



Faculty of Oral and Dental Medicine  
CAIRO UNIVERSITY



Infection Control Unit

**INFECTION CONTROL MANUAL**



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## Our mission

Create a safer environment in faculty of oral and dental medicine through prevention of infection.

## Our vision

Nurture a culture with high quality standards of infection control among healthcare providers in Egypt.

## Objectives

Infection control program is intended to:

- Protect dentists, their staff and their patients from infectious disease transmission.
- Encourage Dental Health Care Personnel to apply the developed protocol in a diligent and conscientious manner.

## Components of the infection control program

*The infection control program in Faculty of Oral and Dental Medicine Cairo University includes:*

1. Providing education and training on the prevention and control of health associated infection.
2. Producing, implementing, and auditing compliance with infection control policies and guidelines.
3. Communicating and advising all staff on a day to day basis on all matters relating to infection control and ensuring that advice on infection control is available on working time.



## Principles of infection control

- Faculty of Oral and Dental Medicine Cairo University has a duty of care towards employees to provide a safe place of work.
- Dental practices must adopt “Standard Infection Control Precaution” which involves the consideration that all blood, tissues and body fluids should be regarded as potentially infected with blood borne viruses (particularly Hepatitis B, Hepatitis C and HIV). Barrier precautions must be taken when handling saliva in dentistry from patients.
- All new health care providers and dental auxiliaries must be trained in infection control procedures prior to working.
- Faculty of Oral and Dental Medicine Cairo University must ensure that protective clothing and equipment i.e. gloves, protective glasses and face protection are used in the correct manner.
- Infection control is a requirement of duty of care of all health care providers in the Faculty of Oral and Dental Medicine Cairo University. “Failure to employ adequate methods of cross-infection control would almost certainly render a dentist liable to a charge of serious misconduct”.
- All clinical staff including Faculty staff, nurses and students must be immunized against Hepatitis B.
- A clinician who believes that he or she may be infected with HIV, hepatitis virus or other blood-borne viruses (BBVs), has an ethical responsibility to obtain medical advice and testing.
- All members of the dental team must maintain strict confidentiality with respect to patient care.



## Responsibilities and authority of Infection Control committee

1. Meet monthly and report formally to the head of departments (members unable to attend will send a representative).
2. Circulate the ICC minutes widely to the relevant committees and units.
3. Advise on, ratify, and monitor the implementation of infection control policies, procedures and guidelines.
4. Promote and facilitate education and the application of evidence based practice in relation to infection control.
5. Review and update infection control protocol as necessary.
6. Develop the Annual plan to ensure the implementation and compliance to infection control measures.
7. Receive, consider and endorse the Annual Report which will be sent to the Vice Dean.
8. Review the progress of the Annual Program, assist in its effective implementation and review the final results.
9. Develop and review priorities and strategies in relation to infection control ensuring most effective utilization of resources as supported by top management.
10. Provide the necessary guidance for post exposure prophylaxis.
11. Promote a culture aware of the hazards of infection and their prevention.
12. Draw to the attention of the Faculty Council and relevant committees any serious problems or hazards relating to infection control.
13. Discuss, evaluate, and initiate necessary action for issues related to infection control and ensure matters are taken forward at a local level.
14. Exchange knowledge and experience with infection control units all over educational hospitals in Egypt.





**P**Primary uses of PPE are to protect staff and reduce opportunities for transmission of microorganism in hospital. The selection of protective equipment varies based on the risk of transmission of microorganisms to the patient, and the risk of contamination of health care practitioners' clothing and skin by patients' blood, body fluids, secretions and excretions.

### **Personal protective equipment should be used by:**

1. Health care workers who provide direct care to patients and who work in situations where they may have contact with blood, body fluids, excretions or secretions;
2. Support staff including assistants, cleaners, and laundry staff in situations where they may have contact with blood, body fluids, secretions and excretions;
3. Laboratory staff, who handle patient specimens; and
4. Family members who provide care to patients and are in a situation where they may have contact with blood, body fluids, secretions and excretions.

### **Principles for use of personal protective equipment:**

Personal protective equipment reduces but does not completely eliminate the risk of acquiring an infection. It is important that it is used effectively, correctly, and at all times where contact with blood and body fluids of all patients may occur. Continuous availability of personal protective equipment and adequate training for its proper use are essential. Staff must also be aware that the use of personal protective equipment does not replace the need to follow basic infection control measures such as hand hygiene.

### ***The following principles guide the use of personal protective equipment:***

- Health care workers should assess whether they are at risk of exposure to blood, body fluids excretions or secretions and choose their items of personal protective equipment according to this risk.



## Personal Protective Equipment (PPE)

- Avoid any contact between contaminated (used) personal protective equipment and surfaces, clothing or people outside the patient care area.
- Discard used personal protective equipment in appropriate disposal bags.
- Do not share personal protective equipment.
- Change personal protective equipment completely and thoroughly wash hands each time you leave a patient to attend to another patient or another duty.

### PPE include:

#### 1. GLOVES

##### *Reasons for wearing gloves:*

Glove wearing by health care workers (HCWs) is recommended for **two main reasons:**

1. To prevent microorganisms which may be infecting, commensally carried, or transiently present on HCWs' hands from being transmitted to patients and from one patient to another; and
2. To reduce the risk of HCWs acquiring infections from patients.
  - Gloves do not replace the need for hand washing
  - Contamination of the hands may occur when gloves are removed and some gloves have small perforations that may allow contamination of the hands.
  - Gloves must be discarded after each care activity for which they were worn in order to prevent the transmission of microorganisms to other sites in that individual or to other patients.
  - Wear gloves only when indicated – otherwise they become a major risk for germ transmission.



### Types of gloves:

#### Medical Gloves

Medical gloves are disposable gloves used during dental examinations and treatment. Medical gloves are made of different polymers including latex, nitrile rubber, vinyl and neoprene; they come unpowdered, or powdered (fig.1 and 2). Nitrile gloves have an increased resistance to instrument punctures. There are two main types of gloves: exam and surgical. Surgical gloves have more precise sizing with a better precision and sensitivity and are made to a higher standard. Exam gloves are available as either sterile or non-sterile, while surgical gloves are generally sterile.



