



**Research Article**

## **INFECTION CONTROL PROTOCOL IN PROSTHODONTIC LABORATORY- A REVIEW ARTICLE**

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### **ABSTRACT**

Prevention is always better than cure. We the dentist are more prone to the infection causing microorganism and also, we act as carrier for many infections to patient and also for the laboratory technician, the laboratory technician is at high risk of cross infection. There are many ways to protect all of us from infection causing microorganism .one is the most important method of prevention is disinfecting. For proper disinfecting we firstly need to know thoroughly about routes of transmission of disease, prevention of disease and various method of infection control. we should also need to have knowledge on disinfectants which are used for disinfecting the various laboratory materials and clinically used material. The technicians should have a proper knowledge about personal protection which is to be used while various processing procedure like trimming, polishing, etc.

**Key words:**

Transmission of diseases, infection control, laboratory disinfecting, impression disinfection, disinfection of instrument and impression trays, disinfectants.

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### **INTRODUCTION**

Dental health care workers and dental laboratory technicians are exposed to a wide variety of potentially infectious microorganisms in their working environment. The transmission of infectious agent from person to person or from innate objects within the clinical environment results in cross infection. Dental laboratory technicians are at high risk of getting cross infection due to microbes present in the impression of the patient that is received from dental office. Cast that is prepared from the impression of the patient also harbors the microorganism that can be distributed throughout the laboratory during the preparation of the die or from trimming of the cast. In order to overcome this infection the dental laboratory technician and their coworkers must have a basic knowledge about the transmission of disease and the protocols followed in infection control. (1)

#### **Transmission of Disease**

There are four main routes by which infection can be transmitted in dental office. They are

1. Transmission by direct or indirect contact for example touching a surface with contaminated hands
2. Percutaneous (parenteral) transmission such as sharp injuries
3. Transmission via air borne route, for example respiratory secretions and from aerosol
4. Common vehicle spread such as from the dental unit waterlines and plumbing. (2)

#### **Prevention of Disease**

The primary source of spread of infection is from person to person communication by hands and clothing and can be easily interrupted by hand washing and wearing of gloves and disposable aprons. The indirect spread of infection can be prevented by the disinfecting of the impression and transporting it by postal services. The percutaneous infection can be prevented by a prophylactic vaccination

#### **Infection Control**

The infection control procedures involve

1. Patient screening
2. Personal hygiene
3. Personal protection
4. Laboratory disinfection
5. Impression disinfection

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6. Disinfection of instrument and impression trays
7. Disinfection of prosthesis
8. Disinfection of cast
9. Disinfection of wax bites and rims

### **Patient Screening**

Initially before the starting of procedure each and every patient is screened with their basic vitals such as temperature with infrared thermometer, blood pressure and their medical history as their baseline before the start of the treatment. (3)

### **Personal Hygiene**

The maintenance of personal hygiene by the dentist plays an important role in preventing the cross contamination. Hair is to be cleared off from the face and surgical cap is to be worn. The clinician's hair falls in such a way it contacts the patient or dental equipment making the treatment in an uneasy way. Facial hair is to be covered with surgical mask or a protective shield. Jewelry is to be removed from the hands, neck, arms or from the facial area during patient treatment. Fingernails are kept clean and to be short to prevent the perforation of the gloves and accumulation of debris. The nail polish is removed. Thorough washing of the forearm and hand before and after the dental procedure. (4)

### **Personal Protection**

Personal protection is mainly achieved by immunization against communicable disease before treating a patient. Wearing of gloves, surgical mask and face shield, eye goggles is mandatory. (5)

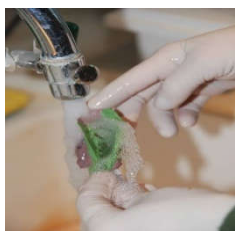


Figure 1



Figure 2



Figure 3



Figure 4

### **Laboratory Disinfection [6][7][8]**

Disinfection procedures should be done in laboratory by well - trained laboratory technician. If the laboratory is proper disinfectant, it will prevent corrosion in metallic components and dimensional changes and surface textures for impressions. Laboratories should have isolate place of high-risk patients from prosthetic laboratory work.

### **Barrier system [1][7][8]**

Barrier system must be followed in the laboratory. Which includes hand washing with plain or antimicrobial soap and an alcohol-based hand rub. Personal protection equipment's is a must be used when there is chance for occupational exposure to blood-borne pathogens. Personal protection equipment's includes Gloves, mask, protective eyewear, chin-length face shield, protective clothing.

