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Cross Infection Control in Dentistry.

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ABSTRACT

Cross Infection is the transfer of infection between individuals. The use of appropriate infection control precaution is important for patient and dental team because dental personnel are exposed to a wide variety of microorganisms from the blood and saliva of the patient. Cross infection among Dental Surgeons, Dental Assistants, Dental Technicians and Patients can be prevented by the use of effective infection control procedure, universal precaution in dental office and lab, Immunization, sterilization and disinfection.

Keywords: Cross infection, Universal precautions, Sterilization, Disinfection

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INTRODUCTION

Cross Infection is the transmission of infectious agents between patients and health care workers in a clinical environment. The dental clinic is an environment where disease transmission occurs easily [1] and there exists a chain of transmission between the patient, dentist, the assistant and the members of their family. Dental health care professionals are at risk of infections caused by various microorganisms such as Mycobacterium tuberculi, hepatitis B and hepatitis C viruses, staphylococci, streptococci, herpes simplex virus types 1, human immunodeficiency virus (HIV), mumps, influenza, and rubella.

Disease transmission in dentistry occurs through the following routes

- *Direct contact* with a lesion, infected body fluids (blood, saliva, etc.) or tissue debris during intraoral procedures; including inoculation injury like needle-stick injury, and splatters of blood, saliva, or nasopharyngeal secretions onto breached or intact skin/mucosa.
- *Indirect contact* via contaminated dental instruments, equipment or materials.
- *Inhalation of infectious aerosols*, from tooth preparation with high-speed handpiece and ultrasonic scaling for examples, that can remain suspended in the air for some time [2,3].

Cross Infection control

The infection control can be achieved only if the chain of disease transmission is interrupted. Studies by Perry et al and McCarthy et al on patients willingness to inform the dentist about the status of their infectious diseases showed that some patients are hesitant to tell the dentists their disease status and are unaware of its importance. These subjects can unknowingly transmit the disease to others [4,5]. Therefore all patients are considered potentially infectious and the same precautions should be applied on everyone. The approach is then widely known as the 'Universal Precautions' [6].

In 1996, 'Universal Precautions' were revised as 'Standard Precautions' by CDC [7]. 'Standard Precautions' refer to precautions taken against contact with (1) blood; (2) body fluids, secretions and excretions (except sweat) - regardless of whether they contain blood; (3) non intact skin; and (4) mucous membranes [8].

Personal Protection

Personal protection measures have to be taken by every Dental Health Care Professional as a step towards cross infection control. These measures include Immunization, Hand wash, Personal barriers.

Protection against some infections can be achieved through vaccinations. The Dental Council of India has made it compulsory that every individual gets vaccinated against Hepatitis-B even before they commence their graduation. Vaccine induced antibodies decline gradually with time. But immunity continues to prevent clinical disease or detectable viral infection. Booster doses of vaccine and periodic testing to monitor antibody

concentrations after completion of vaccine series are not necessary for vaccine responders [9].

Hand washing before and after every patient is a must by every Health Care Professional. The WHO recommended technique has to be practiced by all clinicians and assistants in Dental clinic [10]. Figure 1

Figure 1: WHO recommendation for Hand washing



Girous et al reported that Hand rubbing with an alcohol-based solution, after contact with patients, can achieve a greater reduction in bacterial contamination than conventional hand washing with medicated soap [11].

Personal barriers such as gloves, mask, eye shields are advocated. Wearing of gloves prevents direct contact between the health Care Workers and patient's blood and other secretions. Therefore every Dental personnel has been advised wearing of gloves as an essential element of cross infection control in dental surgery [12,13].

Gloves have to be changed for every patient and never to be reused after washing. Overgloves are advised to be used in case of procuring materials, instruments from the rack or attending a phone call etc and has to be disposed immediately after doing the same.

As for simple dental extraction and other operative procedures, the operator may choose to use either disposable or sterile gloves. Cheung et al found that the use of sterile gloves does not offer an advantage over clean gloves in dental extraction [14].

Protective eyewear or face shields should be worn at all times during patient contact when there is a possibility that a patient's body fluids may splash or spray onto the face/eyes [15]. Protective clothing (uniforms or disposable gowns) prevents contamination of street clothing and protects the skin of DHCP from exposure to blood and body substances [9]. Disposable caps that completely cover the hair may be used when splashes of blood and body fluids are expected. They are also useful in keeping aerosols from lodging on the hair, which may then be transferred to family members or onto inanimate objects [15].

Patient Protection

Safety glasses

Patients' eyes must be protected against possible injury; tinted glasses may also protect against glare from the operating light. Protective glasses with top and side shields are strongly recommended and should be disinfected between patients.

Drape

Patient drape provide full coverage from splatters and stains. perforated for quick dispensing.

Rubber Dam

Rubber dam is useful for preventing saliva or blood spatters and control bacterial counts in aerosol effectively [16,17]. Non-latex rubber-dam is available for patients allergic to latex.

Sterilization and Disinfection

Sterilisation

The process by which an article, surface or medium is freed of all living microorganism either in vegetative or spore state [18].

Disinfection

The destruction or removal of all pathogenic organism or organisms capable of giving rise to infection [18].