**FIG. (1) Latex glove**



**FIG. (2) Nitrile glove**







- Surgeon's gloves should be worn during surgery and during other procedures that are lengthy and involve a good deal of bleeding (e.g., periodontal surgery, extraction of teeth)
- Gloves should be selected that fit the operator well .
- If you begin to experience hand fatigue, cramping, or carpal tunnel-like symptoms (e.g., numbness) you may try a slightly larger glove (or different brand glove)
- If you notice signs of dermatitis on your hands (cracking, itching, redness), appropriate alternative gloves and/or soap should be used (see section on contact dermatitis below) .
- When removing gloves, be careful not to allow "glove juice" to splatter on instruments or patients; do NOT discard used gloves on instruments that are to be used again (as when leaving the patient to find a clinical instructor)
- Soiled gloves should be discarded immediately and should not contact any critical or semicritical items
- Consult with manufacturer regarding materials incompatibility with gloves
- The CDC has made no recommendations regarding the use of double gloves and considers this an unresolved issue; there are studies that demonstrate fewer punctures of the inner glove and less blood on surgeon's hands when double gloves are worn.

#### Latex Allergy and Dermatitis in dental health care providers (DHCP):

With increased use of latex gloves, there has been a corresponding increase in the frequency of latex allergy and contact dermatitis in healthcare workers. This is a serious and growing problem, but there are steps that can be taken to reduce its impact.

You should seek medical consultation if you notice signs that might indicate a latex allergy or dermatitis symptoms that include **itching, redness, rash, dryness, fissures/cracking, hyperkeratosis and swelling. Other symptoms may include general allergic symptoms referred to the respiratory and other systems, such as sneezing, wheezing, hives (urticarial), and red, watery eyes.** Patients may also be allergic to latex and they should be identified by history in rare cases, life threatening emergencies (e.g., anaphylaxis) may occur and will require prompt treatment





### 3. FACE PROTECTION: MASKS, GOGGLES, AND FACE SHIELDS

#### Reasons for using masks

Masks are used for three primary purposes in healthcare settings:

- a. To protect health care workers from contact with infectious material from patients e.g; respiratory secretions and sprays of blood or body fluids as defined in standard and droplet precautions.
- b. To protect patients from exposure to infectious agents carried in a healthcare worker's mouth or nose when healthcare workers are engaged in procedures requiring sterile technique,
- c. To limit potential dissemination of infectious respiratory secretions from the patient to others; so placed on coughing patients (i.e: Respiratory Hygiene/Cough Etiquette).

#### Types of masks

Two types of mask available, the surgical and particulate respirator (N95) used to prevent inhalation of small particles that may contain infectious agents transmitted via the airborne route.

#### Face protection protocol

1. Personal eyeglasses and contact lenses are NOT considered adequate eye protection. Goggles protect the eyes from splashes (fig. 5).
2. Disposable or non-disposable face shields may be used as an alternative to goggles (fig. 6).
3. As compared with goggles, a face shield can provide protection to other facial areas in addition to the eyes.
4. Removal of a face shield, goggles and mask can be performed safely after gloves have been removed, and hand hygiene performed.
5. Change masks between patients **or if mask becomes soiled or wet**. If you change the mask, you must first remove your gloves; **do not touch your mask with your gloved hand**.
6. Clean and disinfect face shields, if used, and protective eyewear.

## Personal Protective Equipment (PPE)

7. Face shields may be considered in **addition** to surgical masks in the case of procedures likely to produce excessive splatter (e.g., use of ultrasonic scaler).
8. Do not to handle contaminated eyewear with unprotected hands until it has been decontaminated. Eyewear that cannot be heat sterilized should be washed with soap and water. Eyewear should be disinfected or sterilized if visibly soiled. Follow specific manufacturer's instructions for all specialty eyewear products

**N.B** When not in use, masks must not be placed on the forehead or around the neck. Masks are not to be worn outside of the immediate clinic area. It is recommended that masks be changed during lengthy treatment procedures.



**FIG. (5) Goggles and mask**



**FIG. (6) Face shield and mask**



### Protective draping

Single-use bibs should be used to protect patients' clothing, and reduce their exposure to spatter and debris created during dental procedures (fig. 7).



**FIG. (7) Bib**

### Use of rubber dam and high-volume suction

- Appropriate efforts should be made to minimize the spread of droplets, spatter and spray created during dental procedures. Accordingly, a rubber dam should be used whenever feasible, and high-volume suction should be used whenever the creation of droplets, spatter and spray, is possible.
- The use of rubber dam and high-volume suction also minimizes the ingestion or inhalation of contaminated material and debris

## Personal Protective Equipment (PPE)

### Putting on PPE (when all PPE items are needed)

1. Identify hazards and manage risk. Gather the necessary PPE.
2. Put on a gown.
3. Put on mask.
4. Put on eye protection e.g. face shield/goggles (consider anti-fog drops or fog resistant goggles).
5. Caps are optional: if worn, put on after eye protection.
6. Wash hands.
7. Put on gloves (over cuffs)

### Taking off PPE

- Avoid contamination of self, others and the environment
- Remove the most heavily contaminated item first:
  1. Remove gloves **FIRST**
  2. Peel off gloves and roll inside, out
  3. Dispose gloves safely
  4. Remove cap (if worn)
  5. Remove goggles from behind
  6. Put goggles in a separate container for reprocessing
  7. Remove mask from behind (untie lower then upper strip)
  8. Perform hand hygiene

***All PPE must be removed when leaving the treatment area***



### Processing Critical Items

- Critical patient care items include any instrument which penetrates soft tissue, contacts bone, enters into or contacts the bloodstream or any other normally sterile body tissue. Examples of critical items would include surgical instruments, periodontal scalers, scalpel blades and dental burs, rubber dam clamps, endo files with reprocessing instructions.
- Critical items must be sterilized by heat in order to prevent cross-contamination and infection spread in the dental setting. DHCP and other personnel can be exposed to microorganisms on contaminated critical instruments and devices through percutaneous injury, contact with non-intact skin on the hands or other body parts, or contact with mucous membranes of the eyes, nose or mouth.

### Operatory Clean-up:

- Contaminated instruments must be handled carefully to prevent exposure to sharp instruments that can cause a percutaneous injury.
- Instruments that have been used on a patient should be handled with puncture-resistant utility gloves during operatory clean-up

**Transportation:** Instruments should be placed in a rigid or puncture-resistant container or cassettes at the point of use to prevent percutaneous injuries during transport to the instrument processing area (fig. 8).



**FIG. (8) Cassette**

## Sterilization and Instrument Processing

- Instrument Processing** requires multiple steps to achieve sterilization. These steps include: disassembly and sorting, cleaning, rinsing, drying, inspection, corrosion reduction, packaging, heat-processing, cooling / drying, storage and delivery. Ultrasonic cleaners or washing machines should be used as an alternative to hand scrubbing.

