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Ministry of Health

الإدارة العامة لمكافحة عدوى المنشآت الصحية

General Directorate of Infection Prevention and Control in Healthcare Facilities

(GDIPC)

Manual of Infection Prevention and Control in Dental Settings

3rd Edition, 2023

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In the name of ALLAH, Most Gracious, Most Merciful

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Message from the General Director,

Dentists and other dental team members are exposed to various potentially infectious microorganisms in their clinical working environment. The transmission of infectious agents from person to person or from inanimate objects within the dental setting results in cross-infection.

In this context, the General Directorate of Infection Prevention and Control (GDIPC) has completed the updates for the 3rd edition of the Infection Prevention & Control Manual for Dentals Settings. The protocols and procedures mentioned in this manual aim to prevent and control infection and reduce the possibility or risk of cross-infection in the dental setting, thereby producing a safe environment for patients and healthcare workers (HCWs).

In this updated edition, all previous recommendations were reviewed and edited to reflect updates in infection prevention & control practices. As a result, this manual provides the most updated and evidence-based recommendations regarding dental infection control. Furthermore, it maintains high levels of adoption of the current Center for Disease Control and Prevention infection control guidelines and other relevant guidelines. In addition, this manual aims to address the critical aspects of improving and maintaining safe dental healthcare facilities. Hence, new elements were included to expand the information and guidance to implement infection prevention and control strategies in dental healthcare institutions.

Recommendations in the manual must be strictly adhered to by all dental healthcare personnel to prevent the possibility of cross-contamination, thereby producing a safe environment for both patients and HCWs.

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Employers and their employees are also legally responsible for ensuring that any person on the premises, including patients, contractors, and visitors, is not placed at any avoidable risk as far as is reasonably practicable.

Wishing you all the best.

Dr. Khaild Hamdan Alanazi

Director General, General Directorate of Infection Prevention and Control Ministry of Health.
Riyadh, Kingdom of Saudi Arabia

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Contributors:

Dr. Abdulmajid Almutairi
aalmutairi53@moh.gov.sa
Mrs. Ahlam Alamri
ahlamha@moh.gov.sa
Mr. Rayed Asiri
raalasiri@moh.gov.sa
Dr. Abobakr Aljifri
drabobkr@gmail.com
Mr. Adel S. Alanazi
adsualanazi@moh.gov.sa
Mr. Abdullah Almoaddi
aalmoaddi@moh.gov.sa

Approved by:

Dr. Khalid H. Alanazi

KAI-Enazi@moh.gov.sa

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Content

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Introduction to Dental Infection Prevention & Control

What is Infection Prevention & Control?

Infection prevention and control (IPC) is a practical, evidence-based practice that aims to prevent patients and health workers from being harmed by avoidable infections. These practices are designed to avoid the numerous routes of disease transmission from an infectious source to a susceptible host. In healthcare settings, pathogenic microorganisms can be found in the air, water, inside and outside the human body, and on inanimate surfaces and equipment. Patients, healthcare workers, and visitors can be both the source of the infectious agent and the susceptible host.

Healthcare-Associated Infections (HAIs):

- Healthcare-associated infections (HAIs) are infections that patients can get in a healthcare facility while receiving medical care. These infections occur in hospitals, medical and dental settings, and other healthcare settings. HAIs can spread in many ways. For example, some patients are infected by contaminated or improperly used equipment, while others are infected by the unclean hands of a healthcare worker.

Dental Health Care Personnel (DHCP):

- DHCPs include all paid or unpaid people working in dental care settings who might be exposed to infectious materials such as body substances, contaminated medical supplies, equipment, contaminated environmental surfaces, or contaminated water or air. This includes dentists, dental hygienists, dental assistants, students and trainees, dental laboratory technicians, contractors, and volunteers.
- DHCP also includes people who do not participate in direct patient care but are potentially exposed to infectious agents, such as administrative, clerical, housekeeping, and maintenance personnel.

Disease Transmission:

- Because of the nature of many dental procedures, both DHCP and patients may encounter disease-causing microorganisms (called pathogens), mainly blood-borne pathogens.

- **Diseases can be transmitted through:**
  - **Direct Contact** with microorganisms from an infected person to a host that is not immune.
  - **Indirect Contact** with contaminated objects, such as instruments, items, or surfaces.
  - **Droplet Transmission**, in which Spray or spatter containing microorganisms travel a short distance before settling on mucous ‘membranes; or

- **An Airborne Route** by which evaporated droplets ("aerosols") suspended in the air are inhaled.

- **For a disease to be transmitted, several conditions must be present. This "chain of infection" includes:**
  - A pathogen in sufficient numbers to cause infection, such as viruses like HIV and hepatitis B.
  - A place for the pathogen to reside and multiply (a reservoir), for example, the bloodstream or mucous membranes, or a dental unit waterline,
  - A way for the pathogen to leave its reservoir and reach a new host (a "mode of transmission"), such as through a cut from a contaminated instrument with contaminated hands or inhaling contaminated aerosols.
  - A portal of entry into a new host is an appropriate route for the pathogen to enter the body (for example, for a bloodborne pathogen to cause infection, it needs a way to enter the bloodstream, such as through a break in the skin).
  - A person who is not immune to the pathogen. Vaccination against a pathogen or prior exposure to it can provide immunity to disease.

Infection Prevention & Control Team in the Dental Center/Center

- Each dental center/ department should assign a designated team or individual responsible for implementing the infection prevention & control (IPC) program in the center.
- The number of team members is determined by the total number of clinics and the workload in the center, with a minimum number of one staff for small dental centers.

- **The infection control team in the dental center has the following roles and responsibilities:**
  - To develop and implement the IPC program in the dental center with a clear action plan.
  - To develop and implement an annual plan for IPC with clearly defined objectives.
  - To ensure that current copies of infection prevention & control policies, procedures, and plans are available and accessible to all dental healthcare personnel (DHCP).
  - To provide initial, annual, and "as per need" IPC training to all dental healthcare personnel and to contract employees, such as housekeeping services.
  - To determine appropriate DHCP immunizations.
  - To prepare work-related injury/illness reporting forms (e.g., exposure incident and accident reports.
  - To monitor compliance with IPC standards through audits, checklists, and other methods.
  - To evaluate and implement safer dental devices (e.g., self-sheathing needles).
  - To ensure the availability of supplies and equipment needed for IPC.

- To ensure compliance with IPC aspects regarding waste management.
- To perform other job-related duties assigned.
- **Education and Training:**
  - The infection prevention & control team of the center should Provide DHCP basic infection control training: on initial employment, when new tasks or procedures affect the employee's occupational exposure, and at a minimum, annually.
  - The educational information should be appropriate in content and vocabulary to DHCP's educational level, literacy, and language.
  - **DHCP should be trained in the following:**
    1. Administrative, engineering, and work practice controls that reduce your risk of contracting an illness or sustaining an injury while doing your job.
    2. Policies and procedures for prompt reporting of injuries and obtaining appropriate medical evaluation and follow-up care.
    3. The importance of reporting any medical conditions or treatments that may make you more susceptible to injury or infection or create a significant risk of transmission to other staff members and patients.
    4. Occupational exposure to potentially infectious agents and infection-control procedures appropriate for and specific to their assigned duties

Dental Personnel Health Program:

- To help protect the health and safety of the dental team while on the job and the health and safety of the patients, the dental setting has an occupational health program. In addition, the IPC Coordinator should familiarize the dental team with all the actions to ensure your health and safety.
- **The dental settings should have the following:**
  - A written personnel health service program for DHCP that addresses:
    - Education and training.
    - Immunization.
    - Exposure prevention and post-exposure management.
    - Medical conditions, work-related illness, and work restrictions.
    - Latex hypersensitivity and other work-associated skin reactions.
    - Maintenance of records, data management, and confidentiality.
  - A referral arrangement with qualified medical professionals to ensure that any necessary job-related medical evaluation and treatment can be delivered quickly and appropriately.

- An education and training schedule that provides training on infection control procedures specific to your duties and responsibilities. DHCP should receive this training before performing any tasks that put them at risk of exposure to body fluids.
- **A written immunization program that outlines:**
  - All required and recommended vaccinations/immunizations for staff by job title/description, and
  - referral to healthcare professionals to receive appropriate vaccinations,
    - Written work restriction and exclusion policies in your workplace (including exclusions which may implement restrictions and exclusions).
    - A confidential, up-to-date medical record for all DHCP maintained and stored onsite or with the practice's healthcare professionals /facility. Records should only include immunization documentation and any tests received due to occupational exposure.

Recommended Immunizations for DHCP:

- DHCP should be vaccinated against the following illnesses:
  - COVID-19
  - Hepatitis B
  - Influenza
  - Measles
  - Mumps
  - Rubella
  - Varicella-zoster (chicken pox)
  - Tetanus, with a booster every ten years

Vaccines and Dental Health Care Personnel:

- DHCP are at risk of acquiring diseases through their work. In addition to bloodborne diseases such as hepatitis B, unvaccinated DHCP also are at risk of transmitting diseases like influenza ("the flu"), measles, mumps, rubella, and chickenpox (varicella).
- Getting vaccinated before DHCP is placed at risk is the most efficient and effective way to protect DHCP health.
- All DHCP should receive the vaccines AS recommended by MOH.
- DHCP who do not directly provide patient care but come into contact with patients or materials should also be vaccinated.

Recommended Vaccines for Healthcare Personnel:

Hepatitis B recombinant vaccine:

- **Dose Schedule:** Three-doses schedule is administered intramuscularly in the deltoid.
- **Major Precautions and Contraindications:** History of anaphylactic reaction.
- **Special Considerations:**
  - No therapeutic or adverse effects on HBV-infected persons.
  - DHCP who have ongoing contact with patients or blood should be tested 1-2 months after completing the vaccination series to determine serologic response.
  - If vaccination does not induce adequate antibodies to hepatitis B surface antigen (>10mIU/mL), a second vaccine series should be administered.
- **Influenza vaccine (inactivated):**
  - **Dose Schedule:** Annual single-dose vaccination intramuscularly or as recommended by MOH.
  - **Major Precautions and Contraindications**: History of anaphylactic hypersensitivity to eggs or other vaccine components.

- **Measles live-virus vaccine:**
  - **Dose Schedule:** One dose administered subcutaneously (SC); second dose ≥4 weeks later.
  - **Major Precautions and Contraindications:**
    - Pregnancy.
    - Immune-compromised state.
    - History of anaphylactic reactions after gelatin ingestion.
    - Recent receipt of antibody-containing blood products.

  - **Special Considerations:** Measles, mumps, and rubella are recommended if recipients are susceptible to rubella or mumps.

- **Mumps live-virus vaccine:**
  - **Dose Schedule:** One dose subcutaneously.
  - **Major Precautions and Contraindications:**
    - Pregnancy.
    - Immunocompromised state (including human immunodeficiency virus-infected persons with severe immunosuppression).
    - History of anaphylactic reaction after gelatin ingestion.

  - **Special Considerations:** Measles, mumps, and rubella (MMR) is the recommended vaccine.

- **Varicella-zoster live-virus vaccine:**
  - **Dose Schedule:** Two 0.5-mL doses SC 4-8 weeks apart if aged ≥13 years.
  - **Major Precautions and Contraindications:**
    - Pregnancy.
    - Immunocompromised state.
    - History of anaphylactic reaction after receipt of neomycin or gelatin.
    - Recent receipt of antibody-containing blood products.

Preventing Transmission of Blood-Borne Pathogens:

- Bloodborne pathogens are infectious microorganisms in human blood that can cause human disease. These pathogens include but are not limited to hepatitis B (HBV), hepatitis C (HCV), and human immunodeficiency virus (HIV).
- Under certain circumstances, these disease agents can be transmitted from patient to DHCP, from DHCP to patient, and from patient to patient through exposure to infected blood or other body fluids.
- The most effective ways to prevent transmission of bloodborne pathogens include vaccination against HBV infection, standard precautions, and strategies to avoid injuries with sharp instruments.

Precautions to Avoid Exposures to Blood:

- The following precautions are recommended for reducing the risk of exposure to blood and body fluids:

- **Stay Aware:**
  - Consider items contaminated with patient blood and saliva as potentially infectious.
  - Handle sharp items with care to prevent injuries. Sharp items in dentistry include needles, scalpel blades, wires, and many hand instruments.
  - Remember: Every patient could carry an infectious disease. Therefore, standard precautions should always be used with all patients.

- **Use Engineering Controls:**
  - These controls reduce or eliminate workplace hazards with minimal or no DHCP intervention.
  - They are the most effective way to reduce occupational exposure to blood by sharp instruments and needles.

- **Examples of engineering controls include:**
  - Use devices that minimize the handling of contaminated items and the risk of injury. Needle recappers, ultrasonic cleaners, and instrument cassettes are common examples in dental.
  - Use leakproof, puncture-resistant sharps containers to discard disposable syringes, needles, scalpel blades, and other sharp items.
  - Automating processes using instrument washers, washer disinfectors, waterline treatment systems, and air-purifying ventilation systems.
  - Use penetration-resistant retraction devices (e.g., dental mirror, surgical retractor, or tongue blade) instead of fingers for tissue retraction or palpitation when administering anaesthesia, performing surgical procedures, and suturing.

- **Use Safer Work Practices:**
  - These controls are behaviors by DHCP that reduce the possibility of exposure by changing how a task is performed.
  - Examples of safe work practices:
    - Never use two hands to recap a needle. The one-handed “scoop” technique or a recapping device reduces the potential for injuries,
    - Place contaminated sharps in sharps containers as soon as possible after use. Keep sharps containers near the point of use and replace them before they are overfilled.
    - Pass instruments with sharp ends pointing away from persons and announce instrument passes so the receiving DHCP knows sharp objects are coming into their workspace.
    - Use instruments instead of fingers to retrace tissues during suturing and anaesthetic injections.
    - Proper use of PPE, safe transfer of sharp instruments, and effective control of aerosols and droplets (e.g., rubber dam and high-volume evacuation, HVE) that limit exposure to infectious pathogens are additional examples of work-practice controls.
    - A mechanical device or one-handed technique is recommended when recapping contaminated sharps.

- **Wear personal protective equipment whenever exposure to patient body fluids is expected.**
  - Wear gloves, face protection, eye protection, and protective clothing as described in the Personal Protective Equipment section.

- **Learn and routinely apply exposure-prevention techniques as outlined in your practice.**
  - DHCP should be familiar with their facility's comprehensive program for minimizing and managing DHCP exposure to blood and other potentially infectious body fluids.

Standard Precautions:

- Standard Precautions are the minimum infection prevention practices that apply to all patient care, regardless of suspected or confirmed infection status of the patient, in any setting where health care is delivered. These practices are designed to both protect DHCP and prevent DHCP from spreading infections among patients.
- The purpose of Standard Precautions is to decrease the risk of transmission of bloodborne and other pathogens from known and unknown sources.
- These precautions apply to contact with blood; all body fluids, secretions, and excretions regardless of whether they contain blood; non-intact skin; and mucous membranes. In addition, saliva has always been considered a potentially infectious material in dental care infection control.
- **These precautions practices are described in subsequent sections and include the following:**
  - Hand hygiene.
  - Use of personal protective equipment (e.g., gloves, masks, eyewear).
  - Respiratory hygiene/cough etiquette.
  - Sharps safety (engineering and work practice controls).
  - Safe injection practices (i.e., an aseptic technique for parenteral medications).
  - Sterile instruments and devices.
  - Clean and disinfect environmental surfaces.

Hand Hygiene:

Indications for Hand Hygiene:

- Wash hands with soap and water when visibly dirty or visibly soiled with blood or other body fluids or after using the toilet.
- If exposure to potential spore-forming pathogens is strongly suspected or proven, including outbreaks of Clostridium difficile, hand washing with soap and water is the preferred means.
- Use an alcohol-based hand rub for routine hand antisepsis in all other clinical situations if hands are not visibly soiled.
- If alcohol-based hand rub is not obtainable, wash your hands with soap and water.

Hand Hygiene Techniques:

Hand Hygiene Technique with Alcohol-Based Formulation:

- Duration of the entire procedure: 20-30 seconds
- Apply a palm full of alcohol-based handrub and cover all surfaces of the hands.
- Rub hands palm to palm.
- Right palm over left dorsum with interlaced fingers and vice versa.
- Palm to palm with fingers interlaced.
- Backs of fingers to opposing palms with fingers interlocked.
- Rotational rubbing of left thumb clasped in right palm and vice versa.
- Rotational rubbing, backwards and forwards, with clasped fingers of the right hand in the left palm and vice versa.
- Once dry, your hands are safe.
- The technique for hand rubbing is illustrated in **Figure 1.**

Hand Hygiene Technique with Soap and Water:

- Duration of the entire procedure: 40-60 seconds.
- Wet hands with water.
- Apply enough soap to cover all hand surfaces.
- Rub hands palm to palm.
- Right palm over left dorsum with interlaced fingers and vice versa.
- Palm to palm with fingers interlaced.
- The backs of fingers to opposing palms with fingers interlocked.
- Rotational rubbing of left thumb clasped in right palm and vice versa.
- Rotational rubbing, backwards and forwards, with clasped fingers of the right hand in the left palm and vice versa.
- Rinse hands with water.
- Dry hands thoroughly with a single-use towel.
- Use a towel to turn off the faucet.
- Your hands are now safe.
- The technique for hand washing is illustrated in **Figure 2.**

Recommendations for Surgical Hand Preparation:

- Remove rings, wristwatch, and bracelets before beginning surgical hand preparation.
- Sinks should be designed to reduce the risk of splashes.
- If hands are visibly soiled, wash hands with plain soap before surgical hand preparation. Remove debris underneath fingernails using a nail cleaner, preferably under running water.
- Brushes are not recommended for surgical hand preparation.

- Surgical hand antisepsis should be performed using a suitable antimicrobial soap or an alcohol-based handrub, preferably with a product ensuring sustained activity, before donning sterile gloves.
- When performing surgical hand antisepsis using an antimicrobial soap, scrub hands and forearms for the length recommended by the manufacturer, typically 2–5 minutes.
- When using an alcohol-based surgical hand rub product with sustained activity, follow the manufacturer's instructions for application times. Apply the product to dry hands only. Do not combine surgical hand scrub and surgical handrub with alcohol-based products sequentially.
- When using an alcohol-based handrub, use a sufficient product to keep hands and forearms wet with the handrub throughout the surgical hand preparation procedure. The technique for surgical hand preparation using alcohol-based hand rubs is illustrated in **Figure 3.**
- After application of the alcohol-based handrub as recommended, allow hands and forearms to dry thoroughly before donning sterile gloves.

My (5) Moments of Hand Hygiene:

- **Moment (1): Before touching a patient: (*see* Figure 4)**
  - When? Clean your hands before touching a patient when approaching them.
  - Why? To protect the patient against harmful germs carried on your hands.

- **Moment (2): Before clean/ aseptic procedure:**
  - When? Clean your hands immediately before performing a clean/aseptic procedure.
  - Why? To protect the patient against harmful germs, including the patient's own, from entering their body.

- **Moment (3): After body fluid exposure risk:**
  - When? Clean your hands immediately after an exposure risk to body fluids (and after glove removal).
  - Why? To protect yourself and the healthcare environment from harmful patient germs.

- **Moment (4): After touching a patient:**
  - When? Clean your hands after touching a patient and their immediate surroundings when leaving the patient's side.
  - Why? To protect yourself and the healthcare environment from harmful patient germs.

- **Moment (5): After touching the patient's surroundings:**
  - When? Clean your hands after touching any object or furniture in the patient's immediate surroundings when leaving – even if the patient has not been touched.
  - Why? To protect yourself and the healthcare environment from harmful patient germs.

