if seroconversion occurs. Treatment with these two antiviral agents during the acute phase of the disease may prevent establishment of the carrier state.
- If the HCV antibody test of the source patient is positive, then HCV RNA polymerase chain reaction (PCR) assay should be performed to test for HCV RNA. Not all anti-HCV antibody-positive subjects are currently HCV infected.
- The risks of transmission after a sharps injury from a positive source varies according to whether active viral replication is occurring. If the source is HCV RNA negative by PCR assay, the risk is 1.8-3.1%; however the risk increases to 10% if the source is PCR positive.

The injured staff member should be **re-tested for HCV antibodies** at 3 and 6 months, in addition to their baseline test.

In addition, regular **liver function tests** such as ALT and AST (e.g. at 2, 3 and 6 months) and the monitoring of clinical signs and symptoms should be undertaken by an infectious diseases physician or gastroenterologist, and specific therapy considered if appropriate.

If the Source is KNOWN or SHOWN to be Positive for Antibodies to HIV
(or is at high risk of seroconverting)

The risk of seroconversion is as follows:

- after a sharps injury with HIV-infected blood: 0.3 %.
- after a mucous membrane exposure to HIV-infected blood: 0.09 %.

As only a small proportion of occupational exposures to HIV result in transmission of the virus, the toxicity of HIV post-exposure prophylaxis (PEP) must be carefully considered against its efficacy.

PEP is only indicated if there has been a significant exposure, and a proper risk assessment has been undertaken by a medical

practitioner experienced in HIV management. This person will gather information on the stage of infection in the source, and current and previous anti-retroviral therapy, in order to decide on an appropriate prophylactic regimen.

HIV PEP is an experimental, not a proven, therapy. There is some evidence that taking Zidovudine reduces the risk of transmission of HIV after an occupational exposure. Nevertheless, there are also documented cases of seroconversion, despite early use of Zidovudine. It is the exposed individual's choice whether or not to take PEP, and they can stop at any time.

- PEP is recommended for percutaneous (skin penetrating) exposure to potentially infectious blood or body fluids (because of the increased risk of HIV transmission).
- PEP should be offered (but not actively recommended) for exposure of ocular mucous membrane or non-intact skin to potentially infectious blood or body fluids (as there is less increased risk of HIV transmission).
- PEP should not be offered for an exposure to non-bloodstained saliva (as this is not potentially infectious for HIV).

HIV PEP is typically **2 or 3 orally administered anti-retroviral drugs** (such as Zidovudine [AZT/ZVD] or Lamivudine, and a protease inhibitor), and should be administered to the recipient **within 24–36 hours after exposure** (preferably within 2 hours). This therapy should be continued for 4 weeks, on the advice of an infectious diseases physician.

If the source is known to be on anti-HIV medications, the treatment history will influence the medications prescribed by the infectious disease physician. An individual would normally only be commenced on HIV PEP on the advice of an S100 prescriber, or a physician specialising in HIV or infectious diseases.

Follow-up blood tests for the injured person should be undertaken at 1, 3 and 6 months, and follow-up undertaken to detect any febrile illness occurring within 3 months of exposure (possibly representing a HIV seroconversion illness).

All anti-retroviral agents may cause significant side effects, particularly gastrointestinal. There can be difficulties taking PEP (especially if working). Up to 40% of individuals do not complete the course of PEP due to side effects. It is important that the exposed person knows the difference between PEP side effects and HIV seroconversion symptoms.

Discussions as to the value of HIV PEP in exposed females should include the possibility of pregnancy. Anti-retroviral therapy is safe during pregnancy, and is effective at reducing the risk of transmission of HIV to the unborn child.

**Special Issues for
Exposure Incidents in
Females**

Some people find the experience of an occupational exposure to HIV very distressing, and they should be given the opportunity for immediate counselling to address anxieties. The exposed person should be advised on ways to prevent transmission of blood-borne viral diseases to others. This will include advice about safe sex, safe injecting / safe needle use, breastfeeding, blood donation and safe work practices. A staff member who has been exposed to HIV (or Hepatitis C) should not donate blood, semen, organs or tissue for six months, and they should not share implements that may be contaminated with even a small amount of blood (e.g. razors or toothbrushes).

Both the employer and pregnant members of staff have an obligation to reduce risks to the foetus. In general, adherence to standard and additional precautions, vaccination and high standards of general hygiene in the workplace should protect pregnant members of staff. It is the responsibility of pregnant staff to advise their medical practitioner and employer of their pregnancy.