**Instrument Processing Area:** A designated instrument processing area or a separate room should be constructed in the dental office or practice. This central processing area should have clear sections for:

- Receiving, cleaning, and decontamination
- Preparation and packaging
- Sterilization
- Storage of processed instruments (or, suitable storage in the operatory)

### Decontamination

- Instruments should be cleaned immediately. The surface of an instrument cannot be sterilized if there is blood, saliva, other body fluids or other debris adhering to the surface. Decontamination and cleaning should precede all disinfection and sterilization processes.
- Cleaning involves the removal of debris as well as organic and inorganic contamination. Removal of debris and contamination is achieved either by scrubbing with a surfactant, detergent, and water, or by an automated process (e.g., ultrasonic cleaner using chemical agents or instrument washer using water; fig. 9 and 10). Soak instruments in a rigid container filled with detergent, disinfectant/detergent, or an enzymatic cleaner. This step prevents drying of patient material and makes cleaning easier and less time consuming. Do not use high-level disinfectants/sterilants (e.g., glutaraldehyde) as instrument-holding solutions.
- After cleaning, instruments should be rinsed with water to remove chemical or detergent residue, taking care to minimize splashing.



- DHCP and other personnel should wear masks, glasses and gloves as aerosols may be released when hand scrubbing. Keep the hands away from sharp instruments; e.g. using puncture-resistant utility gloves and long-handled brush when handling or manually cleaning contaminated instruments and devices. PPE should be worn during instrument decontamination to avoid exposure from splashing.



**FIG. (9) Ultrasonic cleaner**



**FIG. (10) Washing machine**

### Instrument preparation and packaging

- Cleaned instruments should be inspected, assembled into sets or cassette trays, and wrapped, packaged or placed into container systems for sterilization. Keep in mind that these instruments are still considered contaminated.
- Packaging and wrapping materials that are specifically designed for sterilization must be used. Fabric can be used for drying as long as it is “specifically designed for sterilization”. Hinged instruments should be processed “opened” and unlocked. Hinged instruments (e.g., pliers / scissors / forceps) should be immersed in a rust inhibitor prior to sterilization.

## Sterilization and Instrument Processing

### II. Sterilization

Heat-tolerant dental instruments are sterilized in a dental office using:

- Steam under pressure (autoclaving)
- Dry heat
- Unsaturated chemical vapour (with adequate ventilation)

**Instrument packs must be allowed to dry** inside the sterilizer chamber before removing and handling, in order to avoid wicking of moisture and, potentially, microorganisms from hands or gloves.

**Examine each package.** If it is damaged in any way, items should be re-cleaned, re-wrapped, and re-sterilized

**In date-related packing,** every sterilized package is expiration-dated and the instruments are used on a “first in, first out” basis.

### Processing Semi-Critical Items

- Semi-critical items contact mucous membranes or non-intact skin, but do not penetrate soft tissue, contact bone, enter into or contact the bloodstream or other normally sterile tissues. Examples of semi-critical patient care items would include dental mouth mirrors, rubber dam forceps, amalgam condensers and reusable impression trays.
- Semi-critical items that are heat-tolerant must be sterilized by heat in order to prevent cross-contamination and infection spread in the dental setting. All steps for the sterilization of critical items should be followed for semi-critical items.
- Semi-critical patient care items that are heat sensitive and cannot be sterilized must receive high-level disinfection. Manufacturer instructions regarding dilution, immersion time, temperature and safety precautions must be followed carefully. All steps involved in critical instrument handling, transportation, decontamination and storage should be followed for semi-critical item processing, with the exception that high-level disinfection is utilized instead of heat sterilizer processing.



- High-level disinfection destroys all microorganisms, but not necessarily high numbers of bacterial spores. High-level disinfection can be achieved by using a washer-disinfector, or by liquid immersion in a high-level disinfectant.
- Following high-level disinfection by liquid immersion, semi-critical items should be handled with sterilized tongs or sterile gloves, rinsed with sterile water, dried and stored in sterile or clean containers or packaging material.
- Due to the toxicity of these chemicals, appropriate precautions should be taken to protect the DHCP and other personnel, including using closed containers to limit vapour release, utility gloves and aprons, mask, goggles / safety glasses / face shields.

### Monitoring Sterilization

Monitoring of sterilization procedures and equipment, utilizing mechanical, chemical and biological monitors, ensures the condition of sterility.

### Mechanical techniques

1. For monitoring sterilization include assessing cycle time, temperature, and pressure by observing the gauges or displays on the sterilizer and noting these parameters for each load.
2. Correct readings do not ensure sterilization; however, incorrect readings may be an early indication of a problem with the sterilization cycle.

### Chemical indicators

1. Use sensitive chemicals to assess physical conditions (e.g., time, temperature or the presence of steam) during the sterilization process.
2. Even though chemical indicators do not prove that sterilization has been achieved, they allow detection of certain equipment malfunctions, and they can help to identify procedural errors.



## Sterilization and Instrument Processing

- Internal and external chemical indicators (e.g., chemical indicator tape or special markings) change color rapidly when a specific parameter is reached. This verifies that the package has been exposed to the sterilization process (fig. 11).

### Biological monitors (i.e., spore tests)

- Verify the sterilization process directly by assessing the killing of known highly resistant microorganisms. As spores used in biological monitors are the most resistant and present in greater numbers than the common microbial contaminants found on patient-care equipment, a negative spore test signifies that other potential pathogens in the load have been killed. The date and time or cycle number should be documented and signed (fig. 12).
- Correct functioning of sterilization cycles must be verified for each sterilizer by weekly use of biological monitors. Every load containing implantable devices and/or the standard instruments used to place implantable devices must be biologically monitored with spore-test strips. These items must be quarantined until the test results are known.