Figure 1: Hand Rub Technique (WHO, 2009)

Figure 2: Hand washing Technique (WHO, 2009)

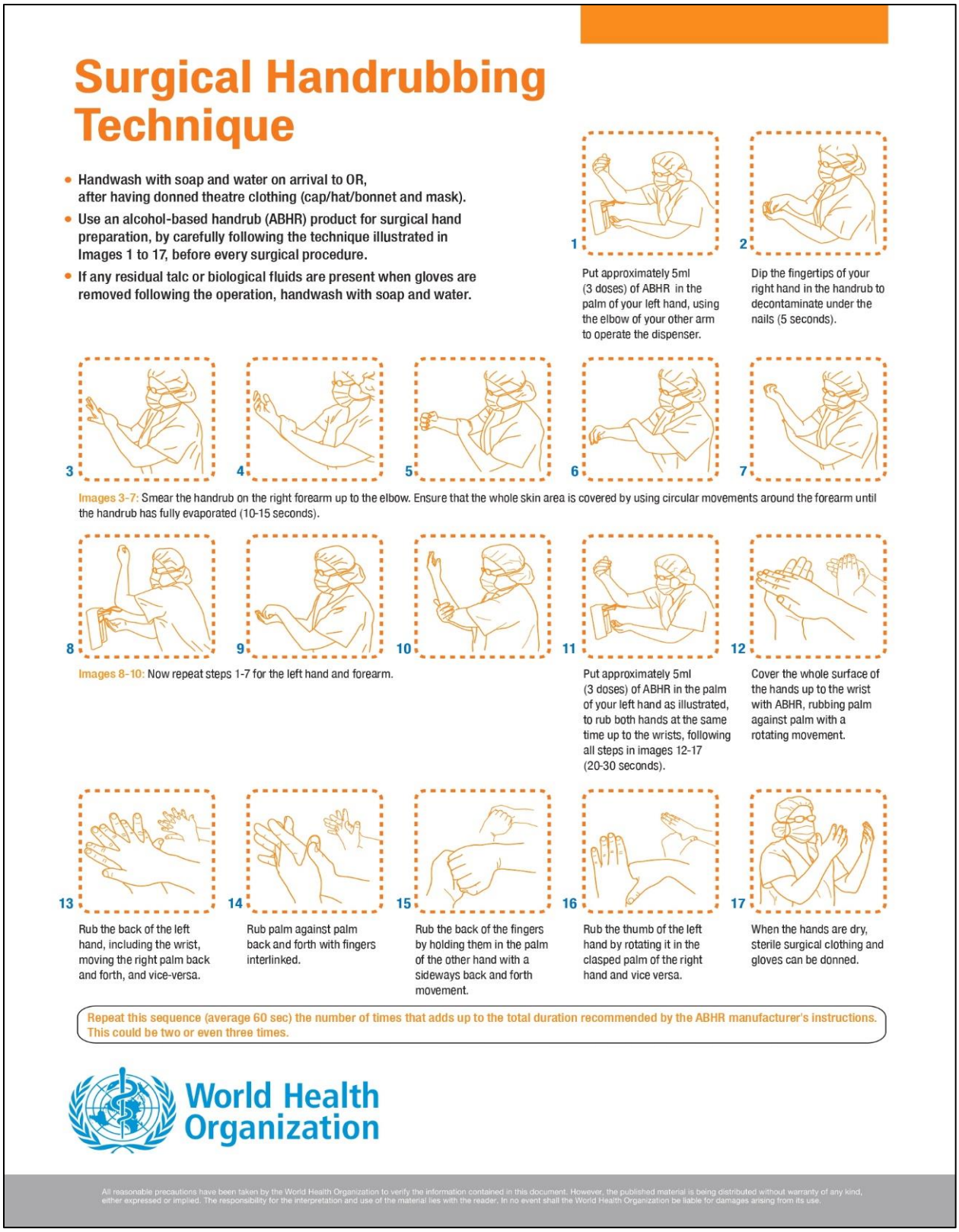
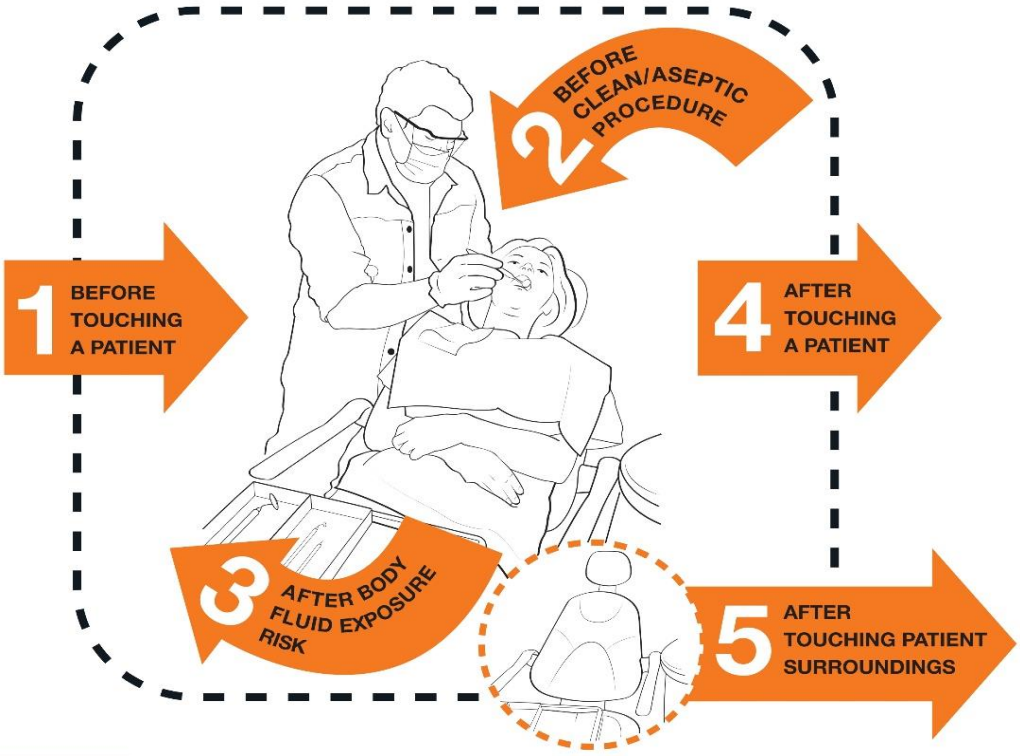


Figure 3: Surgical Handrubbing Technique (WHO, 2009)

Your 5 Moments for Hand Hygiene

Dental Care



1	BEFORE TOUCHING A PATIENT	WHEN?	Clean your hands before touching a patient.
		WHY?	To protect the patient against harmful germs carried on your hands.
2	BEFORE CLEAN/ ASEPTIC PROCEDURE	WHEN?	Clean your hands immediately before performing a clean/aseptic procedure.
		WHY?	To protect the patient against harmful germs, including the patient's own, from entering his/her body.
3	AFTER BODY FLUID EXPOSURE RISK	WHEN?	Clean your hands immediately after a procedure involving exposure risk to body fluids (and after glove removal).
		WHY?	To protect yourself and the environment from harmful patient germs.
4	AFTER TOUCHING A PATIENT	WHEN?	Clean your hands after touching the patient at the end of the encounter or when the encounter is interrupted.
		WHY?	To protect yourself and the environment from harmful patient germs.
5	AFTER TOUCHING PATIENT SURROUNDINGS	WHEN?	Clean your hands after touching any object or furniture in the patient surroundings when a specific *zone* is temporarily and exclusively dedicated to a patient - even if the patient has not been touched.
		WHY?	To protect yourself and the environment from harmful patient germs.

World Health Organization

SAVE LIVES
Clean **Your** Hands

WHO acknowledges the Ministry of Health of Spain and the Hôpitaux Universitaires de Genève (Infection Control programme) for their active participation in developing this material.

March 2012

Figure 4: Your 5 Moments for Hand Hygiene-Dental Care (WHO, 2012)

Fingernails and Artificial Nails:

- Do not wear artificial fingernails or extenders when directly contacting patients.
- Keep natural nails short (tips less than 0.5 cm long or approximately ¼ inch).

Personal Protective Equipment:

- Personal Protective Equipment (PPE) is specialized clothing or equipment an employee wears for protection against a hazard (e.g., gloves, masks, protective eyewear, and gowns).

Gloves:

Uses and Types:

- The followings are examples of Patient Care Gloves:
  - Sterile latex surgical gloves.
  - Sterile styrene surgical gloves.
  - Sterile synthetic copolymer gloves.
  - Latex examination gloves.
  - Nitrile examination gloves.
  - Polyurethane gloves.
  - Low-protein gloves.
- Examples of Utility Gloves:
  - Heavy latex gloves.
  - Heavy nitrile gloves.

Using Gloves for Patient Care Activities:

- Dental professionals should wear disposable gloves:
  - During all patient care activities where a potential exists for direct hand contact with saliva, blood, or other oral fluids; mucous membranes; and nonintact skin.
  - When handling items or surfaces contaminated with body fluids or potentially infectious materials.
- Gloves used for patient care are not to be reused on a subsequent patient.
- Torn or punctured gloves must be removed as soon as possible, followed immediately by hand hygiene, and donning of new gloves.
- Sterile latex or vinyl gloves are used during surgical procedures, but nonsterile gloves are appropriate for most other dental procedures.

Using gloves for Dental Setting Cleanup and Instrument Processing:

- Dental professionals should use utility nitrile or heavy latex gloves when preparing and using chemicals, precleaning and disinfecting contaminated surfaces, and handling contaminated items during instrument processing.
- The heavy utility gloves are reusable and can be washed, rinsed, and dried based on the manufacturer instruction.
- Heavy utility gloves should not be used if they are peeling, cracking, discolored, torn, punctured, or any other signs of deterioration.

Note:

- For further information in gloves type and indication *see* **Table 1.**

Table 1: Glove Types and Indications

Glove Type	Indications	Comments	Common Examples of Glove Materials
Patient Examination Gloves	Patient care, examinations, and other nonsurgical procedures involving contact with mucous membranes; laboratory procedures	• Nonsterile, single-use disposable. Use for one patient and discard appropriately.	• Natural rubber latex • Nitrile • Polyvinyl chloride (vinyl) and other synthetics • Polyethylene (plastic)
Surgeon's Gloves	Surgical procedures	• Sterile and single-use disposable. • Use for one patient and discard appropriately.	• Natural rubber latex • Nitrile • Combinations of latex and/or synthetics

Masks:

Surgical Masks:

- A mask should be worn when there is potential contact with respiratory secretions and sprays of blood or body fluids (as defined in Standard Precautions and/or Droplet Precautions).
- Masks should fully cover the nose and mouth and prevent fluid penetration. In addition, masks should fit snuggly over the nose and mouth. For this reason, masks with a flexible nosepiece that can be secured to the head with string ties or elastic are preferable.
- The mask should be changed with every patient.

N95 Respirators:

- Dental professionals should wear N95-or higher respirators for potential exposure to infectious agents transmitted via the airborne route (e.g., tuberculosis).
- All healthcare personnel that use N95-or higher respirators should be fit tested according to MOH requirements.

Protective Eyewear:

- The use of Eye protection and surgical masks are recommended to protect against respiratory secretions during all patient encounters.
- DHCP should wear protective eyewear whenever contamination of the eyes with aerosols, sprays, or splashes of body fluids or chemicals is possible and whenever projectiles may be generated.
- Protective eyewear should protect the sides of the eyes.
- Protective eyewear worn by the dental team should be decontaminated thoroughly before being reused with subsequent patients.

Face Shield:

- If dental professionals use face shields, the shields should be chin length, provide maximum protection, and be curved to provide side protection.
- DHCP should wear masks with face shields to reduce inhalation of fluid and dust particles that travel around or beneath the shields.

Patient Eye Protection:

- The dental team should offer patients eye protection during treatment.
- If a patient wears prescription eyeglasses, they should be allowed to continue wearing them during care; other patients should be provided with eye protection. In addition,

disposable eyewear should be provided, or patient eyewear can be decontaminated between uses based on the manufacturer's instructions.

Gown:

- Gown is the outer layer of clothing that protects/ covers underlying work clothes, street clothes, undergarments, or full body.
- Dental team members should wear gowns whenever a chance exists for contamination of skin or other clothing with spray or splashes of saliva, blood, or other potentially infectious materials.
- Gown should be removed when leaving clinical areas, and not wear such clothing in lunchrooms, restrooms, or outside the clinic and should be changed between patients.

Recommendations for Donning PPE:

- Always perform hand hygiene before donning PPE.
- **Sequence of donning PPE (*see* Figure 5):**
  - The gown should be donned first.
  - The mask or respirator should be put on next and properly adjusted to fit; remember to fit check the respirator.
  - The goggles or face shield should be donned next.
  - The gloves are donned last.
  - Keep in mind that the combination of PPE used and, therefore, the sequence for donning will be determined by the precautions that need to be taken.

- **In addition to wearing PPE, the following safe work practices should be used:**
  - Avoid contaminating yourself by keeping your hands away from your face and not touching or adjusting PPE.
  - Remove your gloves if they become torn and perform hand hygiene before wearing a new pair of gloves.
  - Avoid spreading contamination by limiting surfaces and items touched with contaminated gloves.

Figure 5: Sequence of Donning PPE (CDC, 2014)

Recommendations for Removing PPE:

- **Sequence of doffing PPE:**
  - There are two sequences for removing PPE.
    - **The first sequence (*see* Figure 6):**
      - The gloves are considered the most contaminated PPE and are removed first and hand rubbing must be performed post removing.
      - The face shield or goggles are next because they are more cumbersome and would interfere with removing other PPE.
      - The gown is third in the sequence, followed by the mask or respirator.

    - **The second sequence (*see* Figure 7):**
      - Gowns and gloves should be removed first.
      - The second item is goggles or face shields.
      - Followed by mask or respirator.
      - Perform hand hygiene immediately.

- **Hand Hygiene:**
  - Hand hygiene should be performed immediately after removing PPE.
  - If your hands become visibly contaminated during PPE removal, wash your hands before continuing to remove PPE.
  - Wash your hands thoroughly with soap and warm water, or if hands are not visibly contaminated, use an alcohol-based hand rub.

Figure 6: Example 1 for Sequence of Removing PPE (CDC, 2014)

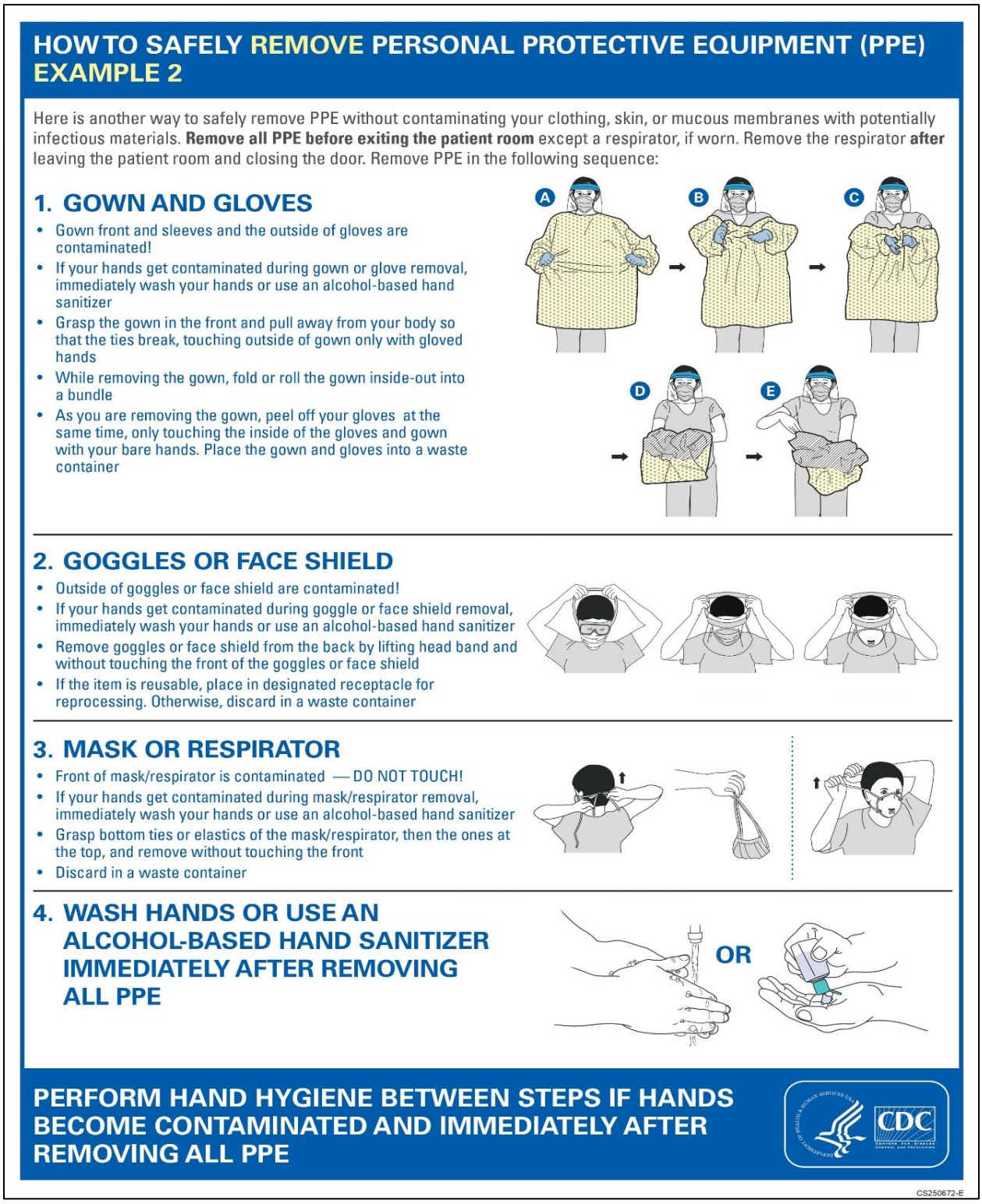


Figure 7: Example 2 for Sequence of Removing PPE (CDC, 2014)

Contact Dermatitis and Latex Allergy

Allergic Contact Dermatitis (Type IV hypersensitivity)

- It is an allergic condition resulting from exposure to accelerators and other chemicals used in the manufacture of rubber gloves (e.g., natural rubber latex, nitrile, and neoprene), as well as from other chemicals used in dental practice (e.g., methacrylate and glutaraldehyde). Allergic contact dermatitis often manifests as a rash beginning hours after contact and, similar to irritant dermatitis, is usually confined to the area of contact.
- **Contact dermatitis is classified as either irritant or allergic.**
  - **Irritant contact dermatitis:**
    - Is common, non-allergic, and develops as dry, itchy, irritated areas on the skin around the area of contact.
  - **Allergic contact dermatitis (type IV hypersensitivity):**
    - Can result from exposure to accelerators and other chemicals used in the manufacture of rubber gloves (e.g., natural rubber latex, nitrile, and neoprene), as well as from other chemicals found in the dental practice setting (e.g., methacrylates and glutaraldehyde)
    - Allergic contact dermatitis often manifests as a rash beginning hours after contact and, similar to irritant dermatitis, is usually confined to the area of contact.

Respiratory Hygiene and Cough Etiquette:

Identifying Persons with Potential Respiratory Infection:

- Facility staff should remain alert for any persons arriving with respiratory infection symptoms.
- Signs are posted at the reception area instructing patients and accompanying persons to:
  - Self-report symptoms of respiratory infection during registration.
  - Practice respiratory hygiene and cough etiquette (a technique described below) and wear a facemask as needed.

Respiratory Hygiene and Cough Etiquette:

- All persons with signs and symptoms of a respiratory infection (including facility HCWs) are instructed to:
  - Wear a surgical mask.
  - Cover the mouth and nose with a tissue when coughing or sneezing.
  - Dispose of the used tissue in the nearest waste receptacle.

- Perform hand hygiene after contact with respiratory secretions and contaminated objects/materials.

Masking and Separation of Persons with Respiratory Symptoms:

- **If a patient calls ahead:**
  - Have patients with symptoms of a respiratory infection come at a time when the facility is less crowded or through a separate entrance, if available
  - If the purpose of the visit is non-urgent, patients are encouraged to reschedule the appointment until symptoms have resolved.
  - Upon entry to the facility, patients are instructed to wear a facemask.
  - Alert registration staff ahead of time to place the patient in an exam room with a closed door upon arrival.

- **If identified after the arrival:**
  - Provide facemasks to all persons (including persons accompanying patients) who are coughing and have respiratory infection symptoms.
  - Place the impacted patient in an exam room with a closed door as soon as possible; if an exam room is unavailable, the patient should sit as far from other patients as possible in the waiting room.
  - Accompanying persons with respiratory infection symptoms should not enter patient-care areas and are encouraged to wait outside the facility.

During Periods of Increased Community Respiratory Virus Activity (e.g., emerging or reemerging outbreak/epidemic) and If the National Regulations & Protocols Available:

- In addition to the infection prevention measures, the following enhanced screening measures are implemented based on the nationally approved guidelines:
- **When scheduling and/or confirming appointments:**
  - Pre-screen all patients and schedule those with respiratory symptoms to come when the facility might be less crowded, if possible
  - Instruct patients with respiratory symptoms to don a facemask upon entry to the facility.
  - If the purpose of the visit is non-urgent, patients with respiratory infection symptoms are encouraged to schedule an appointment after symptoms have resolved.
  - Encourage family members, caregivers, and visitors with respiratory infection symptoms to not accompany patients during their visits to the facility.

- If possible, prepare a daily list of patients with respiratory symptoms scheduled for a visit in advance for the registration staff.

- **Upon entry to the facility and during the visit:**
  - At the time of patient registration, facility staff identify pre-screened patients (from the list) and screen all other patients and accompanying persons for respiratory infection symptoms.
  - Patients identified with respiratory symptoms are instructed to wear a surgical mask and practice cough etiquette and directly placed in a private exam room as soon as possible; if an exam room is unavailable, the same patient is placed in a separate area as far as possible from other patients while awaiting care.

- **If patient volume is anticipated to be higher than usual with prolonged wait time at registration:**
  - A separate respiratory triage station is established to identify patients with respiratory infection signs & symptoms and accompanying persons immediately upon arrival and before registration.
  - Patients identified with respiratory symptoms are placed immediately in a private exam room; if an exam room is unavailable, patients are provided with a facemask and placed in a separate area as far as possible from other patients while awaiting care.

Prevention of Sharps Injuries:

Specific Prevention Approaches:

- **There are four basic approaches to preventing sharps injuries:**
  1. Eliminate using the sharp when possible; this is seldom possible in dentistry.
  2. Apply engineering controls (a device that removes the potential hazard, e.g., sharps containers; engineered medical devices with safety features, such as a protective needle sheath).
  3. Apply work practice controls (actions that alter how a task is performed, e.g., the one-handed scoop technique for recapping a used needle).
  4. Proper handling of sharps is essential because common personal protective barriers, such as examination gloves, often do not prevent sharps punctures or cuts.
- To minimize the potential for an accident with injection needles, use a protective cap-holding device or replace the cap sheath using the one-handed scoop technique.

Examples of Sharps Safety Practices:

1. Avoid bending, breaking, or manipulating needles before disposal.
2. Do not recap a needle by hand (*see* **Figure 8**).