### **Glove**

It is one of the important barrier systems which protects hand from contamination and to prevent transfer of organism. Hand should be washed before and after wearing glove

**Sterile glove:** Used while contact with tissue

**Medical examination glove:** used for all the procedure including the direct skin and mucosal contact

**General purpose glove:** used for instrument cleaning and decontamination procedure, which is made of neoprene, rubbers and butyl. This type of glove can be reused and washed.

These can be used when there is spray, splash or aerosols are produced. It is mandatory to wear these while operating lathes, model trimmers and other rotary equipment.

Lab coat or jacket should be worn during the fabrication process. It should be changed regularly and it should be wearied only inside the laboratory.

### **Impression Disinfection [7][8][9]**

American Dental Association (ADA) guidelines state that impressions must be rinsed to remove saliva, blood and debris, then disinfected and then sent to the laboratory. Disinfectants should not be sprayed on the surface of the impression as it is lesser the effective and creates an inhalation risk. Immersion of the impression is most effective. Reversible (Agar) and irreversible hydrocolloid (Alginate) materials should be handled carefully to prevent distortion of the impression made.

All impression should be rinsed in running tap water to remove visible signs of contamination.

Disinfect impressions using an EPA-registered disinfectant for time recommended by the manufacturer (usually about 15 minutes)

After the proper exposure time, the impressions should be rinsed under running tap water and gently shake to remove water.

Properly disinfected and dried impressions are ready for pouring.

#### **Irreversible hydrocolloids**

**Alginate:** disinfectant is chlorine compounds for less than 10 minutes.

**Reversible hydrocolloids:** Spray with sodium hypochlorite, rinse, spray again and stand under damp gauze or in sealed bag for 10 minutes. Immersed in 2% glutaraldehyde for 10 minutes.

**Polysulphide silicone:** Rinsed for 45 seconds with water and immerse for 30 minutes in 2% glutaraldehyde. Immersed in 5.25% sodium hypochlorite solution for 15 min and then rinsed in water.

**Polyether:** impression are made Immersed in 2% glutaraldehyde for 1 hour, rinsed with water for 45 seconds and then dried for 10 minutes

**Zinc oxide eugenol paste:** Immerse in glutaraldehyde.

**Impression compound:** chlorine compounds or phenolic spray.

**Silicone (vinyl polysiloxane) or rubber-based impression materials:** should be handled in the same manner as hydrocolloid materials. These materials are more stable and could also be immersed in any hospital-level disinfectant

#### **Disinfection of Instrument and Impression Trays[1][6][7][8]**

Instruments cleaning can be done into **6 stages**. 1. Presterilization soaking (Holding) 2. Pre-cleaning 3. Corrosion control, drying, lubrication 4. Packaging 5. Sterilization or high-level disinfection 6. Sterilization monitoring.

**Burs** - carbon, steel, diamond points: Dry heat oven (60°C) for 1-hour, Chemical vapour-20 minutes at 270° F Ethylene oxide-450-800 mg/l.

**Dapen dishes:** Steam autoclave at 121°C for 20 minutes at 15 lb. pressure/square inch Ethylene oxide-450-800 mg/l.[6]

**Glass slabs:** Steam autoclave- 121°C for 15 to 20 minutes at 15 lb. pressure/square inch Dry heat oven-160°C for 1-hour, Chemical vapour-20 minutes at 270° Ethylene oxide-450-800 mg/l.[6]

**Hand instruments:** Dry heat oven at 160°C for 1-hour and then it's been moved to Chemical vapour for 20 minutes at 270° F. Ethylene oxide450-800 mg/l. [10]

**Stainless steel:** Steam autoclave- 121°C for 15 to 20 minutes at 15 lb. pressure/square inch Dry heat oven-I 60°C for 1-hour, Chemical vapour-20 minutes at 2700 F. Ethylene oxide-450-800 mg/l.

**Hand pieces:** According to manufactures recommendation. Ethylene oxide-450-800 mg/l. Steam autoclave at 121°C for 20 minutes at 15 lb pressure

**Impression trays, Aluminium metal tray, Chrome-plated tray, Custom acrylic resin tray, Plastic tray:** Steam autoclave-121°C for 15 to 20 minutes at 15 lb pressure/square inch, Chemical vapour-20 minutes at 270° F. Ethylene oxide-450-800 mg/l.

**Mirrors (mouth & face):** Ethylene oxide-450-800 mg, Dry heat oven, Chemical vapour-20 minutes at 270° F, Ethylene oxide450-800 mg/l.

**Needle:** Discard do not reuse

**Orthodontic pliers:** Dry heat oven-160°C for 1-hour, Chemical vapour-20 minutes at 2700 F, Ethylene oxide-450-800 mg/l.

