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ASEPSIS IN PROSTHODONTICS

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Abstract:

Prosthodontists and patients are typically a high risk group in terms of their capacity for transmission and acquisition of infectious diseases. Every practice should follow a stringent infection prevention plan to minimize the risk of transmission among patients and providers. This article is essentially a literature review of cross-infection control measures especially relevant to prosthodontic practice.

KEYWORDS: Asepsis, Contamination, Disinfectant, Sterilization, Instruments, transmission.

Introduction

Micro-organisms are ubiquitous and may cause contamination, infection, and decay. Therefore, it becomes necessary to remove or destroy them from materials or areas.[1] It is essential to kill or inhibit their growth to minimize their destructive effects. Infection is the multiplication and survival of microorganisms on or in the body. An infection does not always indicate disease, but disease seldom results without infection (Miller).[2] Cross infection is when a patient suffering from a disease and new infection is set up from another host or external source.[3]

Goals are:

(1)To destroy pathogens & prevent their transmission.

(2) To reduce or eliminate microorganisms responsible for the contamination.[4]

Thus a Prosthodontist while providing quality care to its patients should also be very watchful and vigilant to the routine of disinfection and sterilization procedures followed in the prosthodontic office set up for infection control.

Definition

1) Asepsis may be defined as the absence of infection or infectious materials or agents (Miller).[3]

2) Asepsis free from infection; the prevention of contact with microorganisms (GPT 9).[5]

3) Asepsis is defined as freedom from infection and the prevention of contact with microorganisms.[6]

Thus a prosthodontist while providing quality care to its patients should also be very watchful and vigilant to the routine of disinfection and sterilization

procedures followed in the prosthodontic office set up for infection control.

Categorization of instruments[7]

Dental instruments are divided into three groups according to the risk of disease transmission, according to the Centers for Disease Control. Critical, semicritical and non-critical classifications are based on the following criteria:

•Critical Instruments- Essential instruments used to penetrate soft tissue or bone, or to access or touch the bloodstream or other tissue that is usually sterile. For example: scissors, scalers

• Semi-critical instruments are those that do not penetrate soft tissues or bone but contact mucous membranes or non-intact skin, such as mirrors, reusable impression trays, and amalgam condensers. These devices also should be sterilized after each use. In some cases, however, sterilization is not feasible and, therefore, high-level disinfection is appropriate. A high-level disinfectant is registered with the U.S. Environmental Protection Agency (EPA) as a "sterilant/disinfectant" and must be labeled as such.

For example:

Prostheses which have been worn and are either adjusted in the surgery, or repaired or adjusted in the laboratory: medium-level disinfection.

The face bow fork: heat sterilisation.

Wax knife, if used for adjustments at the chair side: heat sterilization

Prostheses, at try-in stage: medium-level disinfection.

Metal dispensing syringes for impressions should be cleaned and heat sterilized.

Bite blocks: medium-level disinfection

Polishing stones and rag wheels: heat-sterilisation if possible.

Impression trays returned from the laboratory: aluminium or chrome plated-heat sterilization, plastic -discard.

The handles of disposable trays can be detached and autoclaved but corrosion and rusting may occur after a few cycles. Sterilisation using a chemiclave may be preferred action.

• Non-critical instruments are those that come into contact only with intact skin examples external components of x-ray heads, blood pressure cuffs, and pulse oximeters. Such devices have a relatively low risk of transmitting infection[7]

Sterilization of instruments

Bite blocks

• Medium level of tuberculocidal hospital disinfectant solution can be used for disinfection of bite block

Procedure

• Bite block is immersed in sodium hypochlorite solution /bleach 5.25% in the dilution of 1:10 for about 10 minutes

Mirrors (mouth & face)

• Ethylene oxide-450-800 mg

• Dry heat oven

• Chemical vapor-20 minutes at 270° F. [8]

Dental Handpieces

• Water allowed to flush through the handpiece by running if over a sink for about 20 seconds followed which the bur is removed

• Debris is removed by scrubbing the handpiece with detergent and water rinse and dry it off

• Good quality oil recommended by the handpiece

manufacturer should be used as a lubricant.

• Expel excess oil by running the handpiece for 2 seconds, after replacing the bur or hanging the handpiece in a handpiece rack.

• Remove the bur, if replaced. Clean the fiber-optic, bundle ends with alcohol place the handpiece in a clear view sterilization pouch, together with a chemical indicator strip.

• Sterilize in an autoclave, ETOX gas or chemiclave, according to the manufacturer's instructions. Do not leave the handpiece in the sterilizer after the sterilization cycle is complete.

• Remove the handpiece from the bag, insert the bur, and use.[9,10]

Burs – Carbon, Steel, Diamond Points.

• Chemical vapor-20 minutes at 270° F.

• Ethylene oxide-450-800 mg/l.

• Autoclave.[11]

Visible-light curing units

Light curing device is a potential source of transmission of infection as both the tip and the handle gets infected with the blood and saliva from the oral cavity and the operators gloved hands.