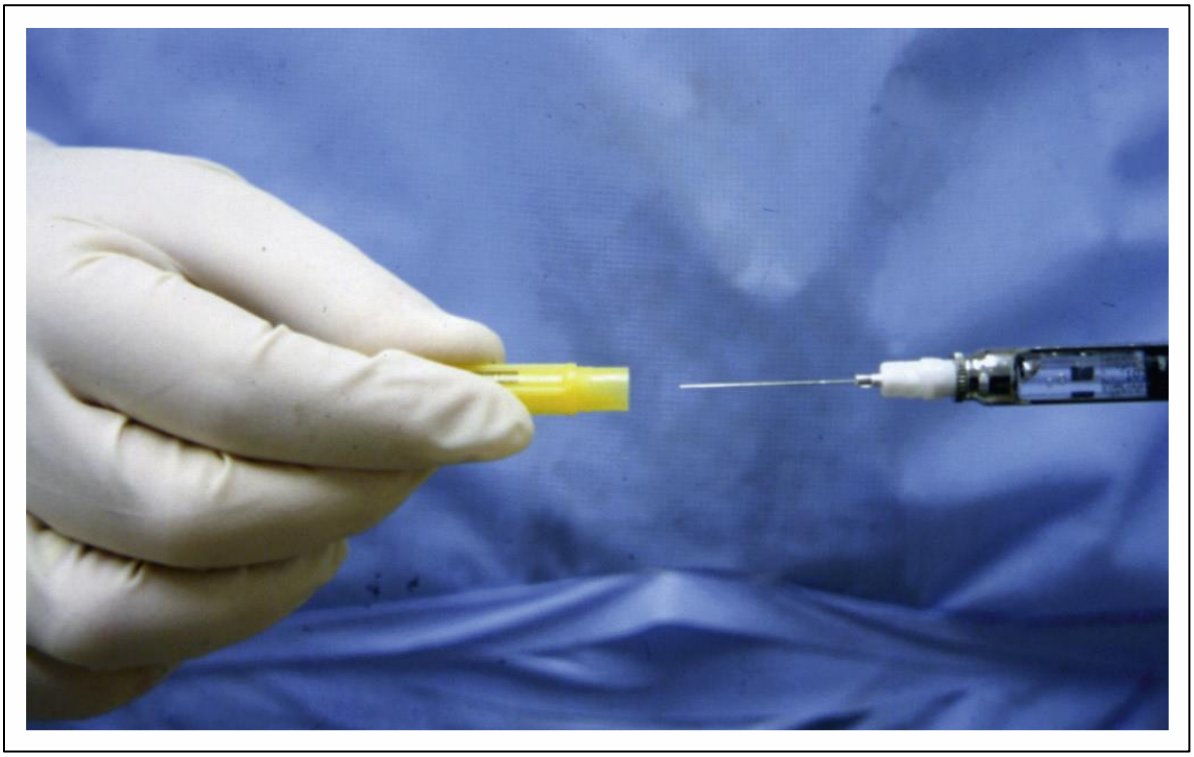


Figure 8: This shows recapping a needle by hand, **Do not do this.**

3. Safely recap used needles before removing them from non-disposable syringes.
4. Recap needles using a cap holder (*see* **Figure 9**) or the one-handed scoop technique.

Figure 9: Example of Needle Recapping Device

5. Avoid removing needles from disposable medical syringes before disposal.
6. Dispose of used needles after use (e.g., at chairside) as soon as possible.
7. Evaluate needle safety devices for possible use when they become available **(*see* Figures 10 and 11).**

Figure 10: Safety needle with an integral retractable sheath

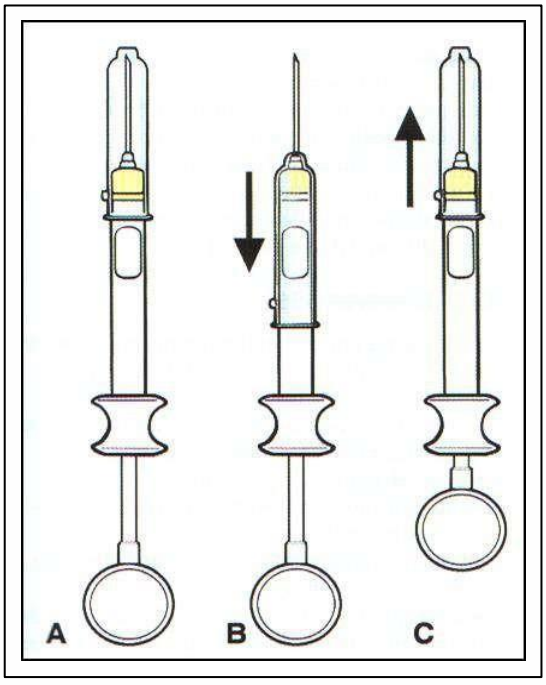


Figure 11: Self-sheathing anaesthetic needles

8. Avoid putting others at risk for an injury.
9. Avoid hand-to-hand passing sharps to another person; use a neutral zone (*see* **Figure. 12).**

Figure 12: This shows the passing of an exposed needle. **Do not do this.**

10. Be extra careful when giving a second anaesthetic injection to the same patient.
11. Consider using instruments rather than fingers to retract tissue when giving injections or suturing.
12. Use round-tipped scalpel blades instead of pointed-tipped blades. (*see* **Figure 13**).

Figure 13: Disposable retractable scalpel blade shown in the open position for use and in the safety position within the integral sheath.

13. Use tongs or cotton pliers (rather than fingers) to pick up sharps from the floor (*see* **Figure 14).**

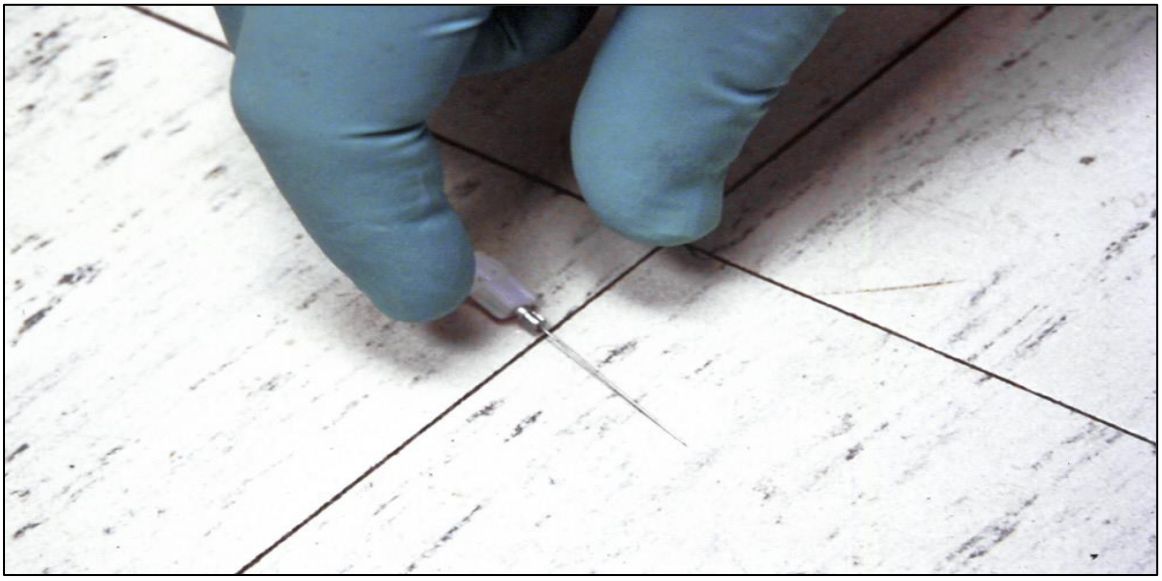


Figure 14: shows picking up a sharp with a gloved hand. Do not do this.

14. Consider distributing your instruments in instrument cassettes; this greatly reduces direct handling of the instruments as they remain in the cassettes during cleaning, packaging, sterilizing, and distributing to the chairside.
15. Organize sharp instruments in trays/cassettes so that their tips are not pointing up.
16. Make sure handpieces in their holders have the bur pointing away from the operator.
17. Use instrument cassettes thick enough to avoid sharps from protruding out of the cassette.
18. Place sharp instruments back in a stable fashion when returning them to trays, cassettes, or bracket tables (*see* **Figure 15**).

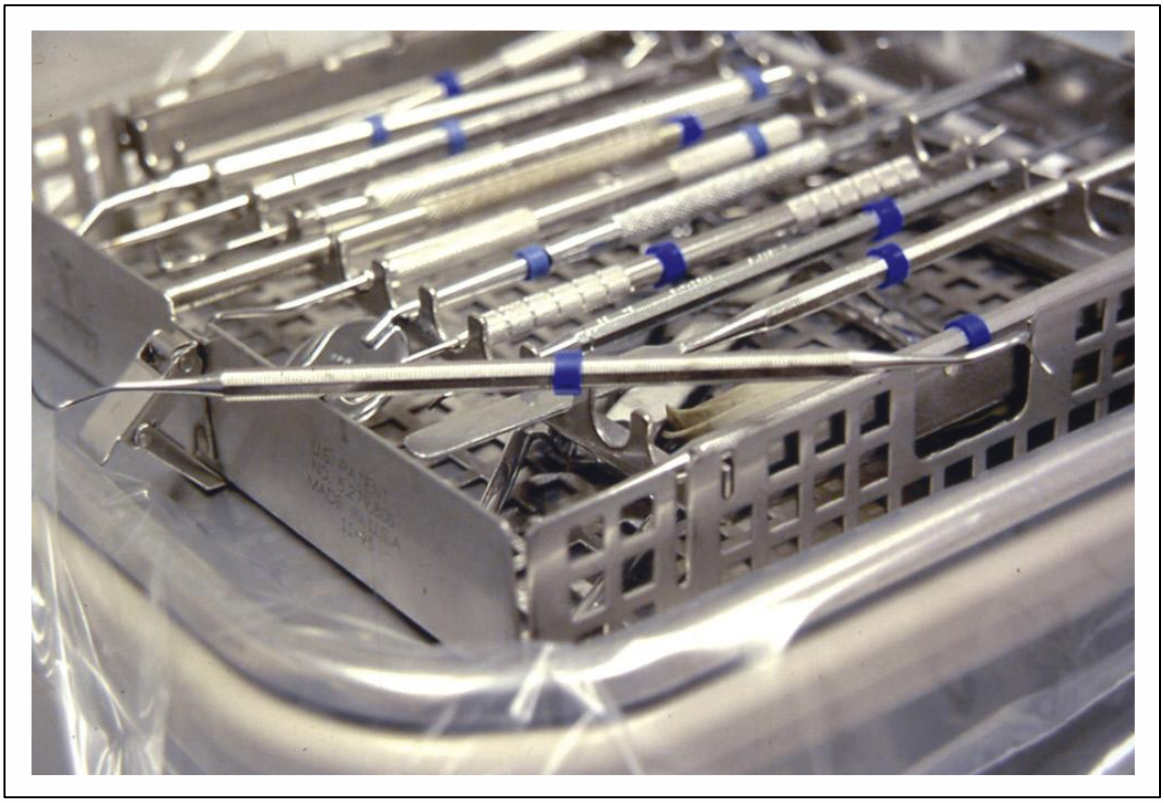


Figure 15: The sharp instrument was placed on the cassette in an unstable position, **Do not do this.**

19. Look before reaching for a sharp instrument or instrument package.
20. Carefully check instrument packages for protruding instruments before handling them.
21. Do not reach unthinkingly into a container of sharp items.
22. Do not sharpen contaminated instruments.
23. Reduce the need for chairside sharpening by providing multiple instruments in the setup.
24. If discarding a disposable medical needle syringe, discard the entire unit without removing the needle.

25. Use puncture-resistant, closable, labeled sharps containers for sharps disposal (*see* **Figure 16)**.

Figure 16: Sharps Container

26. Close sharps containers before moving them to avoid spillage if dropped.
27. Fill sharps containers only three-fourths full to avoid sharps protruding from the top.
28. Use sharps containers with wide enough bases so they do not easily fall over.
29. Do not routinely hand-scrub sharp instruments, use ultrasonic or automatic washer units. (*see* **Figure 17**).

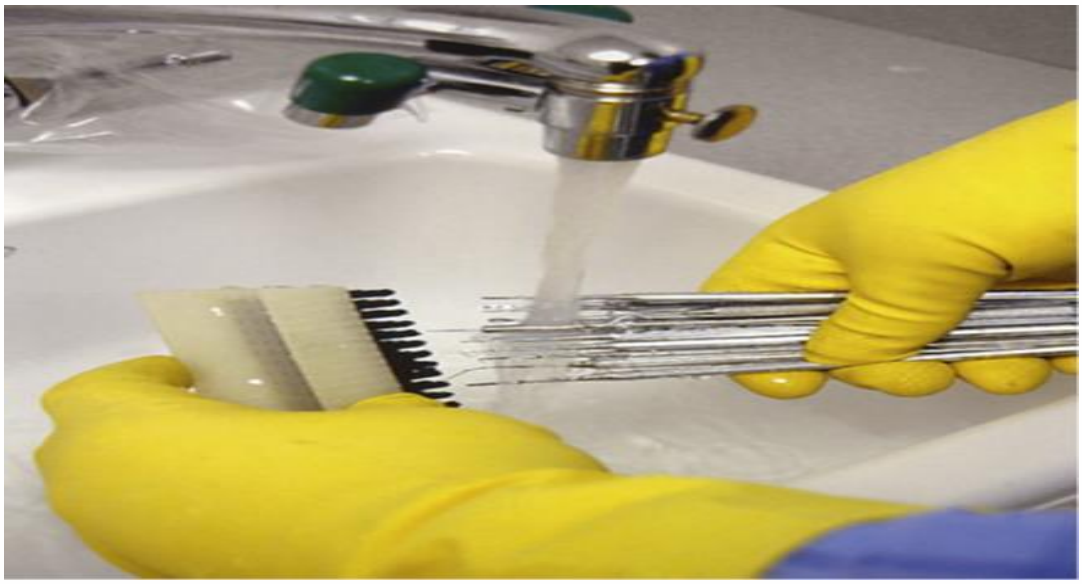


Figure 17: Hand-scrubbing of sharp dirty instruments is dangerous, **Do not do this.**

30. Use a basket or cassette rack to place instruments/cassettes into an ultrasonic cleaner.
31. Use a long-handled brush if an instrument must be hand-scrubbed occasionally.
32. Consider using tongs or cotton forceps rather than fingers to remove burs from the high-speed handpieces.

One-Handed 'Scoop' Technique:

- First, place the cap on a hard, flat surface, then move your hand away from the cap.
- Next, with one hand, hold the syringe and use the needle to "scoop up" the cap.
- Finally, when the cap covers the needle tip completely, hold the needle at the base near the hub and use the other hand to secure the cap.
- The needle is now securely recapped. (*see* **Figure 18**).

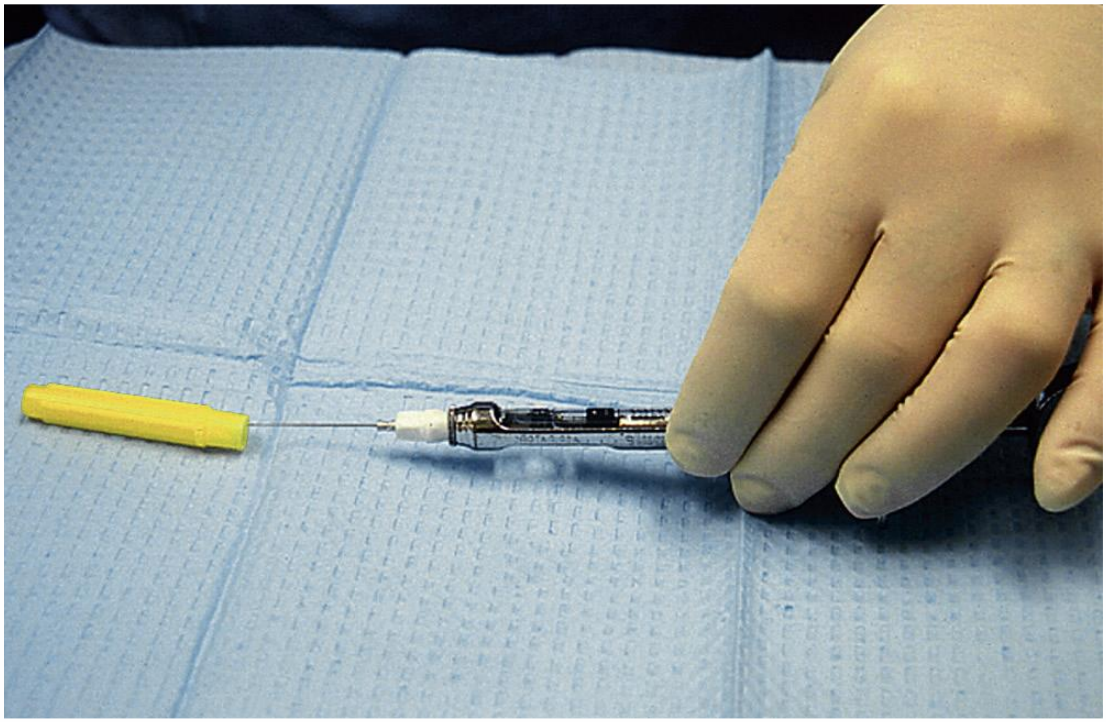


Figure 18: This shows the one-handed scoop technique, a safe way to recap a needle.

Safe Injection Practices:

- Safe Injection Practices: refers to the proper use and handling of supplies for administering injections and infusions. These practices are intended to prevent the transmission of infectious diseases between one patient and another or between patient and healthcare personnel during the preparation and administration of parenteral medications.

Parenteral Medications:

- The CDC recommendations related to the use of injection medication vials are as follows:
  - Use single-dose vials for parenteral medications whenever possible.
  - Do not use needles or syringes for more than one patient. This includes manufactured prefilled syringes and other devices, such as insulin pens.
  - Medication containers (single- and multidose vials, ampules, and bags) are entered with a new needle and new syringe, even when obtaining doses for the same patient.
  - Do not use single-dose (single-use) medication vials, ampules, and bags or bottles of intravenous solution for more than one patient.
  - Do not combine the leftover contents of single-use vials for later use. The following apply if multidose vials are used:
    - Dedicate multidose vials to a single patient whenever possible.
    - If multidose vials are used for more than one patient, they should be restricted to a centralized medication area. They should not enter the immediate patient treatment area (e.g., dental clinic settings) to prevent inadvertent contamination of the vial with spray and spatter or direct or indirect contact with potentially contaminated surfaces or equipment. (If a multidose vial enters the immediate patient treatment area, it should be dedicated for single-patient use and discarded immediately after use.)
    - Date multidose vials when opened and discarded within 28 days unless the manufacturer specifies a shorter or longer date for that opened vial.
  - Do not use fluid infusion or administration sets (e.g., intravenous bags, tubings, and connections) for more than one patient.

Dental Anesthetic Injections:

- The CDC recommends using a dental cartridge syringe to administer local anaesthesia, not using the needle or anaesthetic cartridge (carpule) for more than one patient.
- Ensure the dental cartridge syringe is appropriately cleaned and heat sterilized before use on another patient.

Disinfection and Sterilization of Patient-Care Items:

General Recommendations:

- No repressing of dental instruments should be carried inside the clinics. Instead, all the instruments should be sent to the central sterile supply department (CSSD).
- Use only MOH-approved medical devices for sterilization and follow the manufacturer's instructions for correct use.

- Clean and sterilize critical dental instruments before each use. (Refer to Table 3).
- Clean and sterilize semi-critical items before each use. (Refer to Table 2).
- Allow packages to dry in the sterilizer before handling them to avoid contamination.
- Use of heat-stable semi-critical alternatives is encouraged.
- Single-use disposable instruments are acceptable alternatives if used only once and disposed of correctly.
- **Instrument Processing Area:**
  - Designate a central processing area.
  - Divide the instrument processing area physically into three areas or, at a minimum, two areas spatially into the following:
    - Receiving, cleaning, and decontamination.
    - Preparation, packaging, & sterilization.
  - Storage:
  - Do not store instruments in an area where contaminated instruments are held or cleaned.

Note:

- If space is limited, the storage areas could be in the dental clinic.

Table 2: Categories of Dental Patient-Care Instruments (Spaulding's Classification)

Category	Definition	Dental Instrument or Item
Critical	The category of medical devices or instruments introduced directly into the human body, either into or in contact with the bloodstream or normally sterile areas of the body (e.g., surgical instruments and scalpel).	Surgical instruments, periodontal scalers, scalpel blades, surgical,dental burs.
Semi- critical	The category of medical devices or instruments (e.g.,mouth mirror and amalgam condenser) that come into contact with mucous membranes and do not ordinarily penetrate them.	Dental mouth mirror, amalgam condenser, reusable dental impression trays, dental handpieces.

Noncritical	The category of medical items or surfaces that carry the least risk of disease transmission. This category has been expanded to include noncritical medical devices and environmental surfaces. Noncritical medical devices touch only unbroken (nonintact) skin (e.g., a blood pressure cuff). Noncritical environmental surfaces can be divided into clinical contact surfaces (e.g., a light handle) and housekeeping surfaces (e.g., floors and countertops).	Radiograph head/ cone, pressure cuff, face bow.

Transporting Contaminated Items:

- **The following recommendations should be applied when transporting contaminated instruments:**
  - Contaminated items should be sent to CSSD as soon as possible after use.
  - If the items are not sent to the CSSD immediately, a transporting gel should be applied to the instruments while keeping them in the clinic.
  - Tissues, blood, and material debris should be removed from the contaminated instruments (by wiping them with gauze) as soon as possible before transport to the decontamination area.
  - All disposable items should be removed from the kit before transportation.
  - Transport of contaminated items from the point of use to the CSSD should be in an appropriate container to minimize the risk of percutaneous injury.
  - The transport container should be puncture resistant and of adequate size and depth for the items to be stable and rest safely within the container without protruding beyond its edges.
  - The transport container should be covered and locked.
  - The transport container should be considered contaminated. (Biohazard logo should be posted on the container).
  - While transporting items to the CSSD, the courier's gloves, contaminated items, and container should not contact any surface on the way to the CSSD. Once the contaminated items have sent to the CSSD, the courier must remove the gloves and perform hand hygiene.