**Tissue retraction Pluggers:** Steam autoclave- 121°C for 15 to 20 minutes at 15 lb pressure/square inch, Dry heat over-160°C for 1-hour, Chemical vapour-20 minutes at 270° F, Ethylene oxide-450-800 mg/l.

**Metal framework:** (vitallium and Ticonium) immersed in 5.25% sodium Hypochlorite solution for 3 min and then it's been rinsed in water.

**Polishing wheels, disks, Saliva evacuators and Ejectors:** Ethylene oxide-450-800 mg/l.

**Stones:** Chemical vapour-20 minutes at 270° F.

**Water- air syringe tips:** Steam autoclave- 121°C for 15 to 20 minutes at 15 lb pressure/square inch, Dry heat oven-160°C for 1-hour, Chemical vapour-20 minutes at 270° F, Ethylene oxide-450-800 mg/l

**X-ray equipment:** it is disinfected using Ethylene oxide-450-800 mg/l.

#### **Disinfecting Prostheses [7][8]**

Prosthesis from the oral cavity is a potential source of infection. Most of the prosthetic appliance cannot withstand standard heat sterilization procedures. An alternative method would be disinfecting by immersion in dis infectant followed by a proper cleaning. An intermediate-level disinfectant (tuberculocidal claim) should be used before is handled or worked an appliance upon in the practice laboratory.

Orally prostheses may have large amounts of calculus and another tenacious bioburden. The debris should be removed. Scrubbing can be done with help of brush and antimicrobial soap which help in removing debris and contamination. Prostheses should be placed in sealable plastic bags. Then the prostheses should be removed and rinsed under running tap water which should be dried before proceeding with the next step. It is important to store prostheses in diluted mouthwash and not in disinfectant before insertion.

#### **Grinding, Polishing and Blasting [7][8][9]**

Dental lathe is another means of spread of infection and for injury. The rotary action of wheels, stones, burs will generate aerosols, spatter, and projectiles. When using a lathe, the

Plexiglas front shield should be in place and the ventilation system should be properly maintained. The use of masks is recommended. The air-suction motor (200 ft/min) should be used.

All laboratory items like burs, polishing points, brushes, rag wheels, stones, and laboratory knives used on contaminated or potentially contaminated materials must be heat sterilized if possible.

If items are heat sensitive and/or do not frequently contact the patient (articulators, lathes) cleaning and proper disinfection are required. Water baths are susceptible to contamination and should be always cleaned and disinfected between patient uses. Many laboratory items now come as single-use, disposable item.

Suspending the pumice to the effective disinfectant solution and then using it in polishing lathe.

The pumice should be changed daily. Personal Protective Equipment must be used when chemicals are used. When polishing wheels and rags are not in use it should be stored in disinfectant solution.

#### **Disinfection of Casts [1][7][8]**

Disinfecting the impression so that the resulting cast itself will not have to be disinfected, casts are the most difficult to disinfect without causing damage.

Disinfectant of cast can be done using an iodophor or chlorine product. If the cast is being disinfected and need to be transferred it should be allowed to dry before wrapping it.

#### **Disinfection Wax Bites / Rims [7][8]**

For some material Immersion method of disinfection can't be done so, Iodophor disinfection sprays can be used. Heavy-body bite registration materials may not be easily distortion and so it can disinfect like impression material.

Non-sterilizable equipment's like face bow components must be cleaned with soap and then disinfected with hospital-level disinfectant. The material which are used in ultrasonic cleaner should not be over heated or disinfectant.

The effective method is soaking the equipment in the individual containers contain disinfectant. Iodophors, chlorine solutions, glutaraldehydes or phenols are used. Most immersion disinfectants cannot be used more than once.

If the equipment is kept in a chemical disinfectant for more than a contacted time it may cause damage. Equipment which are disinfected by chemical disinfectant and not rinsed properly before using in patient it may cause chemical burn in skin and oral mucosa of the patient.

**Disinfectants:** The widely used disinfectants are 1. Ethyl alcohol 2. Isopropyl alcohol 3. Chlorine 4. Iodophors and iodine's 5. Glutaraldehyde 6. Phenolic 7. Quaternary ammonium compounds.[7][8]

## **CONCLUSION**

The initial cause of cross contamination is by improper disinfected impression and prosthesis that has been sent to the laboratory for the process. The knowledge about the disinfecting of impression taken from patients and instruments used for the patient should be known by the dentist and the technician. Technician should use proper protection kits so that they can be prevented from infection. The through history of the patient may be required so that care must be taken by the dentist against infection in patient with HIV and other systemic illness. There should be a separate section for the dental student and laboratory technician regarding the disinfection of instruments and materials used for the patient. Dentist should always see the patient as a carrier so that precaution can be done better and prevention can be ensured for both the patient and dental team.

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