If the source patient is positive for HBV, HCV or HIV, pregnancy testing should be offered to women of child-bearing age who have been exposed and whose pregnancy status is unknown. If the exposed person is pregnant, she should be informed about the available limited data on the toxicity of anti-HIV post-exposure prophylaxis in pregnant women.

APPENDIX 4.

Instrument Cleaning in the Orthodontic Practice

Effective instrument recirculation involves removing all visible contamination from instruments prior to their routine sterilization using an autoclave.

Cleaning is an essential step since the sterilizing process does not physically remove growth areas of organic bioload from instruments. If such are present, they prevent the removal of air and the penetration of steam. For this reason, instruments must be visibly clean prior to being placed in an autoclave. If instruments have visible contamination, then the effects of heat on this will cause it to harden. This will make further cleaning more difficult.

To assist in instrument cleaning, some type of detergent or surfactant agent is used. This assists in the removal of organic bioload. Cleaning in the presence of such surfactants helps to emulsify the lipids which are present. Having said this, the effectiveness of a detergent or surfactant is greatly enhanced through a mechanical action. This mechanical action underlies, not only hand cleaning, but also ultrasonic cleaning and the use of high temperature thermal disinfectors.

The detergents which are used for household cleaning (such as dishwashing in the domestic setting) are unsuitable for use in a dental surgery. They lack the appropriate properties for such use.

The most efficient way of cleaning instruments is via mechanical cleaning methodologies such as ultrasonic cleaners and high temperature thermal disinfectors. High temperature thermal disinfectors operate at high temperatures (90 degrees C or above) and use highly alkaline detergents as part of the cleaning process. Ultrasonic cleaners dislodge material through the transfer of sonic energy on to the instruments. Because of this, instruments which have resilient components (such as rubber or plastic) cannot be effectively cleaned in an ultrasonic cleaner.

Upon removal from the ultrasonic cleaner or thermal disinfectant, instruments must be inspected. Any instruments which show visible contamination must be recleaned, either by hand or mechanically. It is a key principle that an instrument cannot be sterilized until it is clean.

The recommendations below are based on two key documents: *Infection control guidelines for the prevention of transmission of infectious diseases in the health care setting*, as endorsed September 2002 by the Communicable Diseases Network of Australia and NH&MRC; and *Australian Standard 4187 (2003) Cleaning, disinfecting and sterilizing reusable medical and surgical instruments and equipment, and maintenance of associated environments in health care facilities*.

Preparation

- Personal protective equipment must be worn by staff working in the sterilizing room as there is the opportunity for exposure to contaminated materials both from aerosols and from splashing.
- Ensure that appropriate personal protective equipment is being worn, namely, thick utility gloves, uniform, appropriate splash-proof apron, footwear with closed covering, eyewear, mask and disposable hairnet.
- It is best to clearly divide the sterilizing area into a range of distinct zones:
 - a receiving zone
 - a cleaning zone which includes the ultrasonic cleaner, the handpiece lubricating system, and the deep sinks
 - a sorting area where items can be assembled and packaged as necessary.
 - a sterilizing area where the autoclaves are located.
 - a sterile storage area where items in pouches and packs are kept. This area needs to be completely free from contamination and splatter.
 - an area for storing items that require to be kept aseptically, but not in a sterile fashion, e.g. items for routine conservative dentistry.
- Sort items according to the type of contamination and the type of instrument. Visible blood and residues such as cement should have been minimized by wiping at the chair-side to pre-clean the items. This wiping must be done in a way that does not create a risk for sharps injury.
- Items should be placed in a holding solution (warm water with detergent) if not cleaned immediately. This holding solution should be a container with rigid sides.
- Instruments taken from the holding bath should be rinsed with warm water and then placed into the ultrasonic cleaner.
- Organise instruments according to the type of cleaning required, e.g. specialist cleaning such as handpiece lubrication, mechanical cleaning in an ultrasonic cleaner or high temperature thermal disinfectant, or specialized hand cleaning.
- Dismantle items where required.
- Check pliers, and other hinged items for smoothness of operation and correct alignment of the jaws.
- Inspect instruments for dull spots, dents, chips and areas of corrosion.
- Inspect instruments for sharpness.

Ultrasonic Cleaning

- Place instruments in a basket for ultrasonic cleaner (or in cassettes, as appropriate).
- Ensure the ultrasonic cleaner chamber has been filled with water, the appropriate additives placed in the chamber, and degassed.
- The ultrasonic cleaner must be tested each day using the foil test before being used on instruments. If the ultrasonic cleaner fails to work effectively, this can be due to degradation of the piezoelectric transducer or overloading of the chamber. The efficiency of the ultrasonic transducer must be checked daily using the 10 second aluminum foil perforation test.