**FIG. (11) Chemical indicator**



**FIG. (12) Biologic indicator**



Common reasons for a positive biological monitor in the absence of mechanical failure of the sterilizer include:

- Improper packaging
- Improper loading
- Improper timing
- Improper temperature
- Improper method of sterilization in regard to the item

### Dental Handpieces and Suction Devices

- Dental handpieces do not actually penetrate intact mucosa and are therefore classified as semicritical items. Despite this, all dental handpieces **MUST** be cleaned, lubricated, and **heat-sterilized** between patients.
- The manufacturer's instructions must be followed regarding the manner in which this is to be done. No handpiece will be used in the clinic that is incapable of withstanding heat sterilization. Following use, high-speed handpieces should be run (with a bur in the chuck and with irrigant flowing) for approximately 20-30 seconds to clear the lines. Hold the handpiece over the sink or other container to catch the water. Flushing at the beginning of each clinic day also is recommended. PPE should be worn during this procedure.
- Suction devices used for surgery should be sterilized. If used for nonsurgical procedures, then single-use items are acceptable. If a saliva ejector is being used, the patient should be directed NOT to close his or her lips around the tips as this may result in material from the suction system entering the mouth. Backflow, meaning reverse flow, can occur when there is more negative pressure in the patient's mouth than in the evacuator tubing, for example, when the patient uses the saliva ejector as a straw. When this happens, material from the mouth of a previous patient might remain in the vacuum line of the saliva ejector and be aspirated into the mouth of the next patient being treated. Although there have been no reports of any adverse



## Sterilization and Instrument Processing

health issues, patients should not be instructed to close their lips tightly around the saliva ejector tip during use.

- When possible, saliva ejector and high-volume evacuation (HVE) valves (the devices that the suction tips plug into) should be removable and sterilizable. This would be particularly if the treatment room is used for surgical procedures. If this is not feasible, the valves should be cleaned thoroughly with an intermediate-level Environmental Protective Agency (EPA)-registered hospital disinfectant.

### Processing of noncritical items

- They include instruments and devices only contact intact (unbroken) skin, which serves as an effective barrier to microorganisms. Examples of instruments in this category include X-ray head/cones, facebows, pulse oximeter, and blood pressure cuff
- These items carry such a low risk of transmitting infections that they usually require only cleaning and low-level disinfection. If using a low-level disinfectant, according to Occupational Safety and Health Administration (OSHA), it must have a label claim for killing HIV and HBV. However, if an item is visibly bloody, it should be cleaned and disinfected using an intermediate-level disinfectant before use on another patient.



### Biopsy Containers (see also section on Medical Waste)

- Biopsy containers must be kept tightly sealed, as they usually contain formalin or some other toxic tissue preservative. They must be clearly marked with the universal biohazard symbol. During surgery, it is helpful if a second assistant can open the vial while the operator or first assistant drops the specimen into the container. This prevents the surgical team from touching the surface of the vial. Such contact will:
  1. Contaminate the outer surface of the vial and
  2. Contaminate the surgeon's gloves with whatever organisms are on the surface of the container. These organisms can then be introduced into the patient's mouth or biopsy site.
- To protect the people handling and transporting biopsy specimens, each specimen must be placed in a sturdy, leak proof container with a secure lid to prevent leakage during transport. Care should be taken when collecting the specimen to avoid contaminating the outside of the container. If the outside of the container becomes visibly contaminated, it should be cleaned and disinfected or placed in a leakproof bag. The container also must be labeled with a biohazard symbol.



## Extracted Teeth

Extracted teeth that are being discarded are considered infectious and should be treated as regulated medical waste.

Extracted teeth containing amalgam should not be placed in a medical waste container that uses an incinerator for final disposal.

Extracted teeth used for shade comparison should be cleaned and the surface disinfected with an intermediate-level EPA-registered hospital grade disinfectant before sending to the laboratory.

If patients request their own extracted teeth, for the safety of others who may come into contact with the tooth, it should be cleaned and disinfected before it is returned to the patient.

Extracted teeth are occasionally collected and used for preclinical educational training; so:

- Extracted teeth should be cleaned of visible blood and debris and kept hydrated in tap water or saline. Be sure to use a sturdy, leakproof container if transporting and label the container with a biohazard symbol.
- Using teeth without amalgam is preferred because teeth can be safely autoclaved. If extracted teeth that contain amalgam must be used, DO NOT heat sterilize since this will produce harmful mercury vapors. Instead, immerse in 10% formalin for 2 weeks before use.
- Even though the inside of the pulp chamber is now safe to touch, CDC suggests that students use Standard Precautions, because preclinical exercises should simulate clinical practice.



Environmental surfaces can become contaminated with microorganisms during patient care, although they have not been associated directly with disease transmission to patients or DHCP. Environmental surfaces do not require decontamination procedures as stringent as those used on patient care items.

### Categories of environmental surfaces:

There are two categories of environmental surfaces:

**Clinical contact surfaces:** have a high potential for direct contamination from patient materials either by direct spray or spatter generated during dental procedures or by contact with DHCP's gloved hand (fig. 13). These surfaces can later contaminate other instruments, devices, hands, or gloves.

**Housekeeping surfaces:** do not come into contact with patients or devices used in dental procedures (fig. 14). Therefore, they have a limited risk of disease transmission.



**FIG. (13) Clinical contact surface**



**FIG. (14) Housekeeping surface**

## General cleaning recommendations

- Use appropriate protective barriers such as heavy-duty utility gloves, masks, and protective eyewear when cleaning and disinfecting surfaces.
- In general, cleaning and removal of microorganisms is as important as the disinfection process itself. Blood or other patient materials left on surfaces can interfere with the disinfecting process. Follow the manufacturer's instructions for proper storage, dilution, and use of hospital disinfectants.
- Because clinical contact surfaces come into direct contact with contaminated gloves, instruments, spray or spatter, their risk of transmitting infection is greater than for housekeeping surfaces. These surfaces can subsequently contaminate other instruments, devices, hands, or gloves.
- Surface barriers can be used to protect clinical contact surfaces and changed between patients. Surface barriers are particularly useful for surfaces that are hard to clean, such as switches on dental chairs. This practice will also reduce exposure to harmful chemical disinfectants.
- If surface barriers cannot be used, clean and then disinfect the surface with an EPA-registered hospital disinfectant effective against HIV and HBV (low-level disinfectant). If the surface is visibly contaminated with blood or other patient material, clean and then disinfect the surface with an EPA-registered hospital disinfectant with a tuberculocidal claim (intermediate-level disinfectant).
- Housekeeping surfaces carry the least risk for transmitting infections in dental settings. On a routine basis, these surfaces should be either cleaned with soap and water or an EPA-registered detergent/hospital disinfectant. Wet mops and cloths may become contaminated with microorganisms, so clean the mop and cloths after use and allow them to dry thoroughly before re-using.
- Prepare fresh cleaning and disinfecting solutions daily and per manufacturer recommendations.



### High-level disinfection

Certain chemicals are used to attain high-level disinfection of heat-sensitive semi critical medical and dental instruments. The product manufacturers' directions regarding appropriate concentration and exposure time should be followed closely.

