



RESEARCH ARTICLE

PREVENTION IS BETTER THAN CROSS – CONTAMINATION

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ABSTRACT

In globally growing of dental treatment provider's, while providing best treatments to the patient, it is extremely important for a dentist to follow a protocol to facilitate cross infection control in the office and to prevent cross-contamination between the patients, dentists, assistants, and paramedical staff, yet cross contamination and its modes still remain the same. To ensure risk free practice it is essential to follow the two basic R's: Reduce –the infection, Reevaluate the status. This article emphasizes fundamentally on different pathways of cross infection and methods that can be implemented in an attempt to remove but at least reduce creating an ideal situation to prevent cross contamination. Personal protection, decontamination and formulation of an infection control policy have been discussed

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INTRODUCTION

Dental health care professionals, the dental assistant and any other member engaged on the operating field are exposed to a wide variety of potentially infectious microorganisms. They can in turn become the source from which contamination can spread and pathological diseases may occur. Hence it is a prime necessity for any dental professional to take care of the cross contamination and provide a risk free practice. Risk in any hospital practice refers to the probability that a loss or something dangerous or harmful will occur. It may be of attributable type, material type or relative type of risk (Taber, 2013). In dental practice there are a number of criteria's which makes risk significant and worthy of concern which may include potential for actual injury to patients or staff, significant occupational health and safety hazard, the possibility of erosion of reputation or public confidence, potential for litigation, minor incidents which occur in clusters and may represent trends (Pankhurst, 2017; ADA's Guidelines for Infection Control, 2015). Cross contamination refers to the transfer or transmission of potentially infectious organisms

from person to person or from inanimate objects within clinical environment which leads to infection (Pankhurst, 2017).

Modes of contamination/ cross contamination in a dental clinic

While performing any operative/non- operative procedure the dental health care professional the assistant and the patient are subjected to microorganisms, which may be inhaled, ingested, injected, implanted, or splashed onto the skin or mucosa.

There are multitude pathways for cross-contamination in the dental office, such as (Pankhurst, 2017; Cottone *et al.*, 1996; Anil *et al.*, 1999):

- Patient to dental team
- Dental team to patient
- Patient to patient
- Dental office to community, including the dental team's families.

Due to the notorious and minute nature of microorganisms especially when dealing with the oral cavity, the organism shows potentially in affecting the above in the following ways:

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A. Dental health care personnel and dental assistant:

While dealing with the operative/non- operative procedure, dentist is subjected to maximum risk.

Transmission can occur by following ways (Pankhurst, 2017; Recommended infection-control practices for dentistry, 1986 & 1993):

- Transmission by direct or indirect contact, for e.g. touching a surface with contaminated hands.
- Percutaneous (parenteral) transmission, such as sharp injuries.
- Transmission via air-borne route, for example aerosols generated by high speed handpieces and respiratory secretions.
- Common vehicle spread, such as dental unit waterlines and plumbing.

In order to prevent any kind of cross infection the following measures enlisted in Table 1 (Pankhurst, 2017; ADA's Guidelines for Infection Control, 2015; Recommended infection-control practices for dentistry, 1986 & 1993; US Department of Labor, 1991 & 2001) can be positively adapted by the dental professional and dental assistant.

B. Cross transmission by patients

Oral cavity plays a role of natural residence to many harmful organisms. Cross contamination mainly occurs from the saliva harboring these microorganisms. The infected personnel may act as a potential vector in transmitting these microorganisms. To procure proper practice it is essential for any dental professional to ensure minute details of the illness of the patient. A thorough history of patient will take care of details, specifically about disease pertaining to immunity, which includes HIV, HbC, HbV etc. Table 2 (Pankhurst, 2017; ADA's Guidelines for Infection Control, 2015; Recommended infection-control practices for dentistry, 1986 & 1993; US Department of Labor, 1991 & 2001; Neelima Malik, 2012) briefly explains the protocol for treating immunocompromised patients.

In dental clinic

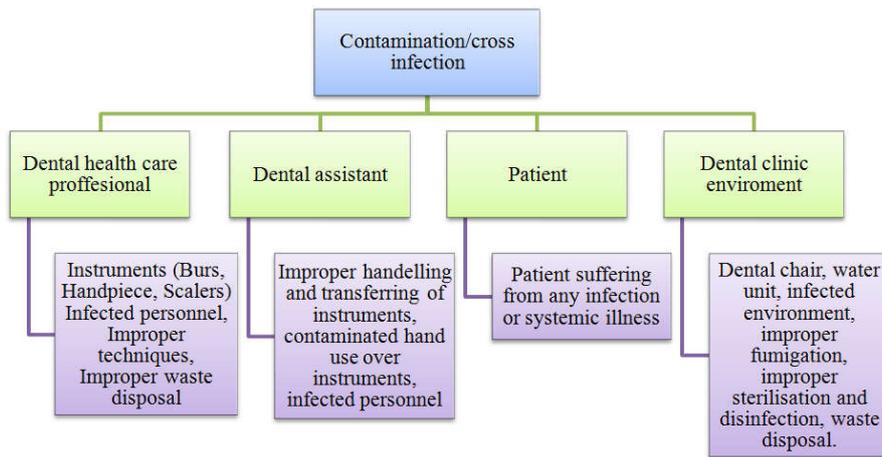
Most dental unit waterlines contain biofilm, which acts as a reservoir of microbial contamination. Biofilm in dental unit waterlines may be a source of known pathogens (e.g. *Pseudomonas aeruginosa*, non-tuberculous mycobacteria, and *Legionella* spp) (Neelima Malik, 2012).