Alternatively, custom-made test devices such as the ultrasonic test can be used. Note that such tests must only be run after the unit has been degassed. Degassing is essential to remove dissolved air which otherwise reduces the amount of available sonic energy in the first several minutes of operation of the ultrasonic cleaner.

- Load the instruments to minimize layering and ensure adequate separation. Items should not be placed directly onto the tank of the ultrasonic cleaning unit, but rather should be placed in a perforated basket. Perforations are necessary to allow sonic energy to penetrate the load during cleaning.
- Operate the instrument for the correct time.
- The lid must be placed on the ultrasonic cleaner during use as these cleaners generate aerosol during their normal operation.
- Remove the instruments from the basket, rinse thoroughly and inspect.
- At the end of the day, the solution must be removed from the ultrasonic cleaner, and the chamber allowed to dry. Ultrasonic cleaners have only limited disinfecting capabilities, and large numbers of viable microorganisms are present in the solution at the end of the day. Regular cleaning of the ultrasonic chamber improves the efficiency of the unit and removes the potential for additional contamination being deposited on to the instruments during the cleaning process.

Hand Cleaning

- For instruments requiring specialized hand cleaning, disassemble as necessary, placed towards the bottom of the sink with the water spray directed downwards.
- Handle items in small lots, and ideally one at a time.
- Use warm water, not cold or hot water, with an alkaline detergent. Both hot water and cold water are unsuitable since they coagulate proteins or blood components, respectively, and this would make the instruments more difficult to clean.
- Do not use abrasive products such as steel wool, rather use abrasive nylon pads.

After Cleaning

- Thoroughly rinse all items and drain.
- Inspect items for cleanliness under good light. They must be “visibly clean”.

Packaging

- Pack instruments as necessary into trays or cassettes.
- Load the instruments into the autoclave chamber allowing space for air removal and for steam penetration. Ensure adequate spacing and correct layering of items.
- Place one chemical indicator (Class 4, 5 or 6) in the chamber at the back / bottom.
- Close the door and operate the autoclave on the appropriate cycle parameters.
- Observe the changes in temperature and pressure during the autoclave cycle by observing the pressure gauge and the relevant readouts.
- Make an entry into the autoclave log which details the operator’s name, date, time, autoclave number, type of contents, and sterilizing parameters used.

After Autoclaving

- At the completion of the load, check the mechanical indicator, check the printout, and check the chemical indicator included in the load.
- Complete the entry in the autoclave log sheet for these indicators.
- Remove the items using clean heat proof insulated gloves (not rubber utility gloves which are contaminated) and place into the relevant storage areas. Unwrapped instruments (i.e. instruments in trays) must be stored in a clean dry dust-free environment, and must be separated from any possible contamination from the chairside. This can be achieved using large plastic bins with close fitting lids, which can be placed on to eliminate environmental and aerosol based contamination.

APPENDIX 5.

Design Issues for Infection control in the Orthodontic Practice

The owners and managers of a dental practice have a legal and ethical responsibility to provide staff with a safe working environment.

Practitioners who are renovating their existing dental practice or intending to move to new premises need to take into account a range of requirements for issues such as radiation safety, and workplace health and safety. The purpose of this document is to provide recommendations for the “built environment” of a dental practice from the standpoint of infection control.

The recommendations below are based on *Infection control guidelines for the prevention of transmission of infectious diseases in the health care setting* (as endorsed in September 2002 by the Communicable Diseases Network of Australia and the NH&MRC).

Physical Facilities of a Dental Practice

- Dedicated work areas should be designed to minimise the transmission of infection.
- Treatment and cleaning areas should be separated, and workflow should be from clean to contaminated areas.
- Staff eating and recreation areas must be separate from work areas and patient treatment areas (Section 11.4.2).
- Food should not be stored in refrigerators with contaminated material, clinical specimens or medical products such as drugs (Section 19.3).
- Ventilation, air-conditioning, cooling towers and water systems must meet Australian Standards (*AS 1668.2 (1991) and Supplement 1 (1991). The use of mechanical ventilation and air-conditioning in buildings - Mechanical ventilation for acceptable indoor air quality*; and *AS/NZS 3666 (1995) Air-handling and water systems of buildings – Microbial control*).
- Temperature, humidity and air purity (to minimise dust, infectious agents and gases) should be maintained within prescribed limits (AS 1668.2).
- Air-conditioning systems in health care establishments should be monitored regularly and serviced by accredited service technicians, and maintenance schedules should be documented.