### Intermediate-Level Disinfection

A chemical germicide with “tuberculocidal” (i.e., mycobactericidal) activity is recommended for disinfecting surfaces that have been soiled with patient material. These intermediate-level disinfectants include e.g., phenolics, and chlorine-containing compounds. A fresh solution of sodium hypochlorite (household bleach) prepared daily is an inexpensive and effective intermediate-level germicide. Concentrations of 500 PPM chlorine are effective on environmental surfaces that have been cleaned of visible contamination. Caution should be exercised since chlorine solutions are corrosive to metals, especially to aluminum.

### Low-level Disinfection

Low-level disinfectants have no “tuberculocidal” activity (e.g., quaternary ammonium compounds or hypochloride solution (200 PPM). They are appropriate for general housekeeping purposes such as cleaning floors, walls, and other housekeeping surfaces.



## Dental Unit Waterlines, Biofilm

- Studies have shown that colonies of microorganisms, or biofilms, can form on the inside of the small-bore plastic tubing that transports water within the dental unit to handpieces and air-water syringes. Once formed, a biofilm serves as a reservoir that may dramatically increase the number of free-floating microorganisms in water used for dental treatment.
- Most organisms isolated from dental water systems originate from the public water supply and do not pose a high risk of disease for healthy persons. Although a few pathogenic organisms, such as *Legionella* spp. and *Pseudomonas* sp., have been found, adverse public health threats have not been documented.

### Dental unit water quality

- Despite a lack of documented adverse health effects, using water of uncertain microbiological quality is inconsistent with infection control principles. Levels of contamination in water from untreated systems can exceed 1 million colony forming units per milliliter (mL) of water.
- Untreated dental units cannot reliably produce water that meets drinking water standards (fewer than 500 CFU/mL of heterotrophic water bacteria). Even using source water containing  $\leq 500$  CFU/mL of bacteria (e.g., tap, distilled, or sterile water) in a self-contained system will not eliminate bacterial contamination in treatment water if biofilms in the water system are not controlled. Removal or inactivation of dental waterline biofilms requires the use of chemical germicides.
- For this reason, CDC recommends that water used for routine dental treatment meets regulatory standards for drinking water (fewer than 500 CFU/mL of heterotrophic water bacteria). In recent years,



commercial devices and procedures designed to improve the quality of water used in dental treatment have become widely available. Examples of methods shown to be effective include the following:

- \* Self-contained water systems combined with intermittent or continuous chemical treatment.
- \* In-line microfilters.
- \* Combinations of these treatments.
- \* Another alternative is to bypass the conventional dental water delivery system entirely and use either autoclavable or disposable pathways, such as sterile water delivery systems.

### Monitoring options

- Monitoring of dental water quality may be performed using commercial self-contained test kits or commercial water-testing laboratories. In-office water-testing systems are available that work at room temperature using small paddles or plates of culture medium to reveal bacterial colonies after 72 or more hours.
- During oral surgical procedures, microorganisms may enter the bloodstream and other normally sterile areas of the oral cavity (e.g., bone or subcutaneous tissue). For this reason, sterile solutions (e.g., sterile saline or sterile water) should be used as a coolant/irrigator when performing surgical procedures.
- Because the tubing cannot be reliably sterilized, conventional dental units cannot reliably deliver sterile water even when equipped with independent water reservoirs. Sterile water delivery devices, such as sterile irrigating syringes, or bulb syringes should be used to deliver sterile water. Sterile water systems, such as those used with surgical handpieces, bypass the dental unit and use sterile disposable or autoclavable tubing.

- Some parts of dental instruments are permanently attached to dental unit waterlines. These items do not enter the patient's mouth but are likely to become contaminated with oral fluids during treatment procedures. Some examples include handles or dental unit attachments of saliva ejectors, high-speed air evacuators, and air/water syringes. These components should be covered with waterproof barriers and changed after each use. If the item becomes visibly contaminated during use, clean and disinfect with an EPA-registered hospital disinfectant with a tuberculocidal claim (intermediate-level disinfectant) before using it with the next patient.



## Heat sterilize heat-tolerant radiographic accessories

### I. Personal Protection

1. Operator should wear gowns, masks and eyewear during routine radiological procedures
2. Gloves should be changed after each single use

### II. Surface Disinfection

1. High touch surfaces on which exposed films/ instruments are placed, table tops and working surfaces should be sanitized and disinfected
2. Sanitization and disinfection should be carried out three times a day; one at start of working, one at finish of working and the other during routine procedures
3. Surfaces prone to routine touch by the operator and the patients should be covered by plastic covers
4. Film holders, position indicating devices, panoramic guides and digital image receptors should be sterilized or high level disinfected

### III. Disinfection during exposure

1. Surface covers should be applied to head rests, control unit and other related surfaces
2. Operator should wear sanitized apron
3. Patient should wear a collar
4. Before wearing gloves, hands should be washed thoroughly using soap and water
5. The x-ray machine switches should be adjusted prior to wearing gloves and never be touched again
6. Film packets should be enveloped in plastic envelopes
7. In case the films are contaminated with blood, they should be



wiped with sterilized napkins and dropped into a plastic cup

#### IV. Disinfection during film processing

1. Exposed films should be dropped immediately into a plastic cup without touching the outer surface of the cup
2. The operator should pick up the cup containing the exposed films with over gloved hands
3. The film should be taken out from the packet without touching the film
4. The contaminated gloves should be removed and discarded
5. Avoid contamination of developing equipment
6. The contaminated film holders should be cleaned before sterilization
7. The operator should wear new gloves to remove waste material from dark room
8. The apron and collar should be disinfected

#### V. Panoramic Radiography

1. Bite blocks should be placed in covers
2. The patient's chin rest, head rest and other parts of panoramic machine should be cleaned after each exposure

#### VI. Digital Imaging

1. The central processing unit should be covered except for the air vent
2. The keyboard should be covered with a plastic wrapper which should be cleaned regularly with disinfectant
3. The monitor should be wrapped in high touch areas
4. A screen shade should be used to prevent aerosols
5. The printer should be covered with wrapper



- Do not administer single-dose vials to multiple patients even if the needle on the syringe is changed.
- Use single-dose instead of multi-dose vials whenever possible.
- Do not combine leftover contents for later use.

### Laser/Electrosurgery Plumes and Surgical Smoke

- Lasers or electrosurgical units can cause thermal destruction of tissue and create a smoke by-product containing toxic gases and vapors such as benzene; dead and live cellular material (including blood fragments), and viruses.
- One concern is that aerosolized infectious material, such as herpes simplex virus (HSV) and human papillomavirus (HPV) in the laser plume may contact the nasal mucosa of the laser operator and nearby DHCP. No evidence exist that HIV or HBV have been transmitted via aerosolization and inhalation.
- Until studies have fully evaluated the risk for DHCP from exposure to laser plumes and electrosurgery smoke, it might be practical to follow National Institute of Occupational Safety and Health (NIOSH) recommendations. Use of precautions beyond Standard Precautions is an unresolved issue in dentistry.