Receiving, Cleaning, and Decontamination Work Area:

- Minimize handling of loose contaminated instruments during transport to the instrument processing area. Use work-practice controls (e.g., carry instruments in a covered container) to minimize exposure potential.
- Clean all visible blood and other contamination from dental instruments and devices before sterilization or disinfection procedures.
- Use automated cleaning equipment (e.g., ultrasonic cleaner or washer-disinfector) to remove debris to improve cleaning effectiveness and decrease worker exposure to blood.
- Use work-practice controls that minimize contact with sharp instruments if manual cleaning is necessary (e.g., long-handled brush).
- Wear puncture- and chemical-resistant/heavy-duty utility gloves for instrument cleaning and decontamination procedures.
- Wear appropriate PPE (e.g., mask, protective eyewear, and gown). Splashing or spraying is anticipated during cleaning.

Preparation and Packaging:

- Use an internal chemical indicator in each package.
- Use an external indicator if the internal indicator cannot be seen outside the package.
- Use a container system or wrapping compatible with the sterilization process used.
- Before sterilizing critical and semi-critical instruments, inspect them for cleanliness, then wrap or place them in containers designed to maintain sterility during storage (e.g., cassettes and organizing trays).

Storage Area for Sterilized Items and Clean Dental Supplies:

- Implement practices based on event-related shelf-life for storing wrapped, sterilized instruments and devices.
- Even for event-related packaging, at a minimum, place the date of sterilization. If multiple sterilizers are used in the facility, the sterilizer lot is used outside of the packaging material to facilitate the retrieval of processed items in case of a sterilization failure.
- Examine wrapped packages of sterilized instruments before opening them to ensure the barrier wrap has not been compromised during storage.
- Re-clean, repack and re-sterilize any instrument package that has been compromised.
- Store sterile items and dental supplies in covered or closed cabinets.

Implant Devices:

- Implantable devices should not be sterilized unwrapped.
- A biological indicator should be used for every sterilizer load that contains an implantable device.
- The results should be verified before using the implantable device.

Sterilization Monitoring:

- **Biological indicator (BI):** a device to monitor the sterilization process that consists of a standardized population of bacterial spores known to be resistant to the mode of sterilization being monitored. BIs indicate whether all the parameters necessary for sterilization were present.

- **Chemical indicator:** a device to monitor the sterilization process that changes color or form with exposure to one or more physical conditions within the sterilizing chamber (e.g., temperature, steam).

- **Mechanical indicator:** devices (e.g., gauges, meters, displays, and printouts) that display an element of the sterilization process (e.g., time, temperature, and pressure).

Forms of Sterilization Monitoring:

There are three forms of sterilization monitoring, all of which must be used to achieve sterility assurance, which are mechanical, chemical, and biological monitoring.

- **Mechanical Monitoring:**
  - Mechanical monitoring involves examining and recording the critical variables (time, temperature, and pressure).
  - Mechanical monitoring provides real-time assessment of each cycle. This information is found on the sterilizer printout or the digital display.
  - If your machine does not have a printout, contact the manufacturer. It is possible that the machine has print-out capabilities, and the manufacturer can provide equipment for printouts.
  - At the end of each cycle, before items are removed from the sterilizer, review the print-out to ensure that the correct time, temperature, and pressure were achieved, and then initial the print-out once all of these have been verified.

- **Chemical Monitoring:**
  - Chemical monitoring involves external and internal indicators that change color or physical form when exposed to high temperatures or specific combinations of time, temperature, and indicators that should be compatible with the packaging material.
  - The type used should be designed for use with steam autoclaves.
  - The indicators should be stored and used following the manufacturer's instructions.
  - Chemical indicators should be used with every instrument pack entering the sterilizer.

  - **External Chemical Indicators:**
    - External Chemical Indicators should be present on the outer surface of packages and are also called process indicators or rapid-change indicators.
    - External indicators, e.g., autoclave tape and special markings on commercially available packages, change color rapidly after reaching a specific temperature.
    - External indicators should be applied to the outside of each instrument package to verify that the package has been exposed to the sterilization process because the external chemical indicators change color very soon after exposure to a high temperature, these indicators should not be considered reliable indicators that sterility has been achieved.

  - **Internal Chemical Indicators:**
    - Internal chemical indicators are placed with the items to be sterilized within the packs, also called integrating indicators or slow-change indicators.
    - Internal chemical indicators should be of the slow-change type, which are multi-parameter indicators designed to react to two or more sterilizing parameters and are a more reliable indicator that sterilization conditions have been met.
    - Internal chemical indicators should be placed inside every instrument pack to ensure the steam has penetrated the packaging material and reached the instruments inside. Although chemical indicators may indicate that the necessary sterilization parameters have been reached, they should not be considered an assurance of sterility because they cannot guarantee that the packages have been exposed to the parameters needed for the required time.

  - **A Bowie-Dick test:**
    - It is a particular type of chemical indicator that does not test the sterilization process but tests for air removal in vacuum and pre-vacuum steam sterilizers.
    - It consists of a pack placed on the bottom shelf near the drain in an empty chamber.

- It contains an internal heat-sensitive chemical that will completely change color if the air is removed, and steam heat is allowed to penetrate the pack thoroughly.
- When air is not entirely removed from a vacuum/pre-vacuum steam sterilizer, air pockets may not reach sterilizing temperatures.

- **Biological Monitoring:**
  - Biological monitoring (also called spore testing) provides the main guarantee of sterilization. In addition, it evaluates the procedure's effectiveness.
  - It is strongly recommended at least weekly spore testing of each sterilizer in practice and post each sterilizer maintenance.
  - Additionally, they must be part of routine load release criteria for every load that contains implantable devices.

- **The following are recommended in the case of a positive spore test:**
  - Remove the sterilizer from service and review sterilization procedures (e.g., work practices and use of mechanical and chemical indicators) to determine whether operator error could be responsible.
  - Retest the sterilizer using biological, mechanical, and chemical indicators after correcting any identified procedural problems.
  - If the repeat spore test is negative and mechanical and chemical indicators are within normal limits, put the sterilizer back in service.

- **The following are recommended if the repeat spore test is positive:**
  - Do not use the sterilizer until it has been inspected or repaired or the exact reason for the positive test has been determined.
  - Recall, to the extent possible, and reprocess all items processed since the last negative spore test.
  - Before placing the sterilizer back in service, re-challenge the sterilizer with biological indicator tests in three consecutive empty chamber sterilization cycles after the cause of the sterilizer failure has been determined and corrected.

- Maintain sterilization records (i.e., mechanical, chemical, and biological) in compliance with local regulations (For Further Information Refer to Guidelines for Central Sterile Processing, GDIPC, 2021).

Note:

- For Further Information Refer to Guidelines for Central Sterile Processing, GDIPC, 2021.

Storing Sterile Items:

- **Storage:**
  - All decontaminated and sterilized items must be stored so that their integrity and decontaminated state are maintained.
  - **Storing conditions of sterile packages:**
    - The sterile packages should be stored in covered or closed cabinets in dry, enclosed, low-dust areas protected from obvious sources of contamination.
    - The packages should be stored away from heat sources that may make the packaging material brittle and more susceptible to tearing or puncture.
    - The packages should be protected from sharp objects that may puncture or tear the packaging.
    - Care must be taken that the storage area is not exposed to moisture, so the packages should not be stored next to or under sinks, underwater or sewer pipes, or anywhere they can become wet.

  - Items should be positioned so that packaging is not crushed, bent, compressed, or punctured and their sterility and integrity are not otherwise compromised.
  - Use of the instrument packs should be on a first-in/first-out basis, i.e., the freshly sterilized packages are placed at the back, so the previously sterilized packages are used first.

- **Shelf Life of Sterile Packages:**
  - Shelf-life of sterilized items should be event-related. This means that the contents of sterilized packages stored in the appropriate storage conditions are considered sterile until some event causes the items to become contaminated.

  - Examples of events that cause the sterile items to become contaminated:
    - A tear in the packaging,
    - packaging becomes wet,
    - the seal is interrupted.

  - Items removed from packaging but not used must be reprocessed.
    - "First in, first out" System:
      - This is a system used for stock rotation.

- The "oldest" sterile packs should be used first, as long as the packaging material is intact.

- A critical point in sterility assurance and event-related storage is to carefully examine each pack, pouch, and cassette before opening it to ensure that the barrier wrap has not been compromised during storage.

- **Transport of Sterilized Items to Clinics:**
  - Sterilized packages should be allowed to cool down before they are transported.
  - Transport of items from the CSSD to the clinics or other departments should be within closed solid-walled containers or in covered or enclosed carts with solid-bottom shelves to protect them from exposure to environmental contaminants along the transportation route.

Note:

- For Further Information Refer to Guidelines for Central Sterile Processing, GDIPC, 2021.

Opening of Instrument Packages:

- **The following recommendations should be applied before the opening of instrument packages:**
  - Before opening instrument packages, the packages must be examined to ensure the seal is intact and the integrity of the package is not broken in any way (e.g., through tears, perforations, or wetness).
  - The instrument packages should be opened without touching the instruments.
  - The packages should be opened with clean, ungloved hands after the patient is seated, and then put on gloves just before first contact with the patient's mouth.
  - If the instrument package is opened with gloved hands, the gloves will become contaminated with any microorganisms on the outside of the packaging. If it's necessary to manipulate instruments just before patient treatment begins (e.g., arranging bagged instruments on the bracket table), they should be handled with sterile tongs.

- **The following recommendations should be applied after the opening of instrument packages:**
  - The internal chemical indicator must be checked to ensure the package's sterilization conditions have been reached.

- If the chemical indicator does not indicate that sterilization parameters have been met, the items should not be used for patient care. The package and the internal indicator must be returned to the CSSD, and the incident must be reported to the CSSD supervisor.

Note:

- For Further Information Refer to Guidelines for Central Sterile Processing, GDIPC, 2021.

Environmental Infection Prevention & Control

Types of Dental Environmental Surfaces:

- Based on the potential risk of contamination, the various dental surfaces can be divided into clinical contact surfaces and housekeeping surfaces. These two types of surfaces require different types of cleaning/disinfecting agents and protocols.

Contamination of Dental Environmental Surfaces:

- Dental clinic settings surfaces become contaminated during patient treatment by just about the same transmission routes as the dental team—droplet, direct, and indirect.
- **Droplet:**
  - Droplets of the patient's oral fluids are spread during aerosol-generating procedures (e.g., use of high- and low-speed handpieces, the air/water syringe, and ultrasonic scalers). Whereas the smaller aerosol particles remain airborne for a time, the larger droplet particles either directly hit an object (e.g., the clinician's mask, eyewear, clothing) or settle on any nearby surface (usually within a few feet).

- **Direct:**
  - Direct spread of the patient's oral fluids to environmental surfaces occurs when contaminated hands (hands) touch a surface, for example, when adjusting the dental light, flipping switches, touching a drawer handle or mobile cart, handling the curing light or a dispensing gun, or grabbing the air/water syringe.

- **Indirect:**
  - Indirect spread occurs when objects contaminated with a patient's oral fluids contact a surface, such as when a patient's denture is placed on the countertop or when an instrument is laid down.

Clinical Contact Surfaces:

- Surfaces that become contaminated with a patient's oral fluids during treatment are usually involved in the treatment of a subsequent patient. These surfaces need to be adequately treated before they become involved in the care of the next patient (*see* **Figure 19)**. Such surfaces include but are not limited to:
  - the dental chair,
  - light handles,
  - switches,
  - dental radiograph equipment,
  - dental chair-side computers,
  - reusable containers of dental materials,
  - drawer handles,
  - sinks and faucet handle used for processing contaminated items, countertops, pens, telephones, and doorknobs.

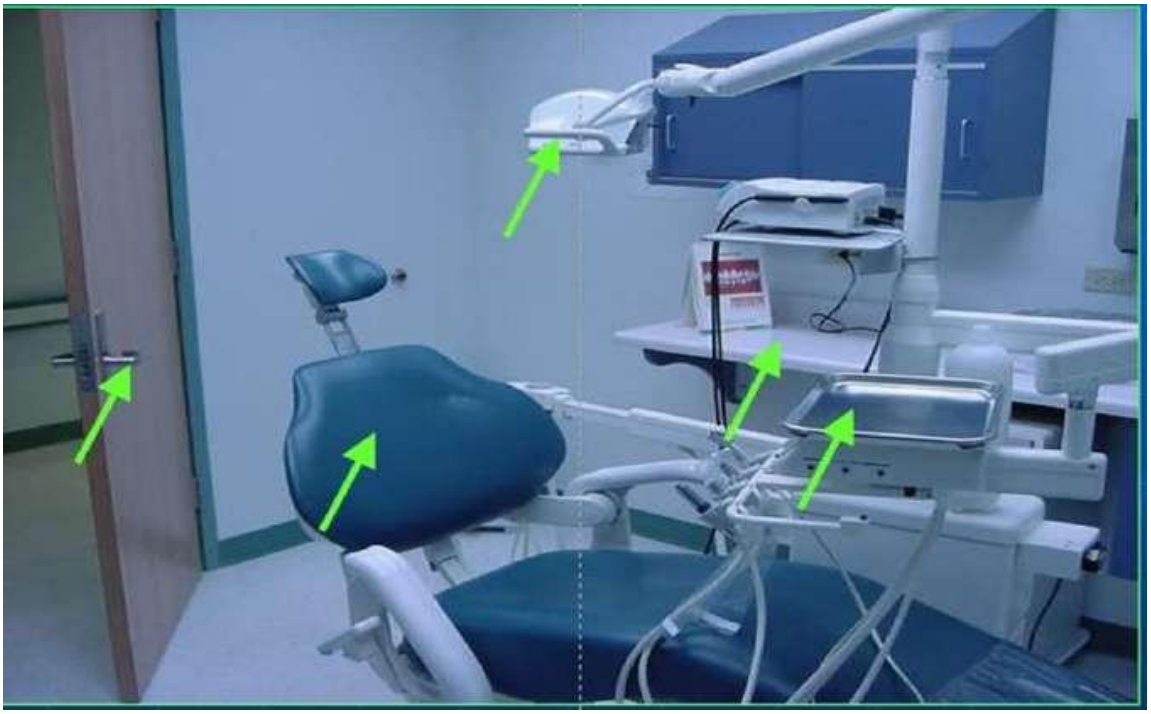


Figure 19: Examples of Clinical Contact Surfaces

- The spread of microorganisms from these surfaces can be minimized by:
  - Using impervious barriers to cover the surfaces during treatment, or
  - Cleaning and disinfecting such surfaces after patient treatment (For Further Information.

Note:

- For Further Information Refer to the Best Practices of Environmental Health for Prevention & Control of Infections in Healthcare Facilities Guidelines, 2022).

Approaches to Clinical Contact Surfaces Asepsis:

- There are two general approaches to clinical contact surface asepsis. One is to prevent the surface or item from becoming contaminated using a surface barrier, and the other is to preclean and disinfect the surface after contamination and before reuse.

  - **Surface Barriers:**
    - Covering surfaces with an impervious barrier is the preferred method of preventing cross-contamination from clinical contact surfaces.
    - Even if barriers are used, general cleaning and disinfection of clinical contact surfaces, dental unit surfaces, and countertops are required at the end of the work session.
    - When barriers are used to prevent cross-contamination, they must be removed between patients.
    - A new set of barriers should be placed with each patient. Barriers should never be used for more than one patient.
    - After the removal of the barrier, the surface should be examined. If the surface is found to have been inadvertently soiled, it should be cleaned and disinfected before the placement of clean barriers for the next patient.
    - Surface barriers should be impervious to fluids to keep microorganisms in saliva, blood, or other liquids from soaking through to contact with the surface.
    - Covering the air/water syringe handle with plastic wrap to prevent contamination is also recommended. (*see* **Figure 20**).

Figure 20: Surface barriers for handpieces and air/water connectors and hoses.

- If units are set up the night before, a large bag can give overnight dust protection to the bracket table and handpiece unit (*see* **Figure 21**).

Figure 21: Surface barrier for a control unit and instrument tray holder.

- Light handles and light switches are commonly touched during patient care and can be covered with plastic wrap or bags, depending on their shape. In addition, some lights have removable handles that can be cleaned and heat-sterilized before reuse.

- If the water at sinks is not controlled by elbow levers, foot pedals, or automatic devices, dental professionals can cover faucet handles with plastic bags.

- **Steps for Using Surface Barriers:**
  - Apply appropriate surface barriers before the surfaces become contaminated with patient material.
  - If the surfaces to be covered have been contaminated previously with patient materials, preclean and disinfect the surface, then remove gloves and perform hand hygiene before applying the surface barriers.
  - Place each surface barrier so it protects the entire surface and will not come off when the surface is touched.
  - Wear gloves when removing surface barriers after completing patient care or other activities.
  - Carefully remove each barrier without touching the underlying surface.
  - If a surface is touched during the barrier removal, preclean and disinfect the surface.
  - Discard used barriers into the regular trash unless local laws consider these items regulated waste; otherwise, dispose of them as the regulations indicate.
  - Remove and discard contaminated gloves, perform hand hygiene, and apply fresh surface barriers for the care of the next patient.

- **Cleaning and Disinfection:**
  - Cleaning is using detergents or surface-active agents to remove organic matter (e.g., saliva and blood), and visible soils.
  - The physical action of scrubbing with detergents and surfactants and rinsing with water removes substantial microorganisms. Furthermore, if a surface is not cleaned first, the disinfection process may be ineffective because organic matter interferes with the action of some disinfectants.
  - Removal of all visible blood and inorganic and organic matter is critical as the germicidal activity of the disinfecting agent.
  - Even if barriers are used, general cleaning and disinfection of clinical contact surfaces, dental unit surfaces, and countertops are required at the end of the work session.

- **Precleaning and Disinfecting Surfaces:**
  - Put on gloves, masks, protective eyewear, and protective clothing.
  - Choose a cleaner/disinfectant compatible with the surfaces to be cleaned and disinfected.

Note:

- For Further Information Refer to the Best Guidance for Selecting, Evaluating & Monitoring of the Infection Prevention & Control Supplies & Equipment, GDIPC, 2022).

- Confirm that the precleaning/disinfecting product(s) have been prepared correctly (if diluted) and are fresh (if necessary) and following the required contact time. Read and follow the product label directions.
- There are two methods for cleaning and disinfection: spray-wipe-spray and wipe-discard-wipe.

- **For spray-wipe-spray:**
  - Spray the surface with the cleaning/disinfecting agent and vigorously wipe with paper towels. Holding paper towels behind appropriate surfaces during the procedure will reduce overspray.
  - Alternatively, saturate a paper towel or gauze pad with the cleaning/disinfecting agent and vigorously wipe the surface.
  - If cleaning large areas, multiple surfaces, or large spills, use several towels or pads so as not to transfer contamination to other surfaces.
  - Disinfect the precleaned surface by respraying the disinfecting agent over the entire surface using towels to reduce overspray (or apply with a saturated pad).
  - Let the surface remain moist for the longest contact time indicated on the product label. Vertical surfaces may dry more quickly.

- **For wipe-discard-wipe:**
  - Obtain a cleaner/disinfectant towelette from its container, close the container lid, and vigorously wipe (clean) the surface. Discard the towelette, obtain a fresh towelette, and wipe the surface again for disinfection. Discard the towelette and let the surface dry.
  - If the surface is still wet when ready for patient care, wipe it dry. If the surface directly touches the patient's skin or mouth, rinse/wipe off residual disinfectant with water. If the surface directly touches the patient's skin or mouth, rinse/wipe off residual disinfectant with water.

Housekeeping Surfaces:

- Housekeeping surfaces are less likely to be contacted with contaminated gloves but may become contaminated with aerosols, spatter, or spills. Examples of such surfaces are floors, walls, and sinks (*see* **Figure 22**).
- Because housekeeping surfaces have a limited risk of disease transmission, they can be decontaminated with less rigorous methods than those used on dental patient-care items and clinical contact surfaces.

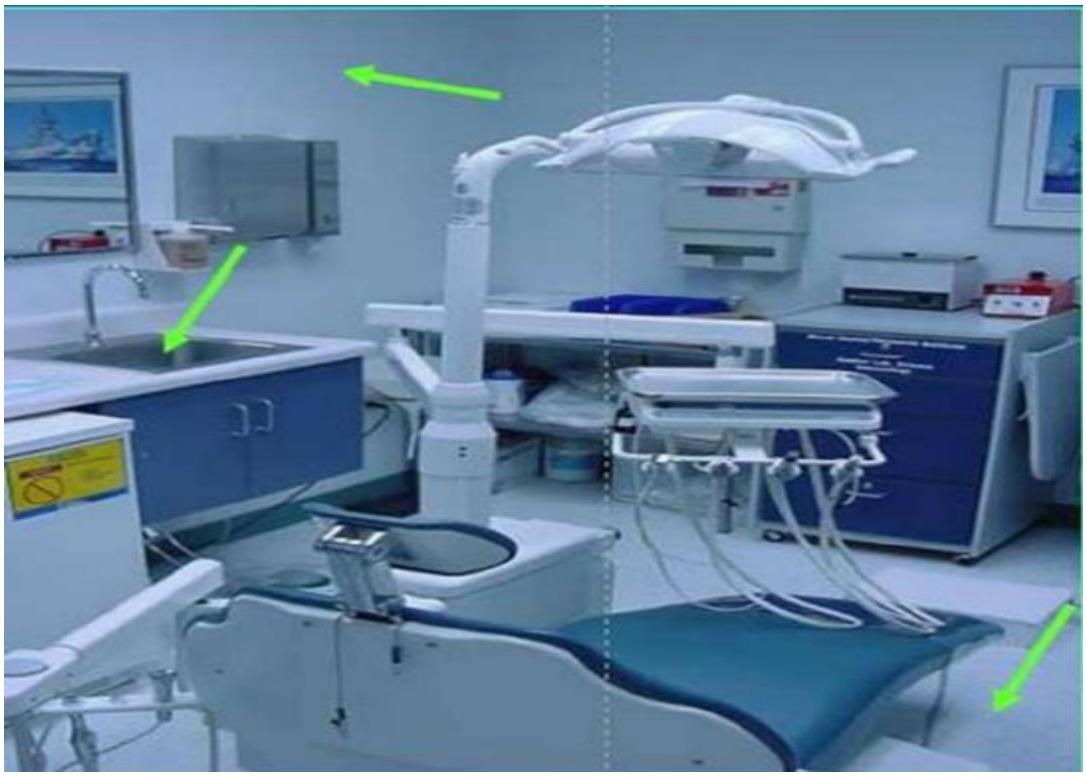


Figure 22: Examples of Housekeeping Surfaces

- **Frequency of cleaning of housekeeping surfaces:**
  - Floors and sinks should be cleaned daily or when required.
  - Walls, window coverings, and other vertical surfaces in healthcare areas should be cleaned and disinfected at least every three months. However, prompt removal and surface disinfection should be done when patient material visibly contaminates housekeeping surfaces.

