MODERN
Dental Laboratory USA

Infection Control Protocol

1. General Principle

Modern Dental Boston Laboratory is concerned with preventing the transmission of infectious diseases and cross-contamination. In particular, the oral environment is inhabited with commensal oral flora and blood-borne pathogens are potentially present on incoming items that have had contact with the patient's mucosa. On the other hand, pathogens and contaminants that came into contact with cases during processing at the laboratory could potentially remain and poses a risk to patients when placed in contact with their mucosa. As such, our main objective is to prevent cross-contamination before, during and after processing, as well as to eliminate pathogenic micro-organisms on items that have a high likelihood to come into contact with a patients' mucosa. According to Spaulding Classification, these items are considered semicritical. Aside from that, the Guidelines for Infection Control in Dental Health-Care Settings (CDC, 2003) contain a specific section for dental laboratory address what needs to be done. It stated that incoming items that may be contaminated "should be thoroughly cleaned, disinfected with an EPA-registered hospital disinfectant with a tuberculocidal claim, and thoroughly rinsed". Also the laboratory should establish a "separate receiving and disinfecting area" "to reduce contamination in the production area". Waste generated, such as disposable trays or impression materials, "can be discarded with general waste" unless otherwise falling under the category of regulated medical waste. Appliances and prostheses delivered should be disinfected with "an EPA registered hospital disinfectant (low to intermediate)" and that the item placed in a "tamper-evident container" before returning.

2. Disinfection Protocol

While some materials (e.g. impression materials) may require specific disinfection procedures, a general disinfecting protocol for intermediate-level disinfection and for low-level disinfection is adopted for ease of application. Further, given that EPA registration only applies to products sold within the United States, products with similar effectiveness are selected for disinfection. The Guideline for Disinfection and Sterilization in Healthcare Facilities (CDC, 2008) is therefore consulted to further explain the meaning of various levels of disinfection as well as the effectiveness of various chemicals employed as disinfectants. The 2008 Guideline stated that in that low-level disinfectants can kill "most vegetative bacteria, some fungi, and some viruses in a practical period of time (≤10 minutes)". While intermediate-level disinfectants might kill "mycobacteria, vegetative bacteria, most viruses, and most fungi but do not necessarily kill bacterial spores". Chlorine products, also commonly referred to as household bleach, are "aqueous solutions of 5.25%-6.15% sodium hypochlorite", have a "broad spectrum of antimicrobial activity", are "fast acting" and can "remove dried or fixed organisms and biofilms from surfaces". "Higher concentrations (1,000 ppm) of chlorine are required to kill M.tuberculosis" while concentrations as low as 100 ppm can be effective against some types of bacteria. Because household bleach contains "52,500 – 61,500 ppm available chlorine", a 1:50 dilution provides in excess of 1,000 ppm of available chlorine while a 1:200 dilution provides in excess of 250 ppm of available chlorine. Consequently, immersion in bleach solution diluted to 1:50 for 10 minutes is selected as a method for general intermediate-level disinfection. Unless the material is incompatible with sodium hypochlorite or that it cannot be immersed. For general low-level disinfection, saturation spraying of bleach solution diluted to 1:200 is employed. Items that are sprayed are given minimum 1 minute of exposure time. A list of disinfection protocols are shown in Table 1.

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3. Incoming Cases

Incoming cases are handled in a receiving area separate from the production area. Only trained personnel are involved in the process and are directed to use appropriate protective equipment, including the wearing of clean uniform, face mask, and gloves. Countertops and work surfaces are cleaned regularly on a daily basis. All cases are disinfected as they are received. Impressions are rinsed are rinsed to remove saliva, blood, debris and other residue and disinfected by immersion in 2% Dentavon solution for 10 minutes as impression materials may not be compatible with sodium hypochlorite. Prostheses and other items that may not be compatible with sodium hypochlorite are similarly disinfected. Dentavon by Schülke is an aldehyde-free disinfectant based on active oxygen and with an extensive spectrum of efficacy. The manufacturer claims that a 2% solution can deactivates tuberculosis bacteria as well as hepatitis B virus and HIV at a reaction time of 10 mins. 100g of Dentavon contains 45g pentapotassium-bis(peroxymonosulphate)-bis(sulphate). Ethyl alcohol is rapidly bactericidal, tuberculocidal, fungicidal and virucidal but do not destroy bacterial spores. 60%–90% solutions in water provide the optimum bactericidal concentration. Thus, for articulators or other items that cannot be immersed, they are disinfected by wiping with 70-80% ethyl alcohol. All others items are disinfected by general intermediate-level disinfection.

4. Outgoing Cases

Outgoing cases are handled in a separate shipping area which is cleaned on a regular basis. Personnel responsible for performing the disinfection have received appropriate training and are instructed to wear appropriate protective clothing. All outgoing cases are cleaned and disinfected before being shipped to remove any debris or pathogenic micro-organisms that came into contact with the case during processing. Prostheses are disinfected by immersion in Sporox II for 10 minutes as the materials may not be compatible with sodium hypochlorite. Sporox II by Sultan Healthcare contains 7.5% hydrogen peroxide, 0.85% phosphoric acid and is a sterilant and high-level disinfectant that claims to achieve high-level disinfection in 30 minutes. However, the Guideline for Disinfection and Sterilization in Healthcare Facilities (CDC, 2008) indicated that the mycobactericidal activity of this chemical mix “has been corroborated in a study showing the inactivation of >105 multidrug-resistant M. tuberculosis after a 10-minute exposure”. Therefore immersion time has been set at 10 minutes to achieve intermediate-level disinfection. Stone models, on the other hand do not come into contact with patient’s mucosa and thus carry a much reduced risk of cross-infection. Given that, they are processed according to general low-level disinfection. After which they are dried in hot-air oven and cooled before being packaged to prevent mould formation. All other items are disinfected by general low-level disinfection. After disinfection, prostheses are placed back onto stone models where appropriate and placed in a plastic bag. All packaging material used are new and disposable.

5. Recommendations for Dentists

The process adopted by Modern Dental Laboratory eliminates many of the pathogenic micro-organisms on dental objects with the exception of bacterial spores. However, practitioners are recommended to consider sterilization or additional intermediate-level disinfection prior to insertion as to reduce the risks to patients to an absolute minimum.