- Dental prostheses, such as crowns, full and partial dentures, orthodontic appliances, and items used in their fabrication are potential sources of contamination in the dental laboratory. As such, they should be handled in a manner that protects patients and DHCP from exposure to microorganisms.
- Prostheses, orthodontic appliances, and impressions should be cleaned, disinfected with an intermediate-level disinfectant, and rinsed before and after being manipulated (Table 1). Wear gloves and other appropriate personal protective equipment (PPE) until disinfection has been completed.
- Clean and heat sterilize heat-tolerant items used in the mouth.
- Communicate specific information about disinfection procedures; personnel in both the dental office and the laboratory should ensure that the other knows what has occurred.

**Table (1) Guide for selection of appropriate disinfection methods for items transported to or from the dental laboratory**

| Item                                 | Method*   | Recommended disinfectants | Comments   |
|--------------------------------------|---|---------------------------|--|
| Appliances                           | Immerse   | Chlorine compounds        | Rinse thoroughly after disinfection  |
| Casts                                | Spray until wet or immerse  | Chlorine compounds        | Disinfectant can be prepared using slurry water (saturated calcium sulfate)<br>Probably should not be disinfected until fully set (24 hours) |
| Impressions                          | Immersion disinfection preferred  |                           | Heat sterilize reusable impression trays.<br>Discard plastic trays after use.  |
| Irreversible hydrocolloid (alginate) | Disinfect by immersion with caution! Use only disinfectants with short-term exposure times (no more than 10 minutes for alginate) | Chlorine compounds        | Short term immersion in glutaraldehyde has been shown to be acceptable; but time is inadequate for disinfection                              |





| Item                           | Method*   | Recommended disinfectants           | Comments  |
|--------------------------------|---|-------------------------------------|---|
| Polysulfide rubber             | Disinfect by immersion  | Chlorine compounds                  | Disinfectants requiring more than 30-minute exposures not recommended   |
| Polyether                      | Disinfect by immersion with caution! Use only disinfectants with short-term exposure times (no more than 10 minutes)      | Chlorine compounds                  | ADA recommends any of the disinfectant classes; however, short-term exposures are essential to avoid distortion |
| ZOE impression paste           | Disinfection by immersion preferred. Spraying can be used for bite registrations.   | Glutaraldehyde                      | Not compatible with chlorine compounds! Phenolic sprays can be used.  |
| Impression compound            |   | Chlorine compounds                  | Phenolic sprays can be used.  |
| Prostheses                     | Immerse in disinfectant. Use caution to avoid erosion of metal! Can also be sterilized by exposure to ethylene oxide gas. | Rinse thoroughly after disinfection | Clean "old" prostheses by scrubbing with hand wash antiseptic or by sonication before disinfection              |
| Removable (acrylic/ porcelain) |   | Chlorine compounds                  | Rinse thoroughly after disinfection; store in diluted mouthwash   |
| Removable (metal/acrylic)      |   | Chlorine compounds                  | Rinse thoroughly after disinfection   |
| Fixed (metal/ porcelain)       |   | Chlorine compounds                  |   |
| Shade guides                   |   | Alcohol                             | Final wipe with water or alcohol to avoid discoloration   |
| Wax rims, wax bites            |   |                                     | Should be treated with caution using gloves, as it difficult to clean or disinfect                              |

- Exposure time to disinfectant should be that recommended by the disinfectant manufacturer. All items must be thoroughly rinsed (15 seconds, minimum) under running tap water after disinfection.

## Sharp Disposal

### Definition of sharp supplies

They include needles, teeth, burs, root canal instruments, metal matrix bands, glass ampoules/vials, scalpel blades, scissors & any other contaminated sharp instrument or item.

### General rules

- Avoid sharps usage wherever possible.
- Never leave sharps lying around.
- Never walk about with unguarded sharps.
- Always request assistance when using sharps with uncooperative patients.
- Remove hand pieces containing contaminated burs from dental units immediately after use.
- Clinical sharps should be single-use only as possible.
- Never dispose sharps with other clinical waste.
- Discard sharps directly into a sharps container immediately after use and at the point of use.

### Specifications of sharp containers

- Capable of being sealed.
- Provided with a handle that is not part of the closure device.
- Proof against spillage of its content.
- Proof against puncture by clinical waste material, such as broken glass or syringes.
- Capable of withstanding 1 meter vertical drop to a concrete floor without fracture, puncture, or loss of the content (fig. 15).



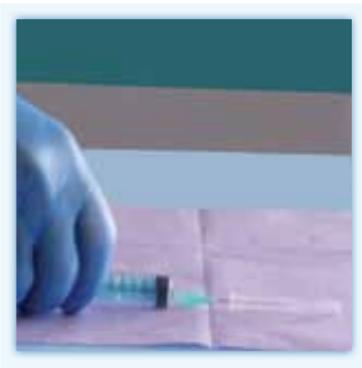
**FIG. (15) Puncture resistant containers**

### Work practice control

- Used needles should never be recapped or otherwise manipulated by using both hands, and any other technique that involves directing the point of a needle toward any part of the body.
- Used a one-handed scoop technique, a mechanical device designed for holding the needle cap to facilitate one-handed recapping, or an engineered sharps injury protection device (e.g., needles with resheathing mechanisms).
- DHCP should never bend or break needles before disposal because this practice requires unnecessary manipulation.
- Before attempting to remove needles from non disposable aspirating syringes, DHCP should recap them to prevent injuries.
- For procedures involving multiple injections with a single needle, the practitioner should recap the needle between injections by using a one-handed technique (fig. 16) or use a device with a needle-resheathing mechanism (fig. 17). Passing a syringe with an unsheathed needle should be avoided because of the potential for injury.
- Inappropriate handling of sharps, both during and after treatment, is the major cause of penetrating injuries which involve potential exposure to bloodborne diseases in the dental surgery.

## Sharp Disposal

- It is essential that all sharp instruments must be handled and used with care, and that the techniques employed minimize the risk of penetrating injuries to dental staff.
- Sharp instruments such as scalpels and scalers must never be passed by hand between dental staff members and must be placed in a puncture-resistant tray or bowl after each use.
- Instruments and sharp items must be carried from the surgery to the sterilising area in a lidded puncture-resistant sharps transport container.
- Contaminated needles must never be bent or broken by hand or removed from disposable syringes.