- **Personal Protective Equipment (PPE):**
  - During cleaning and disinfection of environmental surfaces, staff should wear gloves and other PPE to prevent occupational exposure to infectious agents and hazardous chemicals.

- **Cleaning and disinfectant solutions:**
  - The manufacturers' instructions for preparation and use should be followed closely.
  - Solutions should be freshly diluted at the start of each workday. At the end of the day, any remaining solution should be discarded, and the container scrubbed clean and allowed to dry to minimize bacterial contamination.

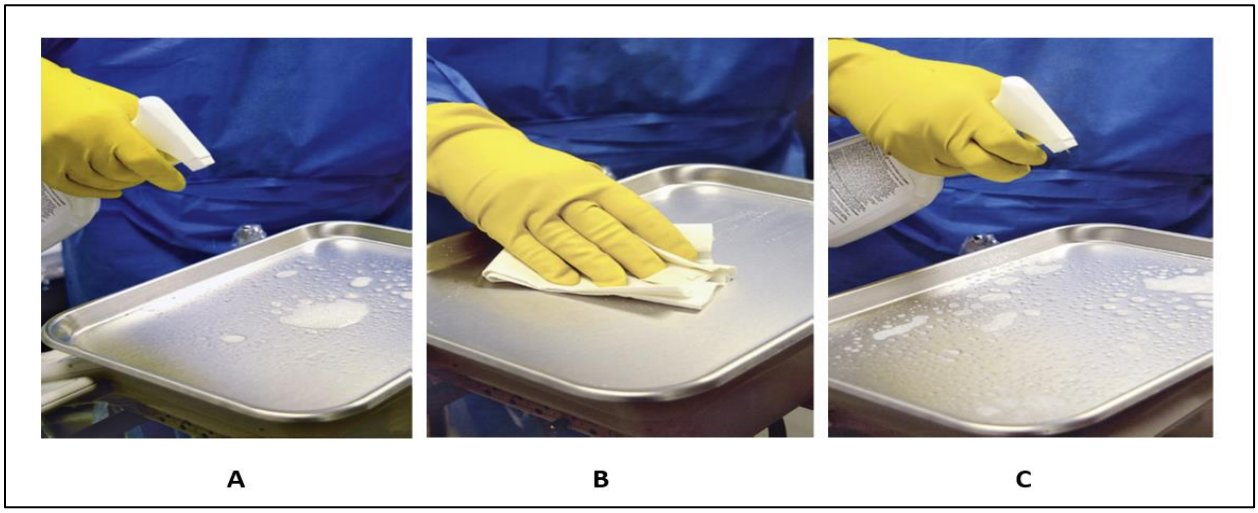


Figure 23: Surface precleaning and disinfecting by the spray-wipe-spray technique. Precleaning consists of **A,** spraying with a surface disinfectant, and **B,** wiping the surface to clean it. Disinfection is **C,** reapplying the disinfectant followed by the appropriate contact time.

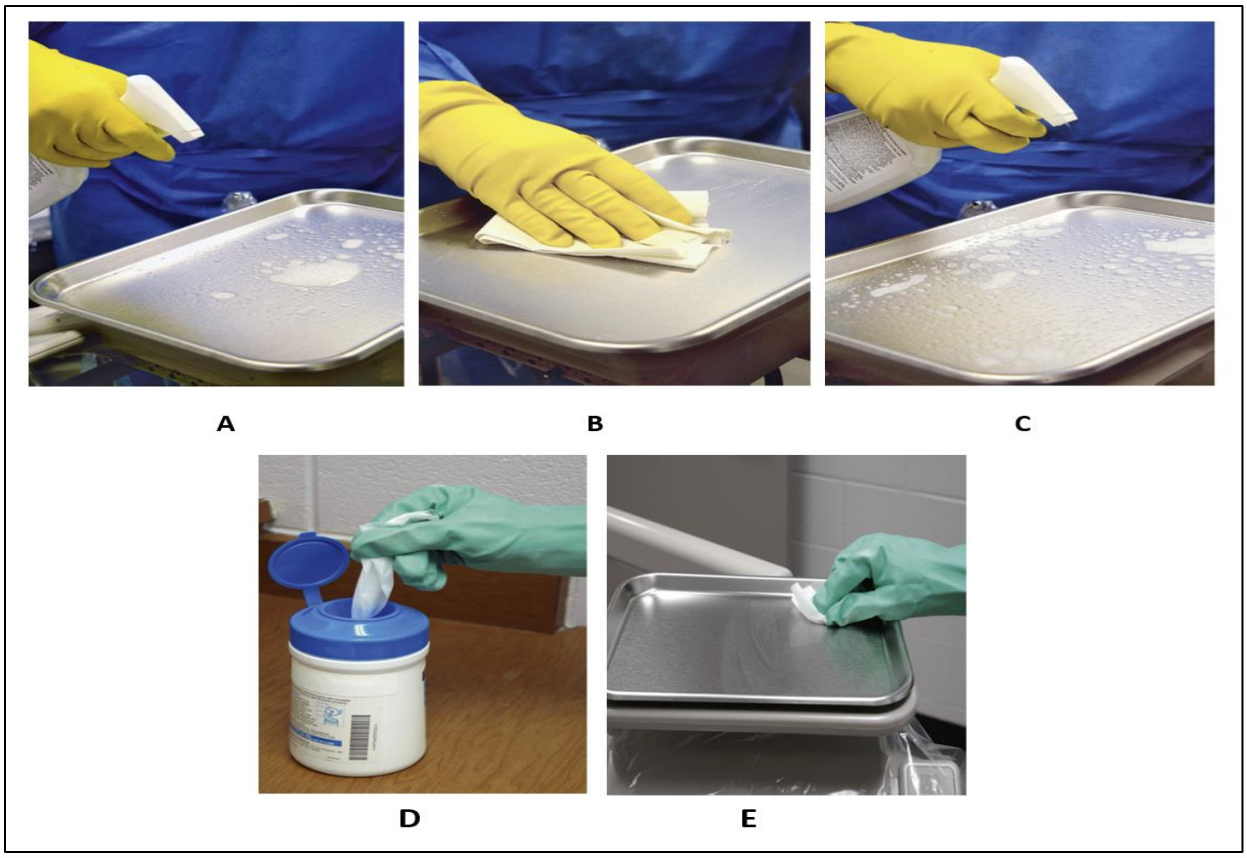


Figure 24: Surface precleaning and disinfecting by the wipe-discard-wipe technique. **A**) Precleaning consists of obtaining a fresh surface wipe. **B)** wiping the surface to clean it. **C)** discarding the wipe. Disinfection: **D**) obtaining a new surface wipe A, and **E)** wiping the surface again is followed by the appropriate contact time.

- **Mops and Cloths:**
  - Mops and cloths should be cleaned and disinfected after use and allowed to dry before reuse.
  - Single-use, disposable mop heads and cloths may be used to avoid spreading contamination.
  - Non-disposable cleaning tools of the various areas within the healthcare facility (clinics, theatres, laboratories, hallways, offices, classrooms, and restrooms) should be separate and not mixed with those of other areas.

Managing Blood and Body Fluid Spillages:

- All work locations where employees may come into contact with blood or other potentially infectious material must have biological spill biohazard equipment/kits available to clean up any spills safely and effectively.
- **The spill kit must include the following:**
  - Personal protective equipment (PPE) such as gowns, gloves, eyewear, and mask.

- Supplies include forceps, plastic scoop and scraper, absorbent granules or pads, hospital-approved disinfectant, yellow plastic bag, and sharp container.

Note:

- For Further Information Refer to Basic Infection Control Skills License (BICSL) Trainer's Guidelines, GDIPC, 2023).

Characteristics of Disinfectants:

- **There are four general types of antimicrobial chemicals (*see* Table 3).**
  1. Antibiotics (for killing microorganisms in or on the body).
  2. Antiseptics (for killing microorganisms on the skin or other body surfaces).
  3. Disinfectants (for killing microorganisms on environmental/ inanimate surfaces or objects).
  4. Sterilants (for killing all microorganisms on inanimate objects).

- **The disinfectants are categorized based on their microbial spectrum of activity as follows:**
  - Sterilant/high-level disinfectant (for killing all microorganisms on submerged, inanimate, heat-sensitive objects).
  - Intermediate-level disinfectant (for killing vegetative bacteria, most fungi, viruses, and M. tuberculosis var. bovis).
  - Low-level disinfectant (for killing most vegetative bacteria, some fungi, and some viruses).
  - Labels on antimicrobial products can be confusing, but reading these labels carefully before using the product is very important. These labels commonly include the type of antimicrobial agent (active ingredients) and general properties, such as the following:
    - Virucidal (kills at least some viruses).
    - Bactericidal (kills at least some bacteria).
    - Fungicidal (kills at least some fungi).
    - Tuberculocidal (kills the M. tuberculosis var. bovis bacterium).
    - Sporicidal (kills bacterial spores, which is a sterilant).

Table 3: Categories of Disinfecting/Sterilizing Chemicals

Category	Definition	Examples	Use
Sterilant	Destroys all microorganisms, including high numbers of bacterial spores	Glutaraldehyde, glutaraldehyde phenate, hydrogen peroxide, hydrogen peroxide with peracetic acid, peracetic acid	Heat-sensitive reusable items: immersion only
High-level disinfectant	Destroys all microorganisms but not necessarily high numbers of bacterial spores	Glutaraldehyde, glutaraldehyde phenate, hydrogen peroxide, hydrogen peroxide with peracetic acid, peracetic acid, orthophthalaldehyde	Heat-sensitive reusable items: immersion only
Intermediate level disinfectant	Destroys vegetative bacteria, most fungi, and most viruses; inactivates Mycobacterium tuberculosis var. bovis (is tuberculocidal)	EPA-registered hospital disinfectant with a label claim of tuberculocidal activity (e.g., chlorine-based products, phenolics, iodophors, hydrogen peroxide, quaternary ammonium compounds with alcohol and bromides)	Clinical contact surfaces; noncritical surfaces with visible blood
Low-level disinfectant	Destroys vegetative bacteria, some fungi, and some viruses; does not inactivate M. tuberculosis var. bovis (is not tuberculocidal)	EPA-registered hospital disinfectant with no label claim of tuberculocidal activity (e.g., quaternary ammonium compounds)	Housekeeping surfaces (e.g., floors, walls); noncritical surfaces without visible blood; clinical contact surfaces

Dental Unit Waterlines, Biofilm, and Water Quality

General Recommendations:

- Implement equipment and procedures, such as separate reservoirs, chemical treatment protocols, filtration systems, and sterile water delivery systems.
- For units using separate water reservoirs, purge the dental unit waterlines each night and whenever units are out of service to prevent stagnant water from settling within the waterlines.

- Discharge water and airlines for at least 20 to 30 seconds after each patient to physically flush outpatient material that might have entered the dental water system during treatment.
- Monitor waterlines for damage or visible contamination and replace them if needed or as per the manufacturer's directions.
- Be alert to signs indicating biofilm formation, including musty odor, cloudiness, or particulates in the water, and clogging of lines.
- For surgical procedures, use sterile irrigating solutions, such as sterile water or saline.
- Appropriate delivery devices (e.g., bulb syringes; sterile, single-use disposable products; or sterile water delivery systems that bypass the dental unit using sterile single-use disposable or sterilizable tubing) should be used to deliver sterile irrigating solutions during surgery. This may include a dedicated surgical irrigation system with components compatible with heat sterilization methods used in outpatient dental settings.
- Adhere to the recommended service life and maintenance of the dental unit and its components and accessories.
- Follow the manufacturer's instructions to clean and disinfect the dental unit at recommended intervals. Contact the manufacturer of the dental unit to obtain the most up-to-date instructions or with any questions regarding the reprocessing of the dental unit.
- Monitor the water quality and microbial contamination of the dental unit waterlines using standard culturing methods at appropriate intervals to keep bacterial counts lower than 500 CFU/mL of water.
- Always correctly dispose of single-use disposable items after they have been used.
- Dental professionals should consider using an enclosed container or high-velocity evacuation to minimize the spread of spray, spatter, and aerosols generated during discharge procedures. In addition, evidence indicates that overnight or weekend microbial accumulation in water lines can be reduced substantially by removing the handpiece and allowing water lines to run and discharge water for several minutes at the beginning of each clinic day. However, flushing the water lines will not remove the biofilm in the lines.

Dental Unit Water and Infection Prevention & Control

- **Oral Surgical Procedures:**
  - Oral surgical procedures involve the "incision, excision, or reflection of tissue that exposes the normally sterile areas of the oral cavity. Examples include biopsy, periodontal surgery, apical surgery, implant surgery, and surgical extractions of teeth (e.g., removal of the erupted or nonerupted tooth, requiring elevation of the mucoperiosteal flap, removal of bone and/ or section of tooth, and suturing if needed).
  - Dental professionals should not use dental unit water as an irrigant for oral surgery.

- Oral surgeries may involve the use of sterile water delivery systems or hand irrigation using sterile water in a sterile disposable syringe.
- Using sterile irrigation for gingival procedures, such as prophylaxis, scaling, root planning, and periodontal maintenance, is based on clinical judgment.

- **Flushing of the Water Lines:**
  - Dental professionals should flush water lines and handpieces between patients.
  - Although flushing will not remove biofilm from the lines (biofilm forms while water moves through the lines), it may temporarily reduce the microbial count in the water and help clean the handpiece water lines of materials that may have entered the patient's mouth.

- **Minimizing Sprays and Spatter:**
  - The routine use of high-volume evacuation with the high-speed handpiece, ultrasonic scaler, and air/water syringe reduces exposure of the dental team to aerosol and spatter from the patient's oral fluids and contamination with the water spray from handpieces, scalers, and syringes. This evacuation may also reduce the exposure of the patient to waterborne microorganisms.

- **Barriers for the Patient and Dental Team:**
  - The rubber dam serves as a protective barrier for the patient from dental unit water.
  - The dam does not eliminate exposure totally but significantly reduces direct contact. The dam also greatly reduces the aerosolizing and spattering of patient microorganisms onto the dental team but does not reduce exposure of the dental team to dental unit water.
  - Protective barriers of eyewear, masks, respirators, and face shields serve as barriers for the dental team against microorganisms coming from the patient's mouths and from the aerosols and sprays of dental unit water.

Approaches to Improve Dental Unit Water Quality:

- Current approaches include independent water reservoirs, antimicrobial agents, source water treatment systems, and sterile water delivery systems. In some instances, more than one of these approaches are combined.
- Check with the dental unit and waterline treatment product manufacturers for their recommendations to maintain and monitor water quality in dental units.

Independent Water Reservoirs:

- Because accurately predicting the quality of municipal water when it enters dental units is not possible, one approach has been to disconnect from city water and supply another source of water. This process can involve the installation of a water reservoir (e.g., a bottle) filled with good-quality water (e.g., distilled water) for patient treatment. This system also allows for decontaminating or EPA-registered antimicrobial agents to clean the water lines.
- Attacking the biofilm (shock treatments) is essential just before starting to use an independent reservoir system or any system designed to improve the quality of the incoming water. This will help remove any preformed biofilm.
- Dental professionals must periodically decontaminate the lines after installing the new water delivery systems, depending on the product/ system used.
- If the biofilm in the water lines does not treat, even sterile water placed in the bottles will come out highly contaminated. Thus, the water lines need to be treated with an agent that will control the biofilm to maintain the quality of the water placed into the bottles as it passes through the lines.
- Dental professionals should not touch the pickup tube in the bottle with contaminated fingers when changing the bottle; one needs to clean the bottles with soap and water every day.

Using an Independent Water Reservoir:

1. Disconnect from municipal water and install an independent water reservoir (bottle) to deliver treatment water.
2. Place the appropriate amount of cleaner/disinfectant into the bottle, reconnect, and pressurize the bottle to flush through the cleaner/disinfectant. Leave all the lines full for the prescribed time (e.g., overnight). The next morning, remove the bottle, rinse off the pickup tube, connect a bottle filled with water, pressurize the bottle, and flush all the cleaner/disinfectant from the lines. Repeat this entire step 2 on three consecutive nights.
3. Fill a clean bottle with high microbial quality treatment water (e.g., distilled water), connect it to the unit, and pressurize. Do not touch the pickup tube.
4. After the last patient of the day, empty the bottle contents, place the bottle back on the unit, pressurize, and blow out the residual water in the lines.
5. At the beginning of the next day, place a clean bottle containing treatment water on the unit and pressurize.
6. Once a week, at the end of the day, remove the bottle and empty the contents. Then, repeat step two for one night only.
7. Monitor the microbiological quality of the water.

Decontaminating and Antimicrobial Agents:

- Decontaminating and EPA-registered, MOH approved antimicrobial agents are available in independent water reservoirs to attack the biofilm. Some agents are placed in the bottles periodically (e.g., once a week), flushed into the water lines, held there for various periods, and flushed out (Refer to the Best Guidance for Selecting, Evaluating & Monitoring of the Infection Prevention & Control Supplies & Equipment's, GDIPC,2022).
- Automated germicide metering or slow-release devices may be used. Other chemical agents are added directly to the treated water to provide continuous antimicrobial activity in the lines.

Source Water Treatment Systems:

1. Other antimicrobial systems treat municipal water before it enters the dental units, such as ultraviolet light, high heat, or antimicrobial chemicals (e.g., iodine, silver ions, and ozone).
2. Chemical agents with antimicrobial claims are to be registered by the EPA and should be approved by MOH.

Note:

- For Further Information Refer to the Best Guidance for Selecting, Evaluating & Monitoring of the Infection Prevention & Control Supplies & Equipment, GDIPC, 2022).

Sterile Water Delivery Systems:

- Because dental units cannot reliably deliver sterile water, systems have been developed that bypass the dental unit entirely and deliver sterile solutions (e.g., water or saline) through sterile disposable or autoclavable lines to the patient.
- A sterile solution for irrigation can also be delivered through a hand syringe.

Water Quality Monitoring:

- Monitoring for the dental water quality must be conducted on a regular basis and based on national approved standards.
- Monitoring can detect how the system functions and/or equipment and products/equipment are used.
- The approach to monitor dental unit water quality: mail-in or local-laboratory testing services.

- The test should determine total bacterial counts in the water after inoculating diluted chlorine-neutralized water samples onto agar plates and incubation the plates at room temperature.
- Dental professionals should keep water samples cold during transport if they are shipped to a laboratory for analysis.
- Dental professionals should recognize that these counts may not always precisely reflect the degree of biofilm in the lines, for this relationship has not been scientifically determined. Nevertheless, if high counts (≥ 500 CFU/mL) were obtained, the intended improvements are not working or be performed correctly.
- If correctly were obtained, the improvements are working, or the water analyzed did not reflect the actual state of the system. Thus, one may need multiple samples to confirm low counts.
- Use the laboratory's instructions for aseptically collecting the water samples.

Procedure for Sampling Dental Unit Waterlines:

- The manufacturer's recommendations for sampling dental unit waterlines should be strictly followed.
- **In the absence of the manufacturer's recommendations, the following steps should be applied:**
  - Dental units have dental waterlines supplying several instrument hoses, three-in-one air/water syringes, patient cup-filler, and cuspidor bowl rinse outlets. All these waterlines are interconnected.
  - Label sterile water bottles (usually 50-100 ml tubes/bottles containing neutralizers). The labeling information should contain details of each waterline to be sampled, the sender's reference, the date, and the sampling time.
  - Purge the 3:1 air/water syringe waterline, instrument hose waterline, patient cup filler waterline (where present), and cuspidor rinse waterline (where present) outlets of the dental unit for 2 minutes before collecting water samples.
  - Open the tube/bottle aseptically and collect 50 ml of water from each outlet.
  - Samples of water should also be taken from independent water reservoir bottles where used.
  - Store the water between 2 and 8℃ and return to the microbiology.
  - laboratory for analysis, ideally within 24 hours of collection.

- **If standards are not met when monitoring dental unit water (i.e., ≥ 500 CFU/mL), the following actions should be applied:**
  - The manufacturer's recommendations should be strictly followed.

- In the absence of the manufacturer's recommendations, the following actions should be applied:
  - Review work practices, waterline treatment protocols, and waterline treatment and monitoring records.
  - Correct any identified procedural problems, retreat the waterlines, and retest the dental unit.
  - If the test remains positive, a shock treatment of the waterlines may be indicated.
  - Many dental unit waterline product manufacturers offer guidance on initial or periodic shock treatments for the waterlines, which may include using a higher product concentration or an extended treatment time.
  - Cleaning or shocking the lines with diluted bleach (1-part household 6% bleach to 10 parts water) is another option.
  - If a unit consistently does not meet standards (i.e., ≥ 500 CFU/mL), contact the waterline treatment product manufacturer for guidance.