Surface asepsis is a collection of procedures that prevent or remove contamination from surface [19]. Biological indicators (spore test) should be done periodically to check the efficiency of autoclave. Spore test is the only reliable method for this purpose [20,21].

Materials and instruments handled in the clinic and laboratory should be segregated as critical, semi-critical and non-critical items [22].

Critical items are those which will be used to penetrate soft tissues or bone forceps, surgical instruments and scalers. These items need to be sterilized as the risk of disease transmission is high.

Semi-critical items are those which touch mucous membranes but will not be used to penetrate tissues such as mouth mirrors, amalgam condensers and hand instruments for operative procedures. The risk of disease transmission is intermediate. The items should be sterilized or, if susceptible to heat damage, they should be subjected to high-level disinfection (with agents registered with the US Food and Drug Administration (FDA) - as a chemical sterilant / high-level disinfectant).

Non-critical items, are those that make contact with intact skin only. The risk of disease transmission is low. Intermediate-level or low-level disinfection is required depending on the visible presence of blood . Intermediate-level disinfectants are those registered with the US Environmental Protection Agency (EPA) as a "hospital disinfectant" with "tuberculocidal" activity. They include phenolics, iodophors, and chlorine-containing compounds. Low-level disinfectants are those registered with EPA as "hospital disinfectants" that are not labeled for "tuberculocidal" activity (e.g. alcohol, quaternary ammonium compounds).

The sterilization sequence

The decontamination of reusable dental instrument includes;

Pre-sterilization cleaning

The organic remnant like blood, saliva and substantial amount of microbe are removed by this step. It may be performed by either mechanical or manual means.



Drying

Instrument must be dried before sterilization. Towel dry are used to clean hand instrument. Blown dry with compressed air are used to hinged instrument or inaccessible parts.

Packaging

The intention of sterilization packaging system is to allow sterilization of packaging instrument, maintain sterility of instrument until the package is opened and permit delivery of instrument without contamination. they can be put perforated aluminium tray with or without wrapping (tray system).

Sterilization

Moist-heat should be used for sterilizing instruments. Autoclaves is the safest and most cost effective method of sterilization. The autoclave is programmed to operate depending on the packaging of the instruments and according to the default parameters set by the manufacturer, e.g. 134 degree C for 3 minutes or 121 degree C for 20 minutes or 134oC for 13 minutes. In this autoclave process, microorganisms are killed by heat, and this is accelerated by the addition of moisture.

Storage

Sterilized items should be properly stored to prevent recontamination. Packaging simplifies storage. Sterility can be maintained indefinitely unless an event causes contamination (e.g. torn or wet wrapping) [9].

Instruments in compromised wrappings should be re-cleaned, re- packaged and re-sterilized.

Cross Infection control in dental laboratory

Dental laboratory is often neglected in aspects of cross infection control and Dental technicians are at risk of cross-contamination from the clinical items they receive and handle from dental offices [23]. A study conducted among Dental Technicians show that most of them are unaware of cross infection and only five of 200 (2.5 %) technicians complied with all infection control procedures [24].

In prosthetic laboratories, impressions, lathes and pumice used for polishing and finishing of prostheses have been described as the greatest sources of contamination [25,26] and therefore technicians are at risk of cross infection from the clinical items they receive and handle from dental clinics [23].

Immediately on removal from the mouth, the impression or appliance should be rinsed under running water to remove saliva, blood and debris

- The process is continued until it is visibly clean. If an appliance is grossly contaminated, it should be cleaned in an ultrasonic bath containing detergent and then rinsed
- The impression or appliance should be disinfected according to the manufacturer's recommendations. Generic materials such as sodium hypochlorite (household bleach) may no longer be suitable for disinfecting impressions unless specifically recommended by the manufacturer
- Disinfectants should not be sprayed onto the surface of the impression; it lessens the effectiveness and creates an inhalation risk. Immersion of the impression is recommended
- The impression or appliance should be rinsed again in water before sending to the laboratory accompanied by a confirmation that it has been disinfected [27].

Dental lathes are used for trimming and polishing of prostheses after being tried in patients oral cavity. The aerosols and particles from lathes could be inhaled in by the dental technicians if proper barrier methods are not employed. It has been reported that contaminated invisible aerosol particles remain in the air for long periods of time when lathes have been used for the polishing of prostheses [28,29].

Barrier methods have to be practiced in dental labs also. Protective measures, such as aprons, protective glasses, and lathes with efficient shields, should be used while working to reduce the risk of cross-contamination [29].

Level of understanding cross infection control in present day practice

It is important for clinicians and assistants to understand and practice cross infection control methods in their day to day practice. Negligence or ignorance of these basics methods will result in health hazards. A study conducted to understand the knowledge of Undergraduate and post-graduate Dental students regarding Cross infection control indicated a lack of understanding of the basics of infection control and the prevention of transmission of communicable infectious diseases among students who took part in the study [30].

deKock and van Wyk advocated the need for interceptive and preventive education and peer pressure for proper infection control [31].

CONCLUSION

Immunization and Standard precautions with personal barrier methods such as gloves, mask, eye shields, drape along with strict adherence to Sterilization and disinfection protocol are the basic methods of setting high standards in cross infection control.

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