**FIG. (16) One handed technique**



**FIG. (17) Needle resheathing mechanism**

### Disposal of sharps

- A separate sharps container should be located in each operatory, close to the point of use of any disposable sharp. Sharps containers must be placed in a safe position within the treatment room to avoid accidental tipping over and must be out of the reach of small children.
- Sharps containers must be sealed when they have been filled to the line marked on the container (3/4 of the container), and then collected by licensed waste contractors for disposal according to local waste management regulations.





- Handwashing/hand decontamination reduces the number of infectious micro-organisms on the skin and is the single most important measure of infection control in the dental surgery. Hands must always be washed when they are visibly soiled, at the start of a session, after food or toilet breaks and on leaving the surgery.
- Handwashing should be undertaken in dedicated (clean) sinks preferably fitted with non-touch taps (or done with a non-touch technique) and not in the (contaminated) sinks used for instrument cleaning. If touch taps are used the taps may be turned on and off with a paper towel (fig. 18).
- Hands must be washed with a liquid handwash (for 40-60 seconds) or decontaminated using alcohol-based gels or liquids (also known as waterless handwashing or alcohol rub; for 20-30 seconds till hands get dry) before and after every patient contact and before gloves are put on and after they are taken off. Wet hands must be dried with single use linen or paper towels. If hands are soiled alcohol rub cannot substitute hand wash.

### Hand care regimen:

- Emollient hand lotions should be considered for routine use at work and at home, in order to prevent hand irritation and dermatitis that comes from frequent hand hygiene and glove use.
- Petroleum based lotions should be avoided during the workday, as these may weaken the glove material, resulting in increased permeability. Washing hands in hot water should be avoided.
- Manufacturers of hand hygiene products should be consulted regarding any possible interaction with hand lotions. Lotion manufacturers should be consulted regarding any interaction between the lotions, the antimicrobial soaps or alcohol hand-rubs, as well as other dental materials. For example, if using a chlorhexidine solution for hand



## Hand hygiene

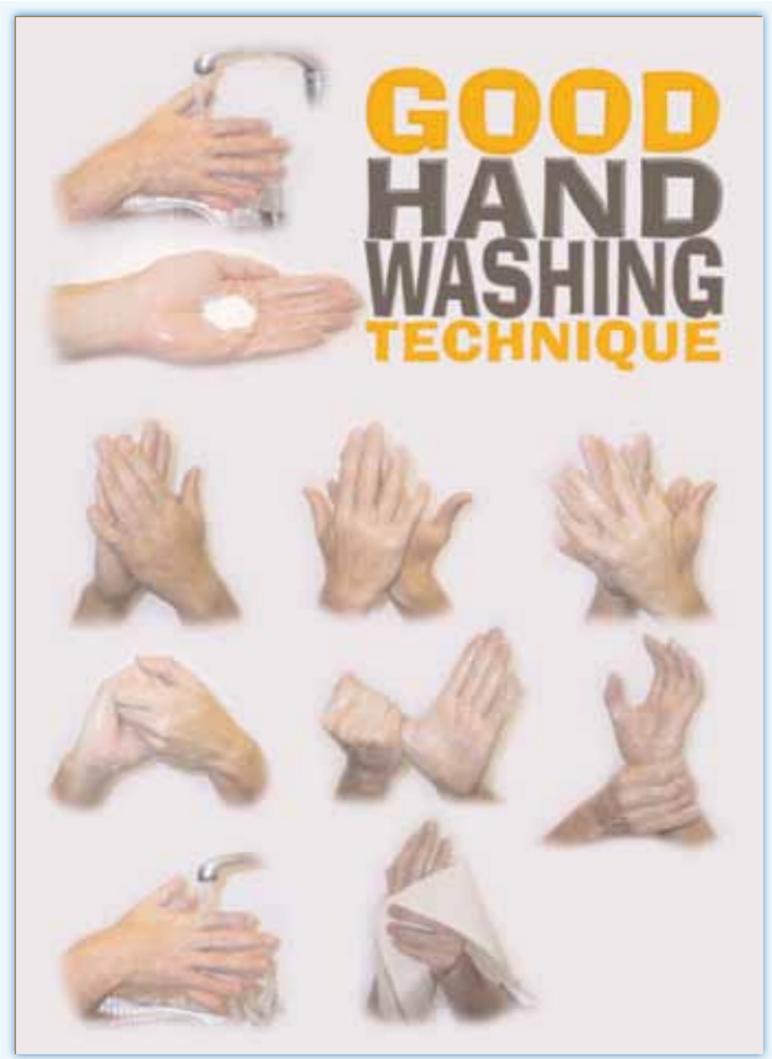
hygiene, only nonanionic hand lotions should be used; otherwise, there will be a loss in persistence of the antimicrobial action of the solution. Typically, lotions, soaps and alcohol hand-rubs from the same manufacturer are compatible; however, actual compatibility should be checked with the manufacturer or from the manufacturer's literature.

### Fingernails

- They are a common area of blood impaction and bacterial contamination. Fingernails should be kept short and trimmed in order to thoroughly clean underneath them and prevent glove tears. Long natural or artificial nails should be avoided, as they are more difficult to clean, can make donning gloves more difficult and can cause gloves to tear more readily.
- Freshly applied nail polish on natural nails is acceptable, provided fingernails are kept short; however, chipped nail polish can promote bacterial growth and prevent adequate hand hygiene, and should be avoided.

### Jewelry

These including rings, arm and wrist bands and bracelets and watches should be avoided on the hands or arms, as they prevent adequate hand hygiene, make donning gloves more difficult and can cause increased tearing of gloves. Alternately, arm and wrist jewelry and watches should be covered by the cuffs and long sleeves of the protective clothing (PPE WHICH IS TIGHT ON THE WRIST).



**FIG. (18) Hand wash**



## Immunization and post exposure prophylaxis

### Rational

- Dental practitioners and clinical support staff are at risk of exposure to many common vaccine-preventable diseases (VPDs) through contact with patients and the general community. Immunizations substantially reduce the potential for acquisition of disease, thereby limiting further transmission to other dental staff and patients. Based on exposure to, or possible transmission of, vaccine preventable diseases, nurses, dental professionals, dental students, lab techs, administrative staff should be immunized (table 2).
- All dental practitioners and clinical support staff should be vaccinated against HBV if they have no documented evidence of pre-existing immunity (from natural infection or prior vaccination) and ensure they are assessed for immunity post-vaccination. After a full course of HBV immunization or rubella vaccination, testing for antibody levels should be carried out to identify poor responders.
- All healthcare workers and thus for dental practitioners and clinical support staff are encouraged to receive immunization to varicella (if seronegative); measles – mumps – rubella (if non-immune); pertussis (whooping cough); and annual immunization for viral influenza. Those who work with remote indigenous communities are advised to also receive immunization for hepatitis A, while those at high risk of exposure to drug-resistant cases of tuberculosis should also undergo vaccination with BCG.