Dental Handpieces and Other Devices Attached to Air Lines and Waterlines:

Handpieces:

- Dental handpieces and other intra-oral devices attached to air or waterlines should be sterilized between patients.
- The only effective way of cleaning the lumen of a dental handpiece is to process it through a washer-disinfector, with each lumen connected to a flushing system.
- Surface disinfection or immersion in high-level disinfectants cannot safely process such devices.
- Furthermore, restricted physical access to the internal surfaces of the handpiece limits sterilization with chemicals; therefore, handpieces must be heat sterilized (autoclaved) between patients.
- Handpieces that cannot be sterilized should not be used.
- The manufacturer's instructions for cleaning, lubricating, and sterilizing handpieces and reusable prophylaxis angles should be followed to ensure effective sterilization and longevity of the instruments.
- Run high-speed handpieces to discharge water and air for at least 20 to 30 seconds after use on each patient. Use an enclosed container or high-velocity evacuation during discharge procedures to minimize the spread of spray, spatter, and aerosols.
- Remove handpieces and allow water lines to run and discharge water for several minutes to reduce overnight microbial accumulation at the beginning of each clinic day.

Reusable Intraoral Instruments Attached to, but Removable From, the Dental Unit Air or Water Lines:

- Clean and sterilize reusable intraoral instruments attached to, but removable from, the dental unit air or water lines (e.g., ultrasonic scaler tips and their parts and air/water syringe tips) in the same manner as handpieces after each patient's treatment. Then, follow the manufacturer's instructions for reprocessing.

Heat-Sensitive Instruments or Permanently Attached to Dental Unit Waterlines:

- Some dental instruments have heat-sensitive components or are permanently attached to dental unit water lines. Other instruments (e.g., handles or dental unit attachments of saliva ejectors, high-speed air evacuators, and air/water syringes) that do not enter the patient's mouth can become contaminated whit oral fluids during treatment procedures.
- These instruments should be covered with impervious barriers changed after each use or, if possible, clean and disinfect them by using approved MOH disinfectant and by following manufacturer instructions.

Preparation of Handpieces, Motors, and Couplings:

- New handpieces (including scalers) should be sterilized before being used for patient treatment for the first time.

Infection Prevention & Control Considerations in Dental Laboratory and Prosthodontics

Laboratory Asepsis:

- Any instrument or piece of equipment used in the oral cavity or on orally soiled prosthetic devices or impressions is a potential source of cross-infection.
- It is impossible to identify all infectious patients from medical histories or patient conversations. Therefore, the only valid posture is to assume (and act as if) all patients can transmit highly infectious diseases.
- The dental team must use the same criteria and techniques in all cases.
- If contaminated items were to enter the laboratory environment, infectious materials could be spread to the prostheses and appliances of other patients.

Protective Barriers:

- All items coming from the oral cavity must be disinfected or sterilized based on the manufacturer's instructions before being worked on in the laboratory and before being returned to the patients.
- Laboratory infection prevention & control involves, depending on need, wearing personal protective equipment (PPE), such as gloves, safety eyewear, gowns, and masks.
- Dental professionals must wear the required PPE when handling contaminated items.

- **A successful laboratory infection prevention & control program requires meeting two primary criteria:**
  - The use of proper methods and materials for handling and decontaminating soiled items and,
  - The establishment of a coordinated infection prevention & control program between dental clinics and laboratories.

Task-Specific Designation of Work Areas:

- The laboratory should have specified areas designated for particular tasks. Strict adherence to these designated purposes acts as a barrier system, reducing the potential for cross-contamination of a dental laboratory should include the following areas:
  - Receiving area.
  - Production area.
  - Shipping area.

Receiving Areas:

- The dental team should create a receiving area to handle all items sent to the laboratory or handled in the laboratory areas within the dental practice.
- The area needs running water and handwashing facilities.
- Covering the area and the counter surfaces with impervious paper and regularly cleaning and disinfecting the area is the best practice.
- The amount of cleaning and disinfection depends on the area's use rate or when required.
- No item (impression or prosthesis) should enter the receiving area until it has been appropriately disinfected.
- Dental professionals should use PPE when handling items received in the laboratory unit until the items have been disinfected. Such equipment includes gloves and gowns. In addition, protective eyewear may be needed to prevent contact with splashes.

Production Area:

- Separate areas should be designated for new work and repairs inside the production area.
- Full PPE should be used when handling these items, and every effort should be made to avoid cross-contamination from such items.
- All work surfaces should be cleaned and disinfected with a MOH-registered tuberculocidal disinfectant regularly but at least once or twice daily.
- Plastic wrap or another barrier can cover work surfaces.
- Any instruments, attachments, and materials to be used with new prostheses/appliances should be maintained separately from those to be used with prostheses/appliances that have already been inserted in the mouth.
- Equipment should be cleaned and disinfected or sterilized as appropriate, usually once or twice a day and after each case for repairs.
- Disposable items such as polishing wheels and brushes are available, eliminating the need to clean and disinfect reusable items.

Shipping Area:

- This area is designed for the final inspection, cleaning, and disinfection of prostheses and appliances.
- The disinfected devices should be shipped in a labeled and sealed plastic bag (information such as type of disinfectant used, disinfection method, and duration should all be mentioned).
- Disinfected acrylic items should be stored and shipped in a sealed bag containing diluted mouthwash.
- Disinfected items should never be shipped in sealed bags containing disinfectant.
- Only new packing material should be used to avoid cross-contamination.

Microbially Soiled Prostheses and Impressions:

- Any prosthesis from the oral cavity is a potential source of infection.
- Dental professionals should:
  - clean, disinfect, and rinse all dental prostheses and prosthodontic materials (e.g., impressions, bite registrations, and occlusal rims) using an Environmental Protection Agency–registered (EPA-registered) and approved MOH disinfectant having at least an intermediate level of activity (tuberculocidal claim) before handling the items in the laboratory.
  - consult with manufacturers regarding the stability of specific materials (e.g., impression materials) relative to disinfection procedures.

- wear gloves and protective outerwear when handling orally soiled prostheses until they have been appropriately disinfected.
- wear masks and protective eyewear when handling hazardous chemicals, such as disinfectants. Therefore, personal protective barriers and adequate ventilation should always be used.

- Eye/face protection is mandatory when using rotary or air-blasting cleaning equipment.
- Some heavily soiled (e.g., with calculus or adhesive) prostheses require cleaning or scrubbing before disinfection.
- **Placement of Prosthesis:**
  - The most efficient and safest procedure is to place the prostheses into zippered plastic bags containing ultrasonic detergent and then place the assembly into an ultrasonic cleaner (*see* **Figure 25**).
  - Dental professionals can use glass or plastic beakers or containers.
  - Suspend the bags by pinning them in place to the lid of the ultrasonic cleaner.
  - The goal is to position the bag near the middle of the cleaning solution.

Figure 25: Ultrasonic cleaning of the soiled prosthesis in a zippered plastic bag containing a detergent.

- Poorer cleaning occurs near the top and bottom of the solution pool. If further hand-scrubbing or cleaning is required, keep personal barriers in place.
- Use air-powered blasters, such as shell blasters, only on cleaned and disinfected prostheses.
- The team members must follow the same procedures when they receive prostheses from the dental laboratory.
- Prostheses that have been appropriately disinfected (treated and rinsed) can be returned to the patient's clinic in a deodorizing solution, such as a mouth rinse.
- Because of the increased risk for adverse tissue response (to the patient and the clinic staff), prostheses should never be sent out or returned in disinfectant solutions.

Grinding, Polishing, and Blasting:

- Laboratory work should be performed on previously disinfected impressions, appliances, and prostheses.
- Operation of a dental lathe allows the spread of infection and injury.
- When using the lathe, Dental professionals should wear protective eyewear, properly place the front Plexiglas shield, and ensure the ventilation system is operating correctly.
- The use of a mask is required.
- Maximum containment of aerosols and spatter can be achieved when a metal enclosure with hand holes is fixed to the front of the hood of the lathe.
- The lathe unit must be disinfected twice a day or when required based on manufacturer instructions.
- Fresh pumice and pan liners should be used for each case.

- **Polishing of appliances and prostheses before delivery:**
  - To avoid the potential spread of microorganisms, dental professionals should obtain all polishing agents (e.g., rouge) in small quantities from larger reservoirs.
  - Dental professionals should never return unused material to the central stock but should throw it away. Most polishing attachments (e.g., brushes, wheels, and cups) are single-use disposable items.
- Dental professionals should disinfect or sterilize reusable items between uses and according to the manufacturer's instructions.

- **Items that become contaminated but usually do not contact the patient:**
  - Dental professionals should follow the manufacturer's instructions for cleaning, disinfecting, or sterilizing items that become contaminated but usually do not contact the patient (e.g., burs, stones, polishing points, rag wheels, articulators, case pans, and lathes).

- Remember to protect against respiratory and eye contact with airborne particles when using gypsum, alginate, pumice, rouge, and microblasting materials.

Intermediate Cases:

- Complete and partial dentures often undergo an intermediate wax try-in stage. Crowns, splinted bridges, and partial denture frameworks often are "test seated" before cementation or soldering. These devices, like wax try-in step dentures, can become soiled with oral fluids.
- Before returning the items to the laboratory for further processing, dental professionals must disinfect them. In most cases, the procedures are the same as those described for completed projects. Practices should include specific information regarding the disinfection technique used (e.g., solutions used and length of disinfection) when laboratory cases are sent off-site and upon return.

The Use of Proper Methods and Materials for Decontaminating Soiled Items:

- **Steam Sterilization (Autoclave):**
  - Heat-tolerant items used in the mouth and on contaminated laboratory items and materials should be cleaned and sterilized before being used for another patient or laboratory case.

  - **Examples of such items are:**
    - Metal impression trays
    - Burs
    - Rag wheels
    - Polishing points
    - Laboratory knives
    - Facebow forks
    - Handpieces and Instruments
    - Polishing points
    - Water bath basins
    - Stainless steel bowels
    - Boley gauges
    - Metal rulers
    - Metal spatulas
    - Occlusal plane guides
    - Orthodontic pliers
    - Impression guns

- **Disinfection:**
  - For items that will come in contact with mucous membranes, but which are not used between patients (e.g., prostheses, custom trays, and occlusal and orthodontic appliances), intermediate- to high-level disinfection is sufficient if laboratory infection prevention & control protocols are adequate to prevent cross-contamination and based on manufacturer instructions.
  - However, items used between patients and contact with the mucous membranes must be sterilized between patients. Heat-sensitive semi-critical items should be sterilized with chemical sterilants or, at minimum, undergo high-level disinfection in the central sterilization department.
  - Items that do not usually contact the mucous membranes but frequently become contaminated and cannot withstand heat sterilization should be cleaned and disinfected between patients and according to the manufacturer's instructions. The spray-wipe-spray method with phenolics or iodophors can be used for such items.

- **Equipment particularly suited to this procedure are:**
  - Articulators
  - Face-bows
  - Lathes
  - Case pans
  - Pressure pots
  - Water baths
  - Shade guide (spray-wipe spray with phenolics or iodophors)
  - Wooden-handled spatulas
  - Rubber mixing bowls
  - Torch

- Contaminated materials and items used intra-orally that cannot be cleaned or sterilized are to be discarded, for example:
  - Plastic impression trays
  - Custom trays
  - Disks
  - Brushes
  - Waxes

- **Chemical Disinfectants:**
  - Only MOH-registered hospital disinfectants with a tuberculocidal claim should be used.

- It is essential to remember that most immersion disinfectants can only be used once before they should be discarded. Concentrations of solutions should be regularly assessed as dilutions will occur with time.
- Items should never be shipped or stored in chemical disinfectants.

Disinfection of Dental Impressions:

- Impressions should be cleaned and disinfected immediately after their removal from the mouth.
- Chair-side rinsing of impressions is the first step in successful infection control in the laboratory.
- Impressions should be rinsed under running water after being removed from the mouth to eliminate saliva and blood visibly.
- After rinsing, the impression should be disinfected using the appropriate material and method.
- Trimming the excess impression material from noncritical areas might reduce the number of microorganisms and organic debris present. Given the porosity of impression materials, recommended exposure times probably should be greater than those for hard surfaces.
- Impression materials marketed as containing a disinfectant still need to be rinsed and disinfected after removal from the oral cavity.

- **Disinfection Methods:**
  - The following techniques are recommended for disinfection of impressions:
  - Spraying Method.
  - Short-term Submersion.
  - Immersion Method.
  - **Spraying Method:**
    - The impression must be sprayed with disinfectant on all sides until thoroughly wet and then covered (wrapped with plastic or otherwise enclosed) to avoid drying and allow exposure for the recommended disinfection time.
    - Some disinfectants, such as glutaraldehydes, should never be sprayed, as the fumes may rapidly reach a lethal level. The fumes may also cause allergenic and other undesired reactions.

  - **Short-term Submersion:**
    - Short-term submersion is an alternative method to spraying.

- The impression is immersed in the disinfectant solution, gently swirled for less than a minute, and then kept in a closed plastic bag for the recommended disinfection time.

- **Immersion Method:**
  - The immersion method is the preferred method of disinfection unless contraindicated by the manufacturer's instructions.
  - The time for exposure to a particular disinfectant (i.e., the immersion time) should be at least that recommended by the product manufacturer for tuberculocidal disinfection.

- **Choice of Disinfectant for Impressions:**
  - No single disinfectant is compatible with all impression materials.
  - When selecting a disinfectant, the following should be considered:
    - the type of impression material
    - the disinfectants available in the dental clinic or laboratory, and
    - the number of impressions to be disinfected per day.
  - The tables below list the effect of various disinfectant treatments of impressions on the resultant cast dimensions.
  - Disinfectants should not be used repeatedly for disinfection of impressions unless they are approved for reuse.

- **When considering methods of disinfection for impressions, two factors must be addressed:**
  - The effect of the treatment on the dimensional stability and surface detail of the impression.
  - The effectiveness of the antimicrobial agent and the deactivating effect of the impression material on the disinfecting solution reduces the efficacy of the process.

Note:

- Dental materials manufacturers should be consulted regarding the compatibility with different disinfectants and disinfection methods not addressed in these guidelines.

- **Elastomeric Impressions:**
  - Polysulfide:
    - polysulfide impression material can be disinfected by immersion with most disinfectants recommended for dentistry without affecting accuracy and detail reproduction. Still, exposure time should be kept to a minimum of 10 minutes (*see* **Table 4**).

  - Silicones:
    - Addition silicone impressions can be disinfected by immersion with most disinfectants recommended for dentistry without affecting accuracy and detail reproduction (*see* **Table 5**).

  - Polyether:
    - Although hydrophilic, polyether impressions can be disinfected by immersion, exposure times should be kept to a minimum (10 minutes).
    - Therefore, polyether would not be the material of choice when complete sterilization is required.
    - Acceptable disinfectants for polyether impressions are listed in **Table 4**.

Table 4: Recommendations for Disinfection of Polyether Impressions

Accepted Disinfectant	Dilution	Time
Sodium hypochlorite 5.25%	1:10	10 minutes
Iodophors	1:213	10 minutes
Combination synthetic phenolics	1:32	10 minutes
Glutaraldehyde with phenolic buffer 2%*	1:16	10 minutes

The recommended method for disinfecting polyether impressions: Immersion (with caution) in an accepted disinfectant (not more than 10 minutes).

* Glutaraldehydes are discouraged because they are toxic and require special precautions.

  - Hydrocolloid Impressions:
    - **Irreversible Hydrocolloid (Alginate):**
      - If dimensional changes are to be avoided or minimized, spraying the surface of the impressions or short-term submersion would be the viable method of disinfecting irreversible hydrocolloid impressions.

- It is recommended to disinfect alginates by immersion (not more than 10 minutes) in diluted hypochlorite (*see* **Table 5**).

Table 5: Recommendations for Disinfection of Hydrocolloid Impressions

Accepted Disinfectant	Dilution	Time
Sodium hypochlorite 5.25%	1:10	10 minutes
Iodophors	1:213	10 minutes
Glutaraldehyde with phenolic buffer 2%*	1:16	10 minutes

The recommended method for disinfecting hydrocolloid impressions: Immersion (with caution) inan accepted disinfectant (not more than 10 minutes)

*Glutaraldehydes are discouraged because they are toxic and require special precautions.

- **Reversible Hydrocolloid:**
  - For reversible hydrocolloid impression materials, a further possible source of contamination is the water bath used for liquefying and conditioning.
  - Immersion in 2% alkaline glutaraldehyde has a significant adverse effect on the impressions and resultant dies.
  - Reversible hydrocolloids can be immersed in an iodophor for up to 30 minutes without losing clinically significant linear dimensional stability.
  - **Zinc Oxide Eugenol (ZOE) and Compound Impression:**
    - Zinc oxide eugenol impression materials may be disinfected by immersion in glutaraldehyde or iodophor.
    - The use of accepted disinfectants that require no more than 30 minutes for disinfection is preferred (*see* **Table 6**).
    - Spraying with phenolics, iodophors, or chlorine compounds can be used to disinfect impression compounds.

Table 6: Recommendations for Disinfection of ZOE

Accepted Disinfectant	Dilution	Time
Sodium hypochlorite 5.25%	1:10	10 minutes
Glutaraldehyde with phenolic buffer 2%*	1:16	10 minutes
2% Glutaraldehyde acidic*	1:4	30 minutes

The recommended method for disinfecting ZOE impressions: Immersion in an accepted disinfectant (for ≤30 minutes).

* Glutaraldehydes are discouraged because they are toxic and require special precautions.

Disinfection of Wax Bites, Wax Rims, Casts, Custom Impression Trays, and Bite Registration:

- **Bite Registration:**
  - Wax rims should be disinfected by the spray-wipe-spray method using iodophors or phenolics. Then, rinse-spray-rinse-spray, with most MOH- approved hospital-level tuberculocidal disinfectants, may be more appropriate for wax bites.
  - After the second spray, they can be enclosed in a sealed plastic bag for the recommended time.
  - These items probably should be rinsed again after disinfection to remove any residual disinfectant.
  - Chlorine compounds should not be applied to bite registration made of ZOE.

- **Stone Casts:**
  - It is difficult to disinfect casts without damaging the cast.
  - To minimize the adverse effects on the cast, casts to be disinfected should be fully set (24 hours after pouring).
  - Stone Casts can be disinfected by spraying until wet or immersing in a 1:10 dilution of sodium hypochlorite or an iodophor (Table 8).
  - Immersion of set die stone in a 1:10 sodium hypochlorite or 1:213 iodophor solution has shown no, or minimal, undesirable physical effects on the stone.
  - Casts should be rinsed after disinfection to remove any residual disinfectant and be allowed to dry completely before handling.
- **Impression Trays:**
  - Custom acrylic resin impression trays should be disinfected by spraying with a disinfectant or immersing in either 1:213 iodophor or 1:10 sodium hypochlorite (*see* **Table 7**).
  - They should be rinsed thoroughly to remove any residual disinfectant and allowed to dry fully before use.
  - After use in the mouth, custom trays should be discarded.
  - Metal trays should be steam sterilized after each use.

Table 7: Recommendations for Disinfection of Stone Casts and Custom Impression Trays (Acrylic)

Accepted Disinfectant	Dilution	Time
Sodium hypochlorite 5.25%	1:10	10 minutes
Iodophors	1:213	10 minutes

The recommended method for disinfecting stone casts and custom impression trays:

- Spraying until wet or immersion in an accepted disinfectant.
- Disinfectant for stone casts may be prepared using slurry water (saturated calcium sulfate)

Disinfection of Dental Prostheses and Appliances:

- Removable Prosthesis and Orthodontic Appliances. (*see* **Table 8**).
- Prosthodontic and orthodontic appliances should be disinfected before delivery and before
- Prostheses or appliances that have been worn by patients and require repair should be handled as contaminated (even after disinfection) and cleaned thoroughly before disinfection by scrubbing with a brush and an antiseptic handwash chairside or by cleaning in an ultrasonic unit.
- The best time to clean and disinfect prostheses or appliances is as soon as possible after removal from the patient's mouth before drying blood or another bioburden can occur.
- Severely contaminated prosthetic devices may have copious amounts of calculus and another tenacious bioburden. This material must be removed before attempts at disinfection. Otherwise, the decontamination process will not be effective.
- Immersion of the prosthesis in a beaker or plastic bag with stone and plaster removal solution, followed by placing it in an ultrasonic cleaner for 3 to 5 minutes, will remove most of the material. Cleaning and disinfection can then be performed.
- Denture cleansers, including those made for ultrasonic cleaning in the dental center, are cleaners and cannot substitute for appropriate disinfection. Some of these products now have limited antimicrobial activity; however, they cannot be assumed to eliminate all microorganisms.
- After cleaning, the appliance is immersed in the chosen disinfectant for a minimum of 10 minutes.
- The clinician must carefully rinse the appliance thoroughly with water before delivery.
- Prostheses should never be stored in a disinfectant before insertion.
- After disinfection and thorough rinsing, acrylic items can be stored in diluted mouthwash until inserted.

- **Orthodontic appliances**
  - These appliances can be handled similarly.
  - Any device immersed in a disinfectant should be rinsed thoroughly before delivery to the patient.

- **Fixed Prosthesis: refer to tables below.**
  - Fixed metal/porcelain prostheses are sterile following porcelain firing/glazing, but if they are not handled aseptically after this step, they must be disinfected before delivery to the patient.
  - However, care should be taken to minimize the exposure times of metals to potentially corrosive chemicals.
  - Unglazed porcelain should not be exposed to any disinfectant; the process of porcelain firing/glazing will sterilize the porcelain.
  - Fixed metal prostheses can be sterilized by autoclaving if desired.