Sterilising Room

- The instrument cleaning area must be dedicated for that purpose only. It must be well lit and well ventilated, with sufficient bench space to accommodate the autoclave(s) and to ensure the separation of sterile, clean and soiled instruments and equipment.
- Provision must be made for handling and storage of waste, in a way that minimises the potential for injury or exposure of staff and others.
- At least one stainless steel sink is required, and this must be deep enough to accommodate instruments and other equipment requiring cleaning.
- Double sinks are preferred.

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- These sinks should be used only for cleaning equipment and instruments (NOT handwashing).
 - Where filters or anti-splash devices are fitted to taps, they should be cleaned regularly.
 - Detailed recommendations for the operation of the sterilizing area can be found in *AS 4187 (2003) Cleaning, disinfecting and sterilizing reusable medical and surgical instruments and equipment, and maintenance of associated environments in health care facilities*. Note that the earlier document *AS 4815: 2001 Office-based health care facilities not involved in complex patient procedures and processes — Cleaning, disinfecting and sterilising reusable and surgical instruments and equipment* is currently undergoing a major revision.
 - Other useful standards applicable to the sterilising room are
 - *AS 2773 (1998) Ultrasonic cleaners for health care facilities*
 - *AS 2945 (1998) Batch-type washer/disinfectors for health care facilities*, and
 - *AS 2487 (1981) Dry heat sterilisers (hot air type)*

Autoclaves

- All steam sterilisers must meet the requirements of
 - *AS 1410 (1987) and Amendments 1 and 2 . Sterilisers - Steam - Pre-vacuum*
 - *AS 2182 (1998) Sterilisers - Steam – Benchtop*, or
 - *AS 2192 (1991) Sterilisers - Steam - Downward displacement*
- All steam sterilizers must be operated according to AS 4187 and AS 4815.
- Office-based practices intending to purchase new bench-top sterilisers for the sterilisation of wrapped instruments and porous loads should check that a printer and a built-in drying cycle is featured and that the steriliser is listed by the Therapeutic Goods Administration.

Clean Instrument Storage

- This must be a clearly defined area, which is protected from all vapours, splashing or aerosols produced during procedures, handwashing, equipment washing, ultrasonic cleaning and reprocessing.
- Materials, equipment and instruments must be protected from contamination by aerosols created in the dental environment by:
 - Storage in bags,
 - Covering instruments with an impermeable material
 - Storage in closed drawers, or
 - Storage in dedicated covered containers
- Dry, sterile, packaged instruments and equipment should be stored in a clean, dry environment which protects them from environmental contamination, and protected from sharp objects that may damage the packaging (as per *AS 1079.1-5 (1993–94) Packaging of items (sterile) for patient care*)

Floors

- All floors should have non-slip coverings.
- Where there is likely to be direct contact with patients, or with blood and body fluids, the surface of floors and walls should be made of smooth, impermeable seamless materials, such as welded vinyl.
- Treatment areas in office practice should not be carpeted.

Bench Tops

- Unnecessary horizontal, textured and moisture-retaining surfaces, or inaccessible areas where moisture or soil can accumulate should not be used.
- Where possible, all surfaces should be smooth, non-porous, and impervious.

Fixtures

- All fixtures and fittings should be designed to allow easy cleaning and to discourage the accumulation of dust.
- Blinds that are easy to keep clean and do not allow the accumulation of dust are preferable to curtains.
- Both treatment areas and the sterilising room should have smooth impervious surfaces without crevices, adequate lighting, good ventilation (to reduce the risk of infection transmission from aerosols) and suitable receptacles for the disposal of clinical waste (AS 403112 and AS/NZS 426113).

Liquid Handwash Dispensers

- Because refillable containers and their pumps are a potential source of contamination as bacteria (such as *Pseudomonas aeruginosa*) can multiply within many products, liquid handwash dispensers with disposable cartridges, including a disposable dispensing nozzle, are recommended.

Taps for Handwashing

- No-touch taps are preferred, e.g. operated by elbow or foot controls, or sensors.
- Both hot and cold water should be supplied for handwashing.
- Taps should be fitted with an aerator filter or other anti-splash device, and these should be cleaned in accordance with the manufacturer's recommendations.

Handbasins

- Clinical handbasins must be provided for staff to wash their hands.
- These must be located at a safe distance from patients to avoid inconvenience and or splashing patients during procedures
- Non-clinical (vanity) handbasins and sinks are not appropriate equipment for handwashing by staff for infection control purposes.
- Handbasins should comply with *AS 1730.11 (1996) Washbasins*.
- Clinical handbasins should only be used for handwashing not for any other purpose such as for the disposal of liquid wastes. Liquid wastes should be disposed of in a separate disposal sink (e.g. in the sterilising room).
- Each procedural room (i.e. each operatory) should contain at least one clinical handbasin designated for handwashing only.