### Immunization Program

TABLE (2) Detailed recommendations for immunization

| Vaccine                | Dose schedule                              | Indications   | Precautions   | Special Considerations  |
|------------------------|--|---|---|---|
| HBV                    | 3-dose schedule at 0,1,6 months in deltoid | DHCP  | Allergy to baker's yeast  | No adverse effect if given to HBV-infected person; should be tested 1-2 months post-vaccine to determine serologic status |
| Influenza              | Annual single-dose                         | DHCP  | Allergy to eggs or other vaccine components                               |   |
| Measles (live-vaccine) | 2 dose regimen                             | No reliable history of infection or serologic evidence of immunity; DHCP born before 1957 considered immune | Pregnancy, immunocompromised status; allergy to gelatin or neomycin       | MMR (measles-mumps-rubella) is recommended vaccine for these three diseases   |
| Varicella-zoster       | 2 doses 4-8 wks apart                      | No reliable history of varicella infection or serologic evidence of immunity                                | As with MMR; avoid salicylate use (aspirin) for 6 weeks after vaccination | High percentage of persons are immune; may consider testing before vaccination  |



## Immunization and post exposure prophylaxis

### Hepatitis B Vaccination

- DHCP should be tested for the presence of adequate amounts of hepatitis B surface antibody approximately 1-2 months following completion of the 3-dose vaccination series. Serologic testing should produce antibody levels of anti-HBs  $\geq 10$  mIU/mL. DHCP who do not develop an adequate antibody response (i.e., anti-HBs  $< 10$  mIU/mL) to the primary vaccine series should complete a second 3-dose vaccine series or be evaluated to determine if they are HBsAg-positive. Re-vaccinated persons should be re-tested for anti-HBs at the completion of the second vaccine series.
- If an inadequate antibody response occurs following the second series of immunizations, testing for HBsAg should be performed. Persons who prove to be HBsAg-positive or HBeAg-positive should be counseled regarding how to prevent HBV transmission to others and regarding the need for medical evaluation.
- Non-responders to vaccination who are HBsAg-negative should be considered susceptible to HBV infection and should be counseled regarding precautions to prevent HBV infection and the need to obtain hepatitis B immunoglobulin (HBIG) prophylaxis for any known or probable parenteral exposure to HBsAg-positive blood.

### Immunization records

The practice must develop and maintain regularly updated immunization/health records for dental staff. It is recommended that dental care providers also maintain their own immunization and screening records. Those dental care providers involved in carrying out exposure-prone procedures have an ethical and professional duty to know their immune status in respect to Hepatitis B, Hepatitis C and HIV and if they are carriers of any of these diseases they should continue to practice only in accord with local Board and health authority policies.



### Exposure incident protocol

In the healthcare environment, the term 'exposure incident' refers to any incident where a contaminated object or substance breaches the integrity of the skin or mucous membranes or comes into contact with the eyes. This includes:

- Penetrating injuries of the skin caused by sharps (e.g. dental instruments, needles and scalpel blades); an injury that involves direct skin contact with blood or saliva visibly contaminated with blood and where there is compromised skin integrity, such as a cut, open wound, abrasion or dermatitis; bites or scratches inflicted by patients; and direct contact with blood or body fluids with the mucous membrane of the mouth, nose or eyes.
- While the site where such sharps injuries are sustained can become infected with microorganisms, the major area of concern to dental practitioners and clinical support staff is the risk of the transmission of HIV, HBV and HCV by contaminated blood.
- For exposures involving the 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.
- To comply with occupational health and safety legislation, all exposure incidents must be recorded, and followed up. For sharps injuries, the required post-injury counselling may be undertaken by a designated medical practitioner or infection control practitioner.
- Follow-up tests must be offered after a significant exposure incident, and blood samples for testing are obtained from the source (i.e. the patient) wherever practicable. These tests include HBV, HCV and HIV. Where the source is positive, follow-up tests will need to be repeated at intervals for the injured person, to assess the status of seroconversion.





**Table (3) Clinical management of HIV post-exposure prophylaxis:**

| Item   | Recommended action and notes   |
|--|--|
| Eligibility  | <p>Exposure within 72 hours</p> <p>Exposed individual not known to be infected with HIV</p> <p>Significant exposure</p> <p>Person who was the source of exposure is HIV infected or has unknown HIV status</p>   |
| Informed consent for post-exposure prophylaxis   | <p>Information about risks and benefits</p> <p>Consent may be given verbally</p>   |
| Medicine   | <p>Two nucleoside-analogue reverse-transcriptase inhibitors (usually part of first-line antiretroviral therapy medicines)</p> <p>Dispensed by appropriately qualified person</p> <p>Add a boosted protease inhibitor to the regimen if drug resistance is likely</p> |
| Time to initiation   | The initial dose of antiretroviral medicines should be given as soon as possible but no later than 72 hours after exposure   |
| Duration of therapy  | 28 days  |
| HIV testing with informed consent and pre- and post-test counseling according to protocols | <p>Baseline HIV test in exposed person</p> <p>Follow-up HIV testing 3–6 months after exposure</p> <p>Rapid HIV test of the source person if feasible and based on informed consent and standard operating procedures</p>   |



## Immunization and post exposure prophylaxis

| Item                              | Recommended action and notes  |
|-----------------------------------|---|
| Additional laboratory Evaluations | Pregnancy testing<br>Haemoglobin (for zidovudine-containing PEP regimens)<br>Hepatitis B and C screening if available and based on the prevalence of the diseases |
| Counselling                       | For adherence; side effects; risk reduction; trauma or mental health problems; and social support and safety  |
| Referral                          | Referrals as appropriate  |
| Record-keeping                    | Maintain accurate, confidential records   |
| Follow-up – clinical              | Assess and manage side effects<br>Assess and support adherence  |

### Recommended two-drug combination therapies for HIV post-exposure Prophylaxis:

| Preferred regimens      | Alternative regimens                             |
|-------------------------|--|
| zidovudine + lamivudine | tenofovir + lamivudine<br>stavudine + lamivudine |



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