Table 8: Disinfection of Dental Prostheses and Appliances

Appliances	Method	Accepted Disinfectant	Dilution	Time
Metal/acrylic All metal	Immersion/ spray until wet	Sodium hypochlorite 5.25%	1:10	10 minutes
		Iodophors	1:213	10 minutes
▪ Removable (acrylic/ porcelain) ▪ Removable (metal/ acrylic) ▪ Fixed (metal/porcelain)	Immersion	Sodium hypochlorite 5.25%	1:10	10 minutes
		Iodophors	1:213	10 minutes

Sterilization of Dental Impressions, Stone Casts, and Dental Prostheses and Appliances:

- Sterilization of impression materials, stone casts, and dental prosthesis and appliances have been recommended to minimize cross-contamination in the dental center.
- In addition to high-temperature sterilization (e.g., autoclave), low-temperature sterilization (e.g., hydrogen peroxide gas plasma and immersion in 2% glutaraldehyde for 10 hours), which is used for heat- and moisture-sensitive devices have been suggested for sterilizing dental impressions; casts; and dental prosthesis and appliances.

- At least one additional type of polyvinyl siloxane impression material is marketed as being autoclavable without affecting the impression reproducibility when used in a rigid reinforced polycarbonate impression tray or a metal tray.

Communication with the Dental Laboratory:

- The dental practitioner should communicate with the dental laboratory regarding infection prevention & control procedures used in the dental clinic.
- When a case is transported from and to the dental clinic or dental laboratory, DHCP should provide written information regarding the methods (e.g., type of disinfectant and exposure time) used to clean and disinfect the material (e.g., impression, stone model, or appliance); otherwise, the laboratory or dental clinic should assume that the case is contaminated and disinfect as appropriate.
- If a material or appliance is manipulated, a previously undetected area of blood or bioburden becomes apparent, cleaning and disinfection procedures should be repeated.
- Transportation of contaminated items should be in a closed, leak-proof container that is identified with a biohazard label.

Infection Prevention & Control in Endodontics:

Barbed Broaches:

- These instruments are difficult to clean, even with washing machines or ultrasonic cleaners. Therefore, barbed broaches should be used once and discarded.
- No attempt to clean or sterilize barbed broaches should be carried out.
- Endodontic Files:
- The manufacturer's instructions for decontamination and disposal of the endodontic instruments must be followed for proper management.
- **In the absence of manufacturing instructions, the following recommendations may be applied:**
  - Endodontic files should be wiped with sodium hypochlorite after each insertion inside the canals so they are submitted for sterilization without any visible debris.
- **Cleansing and Disinfection:**
  - The first sterilization step is removing blood and debris from the endodontic instruments. The debris consists of protein and residue of blood and dentinal.
  - Washing can be done manually with disinfectant liquid or an ultrasonic washer. The ultrasonic process is better than manual washing because it can break the organic component.

- **Disinfection of Root Canal Filling Materials:**
  - Materials used for sealing root canals are gutta-percha (GP). Before using the GP points in the canals, the GP points dipped into 5% Sodium hypochlorite sterilized the points.

- **Sterilization of Endodontic Instruments:**
  - After cleaning the instruments by manual washing or ultrasonic wash. The drying and wrapping should be done on all the instruments.
  - The most effective method for the sterilization of endodontic instruments is autoclaving.
  - Endodontic files may be sterilized in unit sets with gauze to avoid contaminating the entire contents of an endo box once it is opened.
  - The use of a single endo box for multiple patients is unacceptable, as the box's contents are considered potentially infected after it is opened.
  - To reduce the number of times the box contents are subjected to the sterilization cycle, single sets of files may be packaged individually inside autoclavable envelopes along with gauze to absorb the excess moisture and reduce the potential for corrosion.

- **Burs:**
  - Decontamination and Sterilization:
  - Diamond burs used in the endodontic process to remove caries and initial access cavity preparation after use can be dipped into the ultrasonic bath for 15 min. After that, an autoclave can prevent cross-infection with other patients.

Infection Prevention & Control Considerations in Orthodontics and Pediatrics Dentistry:

- There are no special considerations of infection prevention in Orthodontics and Pediatrics Dentistry.
- All the infection prevention & control precautions mentioned in this manual shall be applied in orthodontic and Pediatrics Dentistry.

Dental Radiology:

- Proper infection prevention & control methods and materials for dental radiology differ little from those used for procedures more likely to result in blood exposure, such as periodontal therapy, surgical procedures, and many restorative treatments.
- Consistent use of the most effective and efficient types of PPE—such as gloves, masks, gowns, and eyeglasses—decreases the chances of exposure to infectious agents.

- The team must use appropriate environmental covers and perform cleaning and disinfection.
- For dental radiology, only a limited number of items require sterilization. The team should use heat-tolerant or disposable intraoral devices whenever possible (e.g., film-holding and positioning devices) and should clean and heat-sterilize heat-tolerant devices between patients.
- A consistently appropriate level of personal and environmental protection must be extended.
- Proper hazardous materials management is based on continuous employee training and active participation to minimize exposure and possible injury.
- Employees must know which chemical components are hazardous, the location of the hazardous materials list in the clinic, the labeling system used to identify and describe hazardous chemicals, the warning signs present, and the location and proper use of safety data sheets.

Unit, Film, and Patient Preparation:

- Dental professionals must wear gloves when taking radiographs and handling oral soiled radiographic films.
- Because taking radiographs is a clinical activity, dental professionals must consider the protective gowns and masks worn for restorative procedures.
- Protective eyewear is a barrier against contact with patient fluids and prevents exposure to hazardous chemicals.
- Many of the items used to take radiographs are disposable. Few reusable items touch nonintact skin or mucous membranes or enter normally sterile body tissues. These items, however, still require sterilization.
- After cleaning, one sterilizes such materials by heat and reuses them. Because most of these reusable items can withstand sterilization temperatures, processing them in a steam autoclave or an unsaturated chemical vapor sterilizer is best.
- Heat-sensitive materials (e.g., some types of plastic) can be treated by immersion in a sterilant/high-level disinfectant according to the manufacturer's instructions.
- **Environmental infection prevention & control:**
  - Cleaning and disinfection and the use of barriers are required.
  - Barrier protection is preferred when such an item would be impossible to disinfect properly. However, the placement of plastic drapes, bags, or tubing over the X-ray unit (tube head, arm, and cone), chair headrest, and control panel probably is better than disinfection because of the numerous and large surfaces touched during the process (*see* **Figure 26**).

Figure 26: Use of plastic cover to protect commonly touched surfaces from contamination.

Taking of Radiographs:

- Exposed films must be oriented to differentiate them easily from unused films. A possible solution is to place exposed films into a disposable plastic cup or onto a labeled paper towel. (*see* **Figure 27**)

Figure 27: Removal of the protective plastic cover from an exposed film packet.

- Environmental surfaces should be protected from contamination by using barriers, cleaning, disinfection, or a combination.
- Dental professionals must clean and disinfect contaminated surfaces that are not covered.
- Items like control panel knobs and buttons are best covered because of their shape and design. Spraying disinfectant into such areas may cause electricity shortages.

Digital Radiographic Sensors:

- Unlike X-ray films, digital sensors are used repeatedly on multiple patients. Most, if not all, of these digital sensors cannot be heat-sterilized or chemically disinfected. In these cases, the only alternative is to prevent the sensor from becoming contaminated. This is accomplished using a disposable plastic surface barrier over the sensor and part of the attached wire (unless the sensor is wireless)
- Barriers should always be used as covers.
- Consult with the sensor manufacturer for proper covering or decontamination of the particular type of sensor and computer hardware being used.

Darkroom Activities:

- Dental professionals should:
  - Transport exposed films to the darkroom in a plastic cup or folded paper towel but never in a clinic gown or jacket pocket.
  - Avoid touching surfaces, such as doors, tabletops, or film processing equipment, with soiled gloves during transport.
  - Open the films onto a new paper towel or sheet using disposable gloves and drop them out of the packets without touching them.
  - Accumulate the contaminated packets in a disposable towel or a cup, and after opening all packets, discard the packets and remove the gloves.

- Dental professionals should manually wash their hands and develop the films or use an automatic processor.
- To prevent artifacts, Dental professionals should avoid contact between gloves and uncovered film.
- Use of radiographic films in pouches has distinct infection prevention & control advantages. If one opens the pouches carefully in the clinic settings or the darkroom, one finds exposed

but unsoiled film packets. Testing indicates that, when properly placed, the covers do not allow penetration of fluids.

Daylight Loaders:

- The only aseptic way to use these units is to insert only disinfected or unsoiled film packets (formerly in pouches) into the unit and use powder-free gloves.
- Dental professionals can group film packets into plastic cups and place them inside the daylight loader.
- One can place unwrapped films into another clean cup or a paper towel.
- After one has opened all films, dental professionals can collect the waste packet wraps in a cup. Then, using a bare hand, dental professionals can pick up the films by the edges and feed them into the processor.
- Manual processing requires gloved hands and clips to submerge the films.

Waste Management:

- Orally soiled disposable items, such as gloves, paper towels, or X-ray film covers, are, in most locations, not considered to be infectious, so they are not regulated medical waste.
- This means such items do not require special handling, storage, or neutralization procedures before disposal, and the approved national regulations for these types of waste must be followed.

Aseptic Techniques

Touching as Few Surfaces as Possible:

- Dental professionals should touch as few surfaces as possible with saliva- or blood-coated fingers.
- Any surfaces that may be touched should be protected with surface barriers or cleaned and disinfected.
- Dental professionals should make every effort to dispense all items needed at the chairside before patient treatment begins.
- Removal of contaminated gloves or using an over glove before leaving the chairside during patient treatment is the best practice.
- Dental professionals should put on gloves or carefully remove and discard over gloves when returning to the chairside. Another alternative is to have an uninvolved person retrieve items

needed unexpectedly during patient treatment, which is particularly important during some types of surgery (e.g., implant surgery).

- Dental professionals should not rub the eyes, skin, or nose or touch hair with contaminated gloved hands.

Donning and Doffing Personal Protective Equipment (PPE):

- Aseptic techniques should be used when donning and doffing gloves, mask, protective eyeglasses, and protective gown. These techniques include:
  - Put on gloves last when donning PPE to avoid spreading unnecessary contaminates to the patient's mouth.
  - Remove gloves or gloves and gown first when doffing PPE because gloves are highly contaminated and can spread microbes to any surface touched.
  - When removing protective clothing, eyewear and mask, do not touch the fronts of these items. For example, the gown is removed by unfastening ties in the back, pulling the gown away from the neck, shoulders, and arms by touching only the inside of the gown and turning the gown inside out.
  - For protective glasses or face shields, touch only the ear rests or headband.
  - For a mask, touch only the elastic bands or ties. If hands become contaminated, stop, and perform hand hygiene.

Minimization of Dental Aerosols and Spatter:

- Minimizing the generation of dental aerosols and spatter by using high-volume evacuation and the rubber dam and correctly positioning the patient's head reduces the spread of microbes from the patient's mouth.

High-Volume Evacuation:

- High-volume evacuation (HVE) during the use of rotary equipment and the air/water syringe significantly reduces the escape of salivary aerosols and spatter from the patient's mouth.
- The HVE system should be cleaned by evacuating a detergent or water-based disinfectant-detergent through the system at the end of the day.
- The trap in the system should be removed and cleaned periodically. A safer approach, however, is to use a disposable trap. These traps may contain scrap amalgam that should be disposed of properly. The dental team members must wear gloves, masks, protective eyewear, and gown when cleaning or replacing these traps to avoid contact with patient materials in the lines from splashing and direct contact. Disinfection of the trap by

evacuating some disinfectant-detergent down the line, followed by water, is best before one cleans or changes the trap.

Saliva Ejector:

- Suctioned fluids might be retracted into the patient's mouth when a seal around the saliva ejector is created (i.e. when the patient closes their lips around the ejector tip).
- Reverse flow should not be allowed to happen. Thus, Dental professionals should not tell patients to close their lips around the ejector and "spit" into the tip.
- Never position the vacuum line above the patient's head, for this could allow the flow of materials in the line toward the tip.
- Some disposable saliva ejector tips now have a one-way valve preventing reverse flow.

Use of the Rubber Dam:

- The rubber dam serves as a protective barrier for the patient from dental unit water.
- Simultaneous use of High-volume evacuation (HVE) and the rubber dam provides the best approach to minimize dental aerosols and spatter.
- Even though the rubber dam and HVE significantly reduce the salivary aerosols and spatter, one still must use gloves, a mask, protective eyewear, and a gown when using these aseptic techniques.

Pre-procedure Mouth Rinse:

- The patient's use of an antimicrobial mouth rinse before dental procedures is based on reducing the number of oral microorganisms. This reduction also lowers the number of microorganisms that may escape a patient's mouth during dental care through aerosols, spatter, or direct contact.
- Use of nonantimicrobial mouth rinses allows the oral microorganisms to return to their original levels before most dental procedures are completed, thus having little infection prevention & control value.
- Mouth rinsing may be the only approach to minimizing contamination from aerosols and spatter during such procedures.

Use of Disposables:

- A disposable item is manufactured for a single use or use on only one patient.

- An item labeled as disposable must be disposed of properly after use, and Dental professionals should not attempt to preclean and sterilize or disinfect it for reuse on another patient.

Injection Practices:

- Safe injection practices help prevent the transmission of disease agents between one patient and another or between a patient and dental health care worker during the preparation and administration of parenteral (e.g., intravenous or intramuscular injections) medications.

Single-Use (Disposable) Devices:

General Recommendations:

- Use single-use devices for one patient only and dispose of them appropriately.
- Single-use devices in dentistry (e.g., needles, prophylaxis cups and brushes, and plastic orthodontic brackets.) should be discarded post use immediately.
- Certain items (e.g., prophylaxis angles, saliva ejectors, high-volume evacuator tips, and air/water syringe tips) are commonly available in a disposable form. They should be disposed of appropriately after each use.
- Handle disposable items aseptically.
- Dispense disposable items in small amounts (i.e., unit dose) sufficient for the care of one patient before treatment begins and discard whatever is not used.

Oral Surgical Procedures:

- Surgical hand antisepsis should be performed by using an antimicrobial product (e.g., antimicrobial soap and water, or soap and water followed by alcohol-based hand scrub with persistent activity) before donning sterile surgeon's gloves.
- Dental Unit Water should not be used as an irrigate for oral surgery. The fluid used to irrigate surgical wounds and during surgical procedures should be sterile water or saline solution.
- Use devices specifically designed for delivering sterile irrigating fluids (e.g., single-use disposable products).
- Oral surgeries may involve the use of sterile water delivery systems or hand irrigation using sterile water in a sterile disposable syringe.

Handling of Biopsy Specimens:

- To protect persons handling and transporting biopsy specimens, each specimen should be placed in a sturdy, leakproof container with a secure lid for transport.
- If the outside of the container becomes visibly contaminated, it should be cleaned and disinfected or placed in an impervious bag. In addition, the container should be labeled with a biohazard symbol during storage, transportation, shipment, and disposal.

Waste Management:

- The effective management of healthcare waste must consider the essential elements of waste, and medical waste management policy & procedure should be based on nationally approved regulations, which include:
  - Segregation.
  - Collection.
  - Storage.
  - Transport.

- **Segregation of hazardous healthcare waste inside the healthcare facility:**
  - A segregation plan that includes staff training on waste segregation must be developed.
  - Considering the transmission routes for infection, appropriate healthcare waste segregation requires that:
    - Waste should be placed in containers (e.g., bins, boxes, disposable solid bags) to prevent direct contact.
    - Containers should be kept covered to prevent contact with the open air.
    - Sharps and potentially infectious waste should be kept in separate containers in each medical area and located well away from patients.
    - Sharps containers should be clearly labeled.
    - A color-coding system should be established to differentiate between general and hazardous healthcare waste.

  - Each healthcare waste generator must segregate hazardous from non-hazardous waste at the generation site (e.g., clinics, laboratory, CSSD, radiology department).
  - The waste generator holds the responsibility of segregating and collecting waste in containers specially made for this purpose within the health care facility and its departments as follows:

- **Non-Hazardous Healthcare Waste (General Waste):**
  - This type of waste must be collected in black plastic bags.
  - It should be treated separately and must be segregated from the hazardous healthcare waste in all stages (packaging, collection, and transporting inside the facility and storage) until it joins the stream of domestic refuse or municipal solid waste and is transported to the final disposal places in the landfill (e.g., municipal landfill).

- **Infectious Waste:**
  - This type of waste is collected in yellow-colored plastic bags bearing the phrase "Hazardous Healthcare Waste" (in Arabic and English) along with the biohazard logo.
  - It, therefore, needs to be packaged in bags compatible with the proposed treatment process.

- **Sharps Wastes:**
  - This type should all be collected, regardless of whether or not they are contaminated.
  - They are to be disposed of in color-coded containers (usually made of high-density plastic), fitted with covers and bearing the phrase "Hazard - Sharp Items" (in Arabic and English) and the biohazard logo.
  - The containers should be rigid, leakproof, and puncture-proof.

- **Dental Amalgam:**
  - Amalgam waste, amalgam capsules, and extracted teeth that contain amalgam restorations should not be placed in biohazard containers, infectious waste containers, or regular garbage.
  - Amalgam waste should not be flushed down the drain or toilet.
  - Devices containing amalgam should not be rinsed under running water over drains or sinks as this could introduce dental amalgam into the waste stream.
  - All contact and non-contact scrap amalgam should be salvaged and stored in separate, appropriately labeled containers.
  - Amalgam waste should be stored in a wide-mouthed, covered, rigid plastic container.

- **Radiographic Fixer and Developer Solutions:**
  - Used radiographic fixer, the solution left over from X-ray processing, and developer solutions are classified as hazardous chemical waste.
  - X-ray developer and used X-ray fixer should not be mixed.
  - The silver-laden used X-ray fixer cannot be flushed down the drain.

- If an X-ray developer is accidentally mixed with a used X-ray fixer, the mixture must be disposed of through waste treatment and disposal facilities.
- Waste radiographic developer and fixer solutions should be stored in leak-proof containers and collected by a suitably licensed company or waste facility for material recovery based on nationally approved regulations.

- **Lead Foils, Shields, and Aprons:**
  - Any packaging containing residues of or contaminated by dangerous substances is classified as hazardous waste. In dentistry, this includes the lead foil present in radiographs.
  - The lead foil that shields X-ray film, protective lead shields, and lead aprons should not be placed in the trash or biohazard bags. Instead, suitable licensed or permitted waste treatment and disposal facilities should dispose of them.
  - Manufacturer recommendations should be followed for recycling possibilities for lead aprons that become worn out or damaged.
  - Documentation should be obtained from the company handling the lead waste confirming that the waste has been disposed of properly.

- **Chemical Sterilant Solutions:**
  - The label directions on the product container should be followed for guidance.

- **Collection/Transportation Within the Health Care Facility:**
  - Collection and transportation of bags/containers of hazardous healthcare waste within the healthcare facility require using specially designed trolleys or carts and well-trained janitorial/medical waste staff dedicated solely to that purpose.
  - Healthcare waste should be collected regularly to reduce its build-up in the facility and transported to the designated central storage site or waste transfer station.
  - If clinical waste is stored outside the practice for collection, it must be secure and not accessible to outside interference.
  - Suggested collection frequency is once every clinical session or as often as necessary.
  - Time of collection should be at the end of the clinical session.
  - Before collection and transportation of bags/ containers of hazardous healthcare waste, they should be fully sealed and locked, and it should be made sure that they have the data sticker that reveals their contents, as well as the presence of proper hazard identification and its related labeling including the biohazard logo.
  - Waste bags should not be filled with more than ¾ of their capacity and should not be pressurized or compacted.

- All hazardous healthcare wastes should be collected in double bags. Bags should not be closed by stapling and, when doubled, should be tied separately.
- Waste bags should not be held close to the collector's body or from their bottom.
- Bags should only be held at the top when handling. The bags or containers should be replaced immediately with new ones of the same type. A supply of new collection bags or containers should be readily available at all locations where waste is produced.
- When hazardous healthcare waste spills or leaks out of plastic bags, containers, or trolleys, such waste must be considered highly hazardous. This requires immediate action.
- Cleaning, disinfection, and safety measures must be taken when and where leakage is identified.
- Trolleys for collecting and carrying hazardous healthcare waste are to be cleaned, washed, and disinfected daily with an appropriate disinfectant, by trained janitorial staff, under the supervision of the person responsible for hazardous healthcare waste in the healthcare facility, and in a particular location.

- **Temporary Storage Inside the Health Care Facility:**
  - The bags or containers of waste should be stored in a designated area, room, or building of a size appropriate to the quantities of waste produced and the frequency of collection.
  - In cases where the health care facility lacks space, daily collection and disposal should be enforced.
  - The hazardous waste and domestic waste should have different storage rooms. If not possible, a hard barrier made of impenetrable material should separate the hazardous and non-hazardous waste.

- **Requirements of the storage area:**
  - The area should be:
    - located within the health care facility to be a temporary collection site/center for the health care hazardous waste generated by that health care facility.
    - location should be appropriate and cause no pollution or harm to human health or the environment.
    - located away from dental clinics and direct patient care areas, laboratories, operation rooms, or public access areas.
    - easily accessible for storage, transport, and cleaning.
    - equipped with safety and fire protection tools and an emergency kit.
    - equipped with proper lighting, ventilation, and air conditioning, with temperature monitoring.
    - should have a water supply for cleaning purposes.

- equipped with the necessary PPEs; waste bags or containers; and cleaning tools and supplies for frequent cleaning of the area, spills, and any other emergency cleaning needs.
- managed by competent personnel specialized in handling hazardous healthcare waste.
- only store waste filled in the recommended containers or plastic bags.
- Access should be restricted to authorized personnel only.
- The entry should have a clear hazard sign that states the storage contents (in Arabic and English), e.g., "CAUTION: BIOHAZARDOUS WASTE STORAGE AREA-UNAUTHORIZED PERSONS KEEP OUT."
- It should be possible to lock the storage area to prevent access by unauthorized persons.

- **Transporting Hazardous Healthcare Waste**
  - If the generator of hazardous healthcare waste needs to transport such waste to another site outside the facility in which it was generated.
  - The generator is responsible for the implementation of all the following procedures related to the transportation of such waste:
  - Packaging hazardous healthcare waste and labeling it correctly by the "Segregation of Hazardous Healthcare Waste Inside Health Care Facility" and "Data Stickers" sections.
  - Taking adequate steps to ensure the waste is managed safely and securely.
  - Refraining from delivery of such waste for transport outside the facility without an attached manifest paper or consignment notes.