• Replacing this was the autoclavable light-curing tip.

• The handle can be disinfected using iodophores.

• Glutaraldehyde is not recommended as it causes damage to the glass rods in the fibre optic light tip.

Procedure

• The whole unit must be cleaned properly.

• If the fiber optic light tip can be sterilized, detach it and sterilize as recommended by the manufacturer

• Wrap the handle and light-curing tip (if not autoclavable

• Wrap soaked with an iodophor disinfectant is used to wrap the handle and the light-curing tip for about 10 mins or until the unit is next used.

• The wrap is removed and the unit is cleaned with distilled water to remove excess disinfectant.

• Some practitioners use a Clingfilm to cover the top of the light curing tip, provided with should not interfere with the units cooling mechanism.[12]

Air/water syringes and ultrasonic scalers

• Water is flushed through the handpiece for about 10 mins. Attachments are sterilized the same way as that of the handpiece. If possible, removable tips should be used.[10]

Disinfection of impressions

According to the ADA guidelines, the impression trays must be rinsed to remove saliva, blood, and debris and then disinfected before sending it to the laboratory.

The two important factors to be considered are:

i. The effect of the treatment on the dimensional stability and the surface detail of the impression.

ii. The deactivating effect of the impression material on the disinfecting solution, which could reduce the efficacy of the process.[13]

Polysulphides and addition-cured silicones

• Polyvinyl siloxane, polysulfide, impression compound, and ZOE impression materials are thoroughly rinsed under water and immersed in a 5.25% sodium hypochlorite solution for 10

minutes.[14, 15]

• 2% glutaraldehyde did not affect the accuracy and dimensional stability of polyether and polyvinyl siloxane impression materials after immersion for 30 or 60 minutes.[16]

Alginate

• 5.25%of sodium hypochlorite solution spray is used for disinfection of the alginate impression after rinsing with water followed which it is sealed in a plastic bag.[16]

Agar -reversible colloids

• Agar impression is submerged into a potassium sulphate solution for 20 mins, remove excess and pour the impression.[9]

Zinc Oxide Eugenol (ZOE) and compound impressions

Immersion in 2% ID solution of 20 minutes does not have any adverse effects on the dimensional stability or surface details reproduction of the rigid material.[17]

Dapen dishes

Steam autoclave- 121°C for 15 to 20 minutes at 15 lb pressure/square inch,

• Dry heat oven-160°C for 1 hour,

• Chemical vapor-20 minutes at 270° F.

• Ethylene oxide-450-800 mg/l.[10]

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 vapor-20 minutes at 270° F.

• Ethylene oxide-450-800 mg/l.[10]

Saliva Evacuators, Ejectors

• Ethylene oxide-450-800 mg/l.[10]

Orthodontic pliers

• High-quality pliers: steam, dry heat, chemical vapour, ethylene oxide gas.

• Low-quality pliers: steam autoclave is not preferred as it is damaging to the material.

• In pliers with plastic parts, ethylene oxide sterilization is the only effective method.[18]

Disinfection of occlusal rims, bite registrations:

• First, they are rinsed under water, sprayed with 5.25% sodium hypochlorite solution and placed in a plastic bag for 10 minutes.[19]

Impression trays

• Aluminium & chrome-plated – heat sterilized via autoclave, chemical vapour or dry heat; ethylene oxide sterilization.

• Custom acrylic resin – disinfect with tuberculocidal hospital disinfectant for reuse during the same patient's next visit.

• Plastic: should be discarded.[20]

Disinfection of casts

• Casts are sprayed with 5.25%sodium hypochlorite solution and allowed to set for 10 mins. Care should be taken not to cause damage to the casts.[21]

Disinfecting prostheses

Metal dentures

• Sprayed with 2% glutaraldehyde solution and held in a plastic bag for 10 minutes.[22]

Acrylic dentures

• Immersed in 5.25% sodium hypochlorite solution for 10 minutes.[21]

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Discussion

Sterilization has gained keen awareness by the public and the profession due to increased risk and knowledge of transmissible diseases. This has led to an effective infection control program in the dental office and laboratory for the protection of the staff and the patients and is considered the standard of care. Even though Prosthodontist does not grossly invade the tissues or treat infectious diseases, still the patient carries microorganism that can be transmitted to others. In today's world, there are many professional, moral and medicolegal considerations that make sterilization and disinfection techniques imperative. Adequate attention on prevention of cross-infection has been largely ignored by the Prosthodontist probably because they adopt non-invasive procedures. Many features of dental office contribute to the mode of transmission of infection, as even moving instruments can spread infection in dental office set up.

Conclusion

Time has come when it has become essential that infection control is put to practice instead of just discussing in theory; lest irreversible harm may be caused to our patient or the staff which helps us achieve successful treatment goals. Sterilization & Disinfection of patient care instruments & material used is part of Infection control protocol in health care setting including dental care.

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