Handling of Extracted Teeth:

Extracted adult and deciduous teeth are considered human tissues and regulated medical waste within the dental center.

Storage and Disposal:

- Place extracted teeth in a biohazard-labeled container in the dental office and dispose of them by local laws &regulations.
- Extracted teeth can be returned to the patient on request. Teeth given to patients should be cleaned of blood and gross debris and placed in a plastic bag or another sealed container. Patients and caregivers should be advised not to open the container or discard the tooth until they return home.

- Because dental amalgam contains silver and mercury, extracted teeth containing amalgam should not be placed in a medical waste container if the contents will be incinerated or placed in a landfill that may leach heavy metals into groundwater.

Teeth Used in Educational Settings:

- Extracted teeth used in preclinical educational training should be cleaned of visible blood and gross debris, surface-disinfected, and maintained in a hydrated state in a well-constructed container with a secure lid to prevent leaking during transport. The container should be labeled with a biohazard symbol.

Management of Occupational Exposures to Blood and other Body Fluids

Occupational Exposure to Bloodborne Pathogens:

- **Occupational exposure to bloodborne pathogens** in dentistry is defined as a percutaneous injury (e.g., a needlestick or cut with a sharp object) or contact of mucous membranes, eyes, or non-intact skin (e.g., exposed skin that is chapped, abraded, or with dermatitis) with blood, saliva, tissue, or other body fluids that are potentially infectious.
- Although vaccines play an important role in infection prevention, vaccination alone is not enough because not all bloodborne pathogens are vaccine-preventable (e.g., HIV and HCV).
- Occupational exposure to blood and saliva may occur in several ways:
  - Parenteral exposure because of piercing because of piercing the skin with a sharp item (e.g., hypodermic needle, suture needle, scaler, scalpel, or endodontic file)
  - Contact with oral and nasal mucous membranes or conjunctiva (e.g., blood splashes, droplets, or contaminated hands)
  - Contact with non-intact skin (e.g., chapped skin, dermatitis, or wounds)
  - Occupational transmission of HBV, HCV, and HIV following parenteral exposure has been documented in healthcare settings.

- The risk of acquiring an HBV infection following a single puncture with a needle contaminated with the virus ranges from 6% to 30%. Under similar circumstances, the risk of HCV or HIV infection is approximately 3% and 0.3%, respectively.
- Since HBV can remain infectious in dried blood for up to one week, infections may have resulted from direct or indirect contact with blood or other body fluids.
- Not all exposures result in infection.

The risk of transmission of HBV, HCV, and HIV, as well as other pathogens, is influenced by several factors, including:

- Route of exposure
- Parenteral, mucosal, conjunctival, or non-intact skin exposure
- Direct contact, splash, droplet, hollow-bore needle, or solid, sharp instrument.

The quantity of the virus transferred during an exposure incident is estimated considering the following factors:

- Source infection status and viral load.
- Volume of blood or other potentially infectious materials (OPIM) involved in the exposure (e.g., blood, saliva, pus, or a mixture of blood and OPIM).
- Depth of the injury (e.g., superficial scratch or abrasion, cut involving only skin, or deeper injury or needlestick involving subdermal tissues).
- Susceptibility of the exposed dental team member (vaccination status for HBV and tetanus, immune-compromised status).
- Hollow-bore needles and larger volumes of blood pose a greater risk for infection than injuries caused by solid sharps such as explorers, scalers, or endodontic files.
- Providing accurate and descriptive documentation of injuries and estimated exposure to blood or OPIM to qualified health professionals providing post-exposure management helps ensure appropriate care is rendered to avoid infection.

Preventing Occupational Exposures to Bloodborne Pathogens:

- Bloodborne pathogens are disease-producing microorganisms spread by contact with blood or other body fluids contaminated with blood from an infected person. Examples include HBV, HCV, and HIV.
- Methods to reduce the risk of blood contact in the dental setting include standard precautions, including engineering and work practice controls.

Provide Immediate Care to the Exposure Site:

- **Percutaneous Injuries (Needlestick/ Sharp Injury)**
  - Wash wounds and skin with soap and water.
  - Do not squeeze wounds.

- **Mucocutaneous Exposures (Body Fluid Exposure):**
  - Remove contaminated protective equipment (if necessary).
  - Irrigate the affected area with copious amounts of water (10 minutes).

Reporting of Exposures:

- **All percutaneous injuries and mucocutaneous exposures must be reported. The incident report should include the following:**
  - The date and time of exposure.
  - Details of the procedure being performed, including where and how the exposure occurred and whether the exposure involved a sharp device, the type and brand of device, and how and when during its handling the exposure occurred.
  - Details of the exposure, including its severity and the type and amount of fluid or material. For example, the severity of a percutaneous injury might be measured by the depth of the wound, a gauge of the needle, and whether the fluid was injected. In addition, the estimated material volume, contact duration, and skin condition should be noted for skin or mucous membrane exposure. Other considerations involve documenting whether the skin was chapped, abraded, or intact.
  - Details regarding whether the source material was known to contain HIV or other BBPs, and if the source was infected with HIV, the stage of disease, history of antiretroviral therapy, and viral load, if known.
  - Details regarding the exposed person (e.g., HB vaccination and vaccine-response status).
  - Details regarding counseling, post-exposure management, and follow-up.
  - Exposed personnel should attend the employee health clinic (EHC) during regular working hours or the emergency room (ER) after hours.

- **It is the responsibility of the Employee Health physician to take the history from the DHCP and document the details. History to include:**
  - Mechanism of injury.
  - Site of injury.
  - Amount and type of blood/body fluid and an indication of the severity of the exposure, e.g., degree of penetration of the needle, inoculation.
  - Immediate action taken (first aid).
  - Source patient serology status.

- **It is the responsibility of the EHC/ER physician to request the following baseline lab investigations (as required) on the DHCP after obtaining consent and/or counseling:**
  - HBsAg
  - Anti-HBs
  - Anti-HCV
  - Anti-HIV.

- The incident report should be taken for physician documentation.
- The injury should be reported within (24) hours of the incident for risk assessment and prophylaxis where indicated. Since the documentation of any exposure management is essential to support future compensation claims, the notification must be made within 72 hours.
- All DHCP should report to the employee health clinic despite attendance at the emergency room, as the EHC physician is responsible for determining the need and type of follow–up.

Evaluating the Exposure:

- Each occupational exposure should be evaluated individually.
- This evaluation should be based on the following:
  - the type and amount of body substance involved.
  - the type of exposure (e.g., percutaneous injury, mucous membranes or non-intact skin exposure, bites resulting in blood exposure to either person involved).
  - The infection status of the source; and
  - The susceptibility of the exposed person.
- In the event the source individual cannot be identified because of certain types of accidents, such as an employee being injured while cleaning instruments from multiple patient appointments, or if the source cannot be tested, the circumstances of the exposure incident should be assessed by the qualified health professional to determine the likelihood of transmission of HBV, HCV, or HIV.
- Decisions regarding appropriate management should be handled on a case-by-case basis.
- Certain situations and the type of exposure may suggest an increased or decreased transmission risk. For example, it is helpful to know:
  - Where and under what circumstances did the accident occur?
    - Exposure to a visibly bloody device would suggest a higher-risk exposure than exposure to an instrument processed through a washer-disinfector.

  - What is the prevalence of HBV, HCV, or HIV in the population?
    - An exposure that occurs in a geographic area where injectable-drug use is prevalent or in an AIDS unit would be considered epidemiologically to have a higher risk for transmission than one that occurs in a facility where no known HIV-infected patients are present.

- Testing of needles and other sharp instruments implicated in an exposure, regardless of whether the source is known or unknown, is not recommended. This is because the

reliability and interpretation of findings in such circumstances are unknown, and testing might be hazardous to individuals handling the contaminated sharp instrument.

Prophylactic Treatment:

- When prophylactic treatment with drugs, vaccines, or immune globulins is necessary, it should be offered, and personnel should be informed of the risk of infection, alternative means of prophylaxis, degree of protection provided by the therapy, and potential side effects.
- Hepatitis B (HBV) prophylaxis, when indicated, should be initiated within (48) hours of the exposure incident and no later than seven days.
- No post-exposure prophylaxis or vaccination is available for Hepatitis C (HCV).
- HIV prophylaxis, when indicated, should be initiated as soon as possible following exposure and no later than 24 hours.
- **Recommendation of drugs as a component of a post-exposure management plan:**
  - HBV:
    - In **Table 9** summarizes the recommendations for PEP following exposure to HBV.
    - Hepatitis B immune globulin (HBIG) and/or the HB vaccine may be recommended depending on the source person's infection status, the exposed person's vaccination status, and (if vaccinated) their response to the vaccine. Post-exposure treatment should begin immediately after exposure, preferably within 24 hours and no later than seven days.

  - HCV:
    - There is no post-exposure treatment that will prevent HCV infection. However, it's recommended to do the following:
    - Perform testing for anti-HCV and certain liver enzymes 4-6 months after exposure.
    - Perform HCV RNA testing at 4-6 weeks if an earlier diagnosis of HCV infection is desired.
    - Confirm repeatedly reactive anti-HCV enzyme immunoassays with additional tests.

Table 9: Recommended post-exposure prophylaxis (PEP) for exposure to HBV

Vaccination and antibody response status of exposed workers	Source HBsAg positive	Source HBsAg negative	Source unknown or not available for testing
Unvaccinated	HBIG and initiate HB vaccine series	Initiate HB vaccine series.	Initiate HB vaccine series.
Previously vaccinated			
Known responder	No treatment	No treatment	No treatment
Known non-responder	HBIG × 1 and initiate revaccinationor HBIG × 2	No treatment	If a known high-risk source, treat it as if the sourcewere HBsAg-positive
Antibody response unknown	Test exposed person for anti-HBs • If adequate, no treatment is necessary. • If inadequate, administerHBIG × 1 and vaccine booster	No treatment	Test exposed person for anti-HBs • If adequate, no treatment is necessary. • If inadequate, administer vaccinebooster and recheck titer in 1-2 months

- HIV:
  - In **Table 10** summarizes the recommendations for PEP following exposure to HIV.
  - Treatment should be started as soon as possible, preferably within hours (instead of days) after the exposure.
  - Starting treatment after a more extended period, such as one week, may be considered for exposures that represent an increased risk of transmission.
  - The exposed person should be reevaluated within (72) hours so that drug regimens can be altered as additional information becomes available. If a source patient is determined to be HIV-negative, PEP should be discontinued.

Table 11: Recommended post-exposure prophylaxis (PEP) for exposure to HIV

Infection status of the source					
Exposure Type	**HIV-positive, class 1**	**HIV-positive, class 2**	**Source of unknown HIV status**	**Unknown source**	**HIV-negative**
Less severe	Recommended basic 2-drug PEP	Recommend expanded. 3-drug PEP	Generally, no PEP is warranted; however, consider basic 2-drug PEP for sources with HIV risk factors.	Generally, no PEP is warranted; however, consider basic 2-drug PEP in settings where exposure to HIV-infected persons is likely.	No PEP warranted
More severe	Recommended expanded 3-drug PEP	Recommend expanded 3-drug PEP	Generally, no PEP is warranted; however, consider basic 2-drug PEP for sources with HIV risk factors.	Generally, no PEP is warranted; however, consider basic 2-drug PEP in settings where exposure to HIV-infected persons is likely.	No PEP warranted

- **Perform follow-up testing and provide counseling:**
  - Advice exposed persons to seek medical evaluation for any acute illness occurring during follow-up.
  - HBV exposures:
    - Test for anti-HBs 1-2 months after the vaccine series or booster's last dose.
    - Follow-up is unnecessary if the exposed person is immune to hepatitis B or received HBIG PEP.

- HCV exposures:
  - Perform testing for anti-HCV and ALT 4-6 months after exposure.
  - Perform HCV RNA testing at 4-6 weeks if an earlier diagnosis of HCV infection is desired.
  - Confirm repeatedly reactive anti-HCV EIAs with additional tests.

- HIV exposures:
  - Evaluate exposed persons taking PEP within 72 hours after exposure and monitor for drug toxicity for at least two weeks.
  - Perform HIV-antibody testing for at least six months post-exposure (e.g., at baseline, six weeks, three months, and six months).

- Perform HIV antibody testing for illness compatible with acute retroviral syndrome.
- Advice exposed persons to use precautions to prevent secondary transmission during the follow-up period.

Documentation:

- The incident should be appropriately documented in the confidential medical records of the DHCP.

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Glossary

- **Airborne Pathogens** are transmitted by inhaling contaminated droplets or aerosolized particles into the respiratory tract (e.g., *Mycobacterium tuberculosis*) or by contact with oral or respiratory tract mucosa or possibly conjunctiva (influenza virus, SARS-CoV-2).
- **Allergic contact dermatitis (type IV hypersensitivity)** is an allergic condition resulting from exposure to accelerators and other chemicals used in the manufacture of rubber gloves (e.g., natural rubber latex, nitrile, and neoprene), as well as from other chemicals used in dental practice (e.g., methacrylates and glutaraldehyde).
- **Bloodborne Pathogens** are infectious agents that can be transmitted by exposure to blood or other potentially infectious materials (OPIM). (See also **OPIM**.) Hepatitis B, hepatitis C, and HIV are examples of bloodborne pathogens of most significant concern in dental settings.
- **Boil water advisories** are issued when water systems are contaminated with pathogenic bacteria (e.g., E. coli and related coliforms) or pathogenic protozoa (e.g., *Cryptosporidium, Giardia*) due to breaches in water mains, treatment system failures, excessive storm runoff, or flooding.
- **Chemical sterilants** are products that can kill all bacterial endospores when used according to label instructions. In addition, most chemical sterilants can be used as high-level disinfectants at shorter contact times.
- **Cleaning** is the removal, usually with detergent and water or enzyme cleaner and water, of adherent visible soil, blood, protein substances, microorganisms, and other debris from the surfaces, crevices, serrations, joints, and lumens of instruments, devices, and equipment by a manual or mechanical process that prepares the items for safe handling and/or further decontamination.
- **Contact Precautions** are used to prevent the spread of multi-drug resistant organisms (e.g., MRSA and VRE) or highly infectious diseases like Ebola Fever among hospitalized patients and HCP by contaminated hands and patient care equipment.
- **Decontamination** is “the use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.”
- **Disinfection** is a process that can inactivate most vegetative microorganisms but does not always kill *Mycobacterium tuberculosis* or bacterial endospores. Therefore, disinfection is less lethal than heat or chemical sterilization processes, and disinfected items should not be considered safe for critical items.
- **Do not drink advisories** are issued when water is contaminated with chemicals such as lead or toxins like PCBs, and boiling will not make it safe to drink.

- **Droplet and airborne precautions** in dental settings are intended to avoid transmission of epidemiologically essential diseases spread by exposure of the oral and nasal mucosa and pulmonary system.
- **Engineering Controls** reduce or eliminate workplace hazards with minimal or no DHCP intervention. They are the most effective method to minimize occupational exposure to blood through sharp instruments and needles. These controls often incorporate safer designs of instruments and devices (e.g., self-sheathing anaesthetic needles, intravenous cannulas, and scalpels) to reduce percutaneous injuries.
- **Environmental surfaces:** surfaces or equipment that do not routinely contact the patient or are handled by DHCP during treatment.
- **Exposure incident** is a specific eye, mouth, other mucous membranes, non-intact skin, or parenteral contact with blood or other potentially infectious materials (OPIM), as defined in the OSHA Bloodborne Pathogens Standard, results from the performance of a worker's duties.
- **High-level disinfectants** are immersion disinfectants that kill all microbial pathogens, except large numbers of bacterial endospores when used according to label instructions. In addition, some high-level disinfectant products may be classified as chemical sterilants when used at extended contact times according to label instructions.
- **High-level thermal disinfection** is a feature of instrument washer disinfectors that inactivates all vegetative microorganisms.
- **Infection Prevention and Control (IPC) Coordinator** is a staff member who has received the training necessary to develop and administer policies and procedures that protect staff and patients from the spread of infectious disease to DHCP and patients in the treatment facility.
- **Infectious Agents** include viruses, bacteria, fungi, protozoa, and other parasites that can be transmitted from the environment or from a human or animal to infect a new host. In addition, prions are infectious agents that are non-living disease proteins that can also be transmitted from one host to another.
- **Intermediate-Level Disinfectants** that EPA registers have tuberculocidal label claims and can also inactivate vegetative bacteria, most fungi, and specific viruses on cleaned surfaces when used for the recommended contact time. However, these products do not reliably inactivate bacterial endospores and should not be used as an immersion disinfectant.
- **Latex allergy (type I hypersensitivity to latex protein)** can be a more serious systemic allergic reaction resulting from exposure to natural rubber latex proteins found in glove powder.
- **Low-level disinfectants** are registered by EPA and have label claims for the inactivation of most bacteria, some fungi, and some viruses. Still, they are not tuberculocidal or sporicidal at recommended contact times. EPA-registered hospital low-level disinfectants are often formulated as cleaners and can be used on housekeeping and non-clinical contact surfaces.
- **Noncritical patient care items** include extraoral radiographic or photographic equipment, a **face-bow**, chair controls, bracket tables, light handles, or patient protective eyewear

contacted by DHCP hands. They may be contaminated with blood or OPIM during patient treatment.

- **Occupational exposure to bloodborne pathogens** can result from a percutaneous injury (e.g., a needlestick or cut with a sharp object), mucous membrane, or non-intact skin contact with blood, saliva, tissue, or OPIM.
- **Occupationally related contact dermatitis** (sometimes called OCD) can occur after frequent and repeated use of hand hygiene products, exposure to chemicals, and glove use. Contact dermatitis is a common, nonallergic condition that develops as dry, itchy, irritated areas on the skin around the area of contact. Most cases of occupational contact dermatitis reported in dentistry are due to irritant contact dermatitis and are not due to allergies.
- **Other potentially infectious materials (OPIM)** OSHA defines blood as human blood, human blood components, and products made from human blood. Other potentially infectious materials (OPIM) include semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, anybody fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids. OPIM also includes any unfixed tissue or organ (other than intact skin) from a human (living or dead); and HIV-containing cell or tissue cultures, organ cultures, HIV- or HBV-containing culture medium or other solutions, and blood, organs, or other tissues from experimental animals infected with HIV or HBV.
- **A pathogen** is a microbe capable of causing host damage; the definition includes traditionally recognized pathogens and opportunistic pathogens; host damage can result from either direct microbial action or the host's immune response.
- **Portal of Entry** is how an infectious agent (pathogen) invades the susceptible host. Portals of entry include the respiratory tract, oral mucosa, conjunctive, intact or non-intact skin, the vascular system, the digestive tract, and the genitourinary tract.
- **Portal of Exit** is how an infectious agent (pathogen) escapes its living host (e.g., human or animal) or environmental reservoir (e.g., water, soil) to invade a susceptible host.
- **Regulated Waste** as liquid or semi-liquid blood or other potentially infectious material (OPIM); contaminated items that would release blood or OPIM in a liquid or semi-liquid state if compressed; items that are caked with dried blood or OPIM and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or OPIM; a subset of wastes generated at health care facilities, including dental practices.
- **Respiratory hygiene and cough etiquette** are practices designed to reduce exposure to respiratory pathogens spread by droplet or airborne routes by covering the mouth and nose with a tissue when coughing or sneezing. The strategies primarily target patients and individuals accompanying patients to the dental setting who may have undiagnosed

respiratory infections but also apply to anyone (including dental health care personnel (DHCP)) with signs and symptoms of illness.

- **Respiratory Pathogens** are infectious agents transmitted through respiratory droplets or airborne routes.
- **Source Control Measures** reduce disease transmission by blocking respiratory secretions from speaking, coughing, sneezing, or singing. Surgical masks are commonly used for this purpose, with cloth face masks acceptable for use by the public when there are shortages of surgical masks. In addition, respiratory hygiene, cough etiquette, social distancing, and entry screening may also serve as forms of source control. (See also **respiratory hygiene and cough etiquette**.)
- **Spaulding's Classification** is a system for selecting the appropriate disinfecting or sterilizing process for reusable patient care items. Under this concept, reusable items and surfaces are classified as:
  - Critical: Items that penetrate intact skin or mucous membranes
  - Semi-critical: Items that come into contact but do not penetrate mucous membranes or contact with non-intact skin.
  - Noncritical: Items that contact only intact skin.

- **Standard precautions (SPs)** are the minimum infection control practices that apply to all patient care, including oral healthcare in any setting, without consideration of the patient's suspected or confirmed infection status. Standard precautions aim to decrease the risk of transmission of bloodborne and other pathogens from known and unknown sources.
- **Sterilization** is the process that destroys all types and forms of microorganisms, including viruses, bacteria, fungi, and bacterial endospores. Effective sterilization methods used in dental settings include steam under pressure (steam autoclave), dry heat, and unsaturated chemical vapor.
- **Virulence** describes the relative capacity of a pathogen to cause damage to the host. This can cover a broad spectrum of interactions between the host and pathogen that involve multiple factors, including host resistance and microbial characteristics.
- **Work-practice controls** are behaviors of DHCP that reduce the possibility of exposure or injury by changing how a task is performed.

Appendix 1: List of Tables:

Appendix 2: List of Figures:

وزارة الصحة

Ministry of Health

General Directorate of Infection Prevention and Control in Healthcare Facilities
Ministry of Health, Kingdom of Saudi Arabia, Riyadh,
Email: gdipc@moh.gov.sa
Website: www.gdipc.sa

Ministry of Health
Assistant Agency for Preventive Health
Al Sulaymaniyah District, King Abdulaziz Road, Ministry of Health, 3rd Building.