Table 1. Essential Methods to Prevent Cross Contamination

Masks, Protective Eyewear, and Face Shields	<ol style="list-style-type: none"> 1. Protect mucous membranes of the eyes, nose, and mouth during procedures likely to generate splashing or spattering of blood or other body fluids. 2. Change masks between patients or during patient treatment if the mask becomes moist. 3. Change mask after every 30 minutes
Protective clothing	<ol style="list-style-type: none"> 1. Wearing of protective clothing (e.g., reusable or disposable gown, laboratory coat, or uniform) that covers personnel clothing and skin which may be spoiled with blood, saliva, or any Other Potentially Infectious Material (OPIM). 2. Before departing work area to prevent cross contamination to surrounding remove, barrier protection, including gloves, mask, eyewear, and gown.
Gloves	<ol style="list-style-type: none"> 1. Wear a new pair of medical gloves for each patient, remove them promptly after use, and wash hands immediately to avoid transfer of microorganisms to other patients or environment. 2. Remove gloves that are torn, cut, or punctured as soon as feasible and wash hands before re-gloving. 3. Do not wash surgeons or patient examination gloves before use and also do not wash, disinfect, or sterilize gloves for reuse.
Devices Attached to Air and Waterlines	<ol style="list-style-type: none"> 1. Clean and heat-sterilize handpieces and other intraoral instruments. 2. Do not advise patients to close their lips tightly around the tip of the saliva ejector to evacuate oral fluids

Table 2. Protocol For Treating Immuno compromised Patients

Theatre	<ul style="list-style-type: none"> • Appoint the patient at the end of the operating list. • Operating table should be covered with water proof sheets. • Equipments needed for observing precautions include <ol style="list-style-type: none"> a) Freshly prepared 2% glutaraldehyde solution b) Plastic apron to be worn under the gowns by all personnel c) Eye protective should be worn d) Specimens to be labeled as "biohazard" e) Linen and plastic bags for transporting linen and instruments • After surgery, the operating room and all equipment must be thoroughly cleaned with hot soapy water and sodium hypochlorite.
Personnel Spillage	<p>Additional paramedical staff should be present in case of any necessity. Before mopping the area it should be covered with 1% sodium hypochlorite.</p> <p>Autoclavable instruments</p> <ol style="list-style-type: none"> 1. Should be autoclaved before washing 2. Allowed to cool 3. Wash in soapy water
Instruments	<ol style="list-style-type: none"> 4. Rinse 5. Reautoclave <p>Non autoclavable instruments</p> <ol style="list-style-type: none"> 1. Immerse in 2% glutaraldehyde for 1 hour 2. Discard this solution 3. Instruments should be physically cleaned in warm water and detergent 4. Rinse again in 2% glutaraldehyde and leave to soak for 3 more hours
Sharps	<p>Needles should be decontaminated and immediately incinerated before disposal.</p>



Flow Chart 1. Different modes of pathways through which cross-contamination can occur



Figure 1. Medical Waste Segregation

Strategies to Improve Dental Unit Water Quality

The recommended value of <500 CFU/ mL should be achieved. Simply using source water containing <500 CFU/mL of bacteria (e.g., tap, distilled, or sterile water) in a self-contained water system will not eliminate bacterial contamination in treatment water if biofilms in the water system are not controlled (Recommended infection-control practices for dentistry, 1986 & 1993). Removal or inactivation of dental waterline biofilms requires use of chemical germicides. Dental devices that are connected to the dental water system and that enter the patient's mouth (e.g. handpieces, ultrasonic scalers, or air/water syringes) should be operated to discharge water and air for a minimum of 20–30 seconds after each patient. This procedure is intended to physically flush out patient material that might have entered the turbine, air, or waterlines. Even with antiretraction valves, flushing devices for a minimum of 20–30 seconds after each patient is recommended (Recommended infection-control practices for dentistry, 1986 & 1993; Walker *et al.*, 2000; Barbeau *et al.*, 1998). Flow Chart 1 briefly outlines the different modes of pathways through which cross-contamination can occur while Figure 1 explains medical waste segregation.

DISCUSSION

In a hard and fast life of a dental health care personnel, negligence of prevention against contamination is one of the main reasons in communicating cross infection. Ethically, while treating a patient, dental care personnel's should take care of cross contamination and provide a infection free treatment for the patients. The oral cavity is a unique environment with moist, proper temperature, and internal and external metabolites, which promote bacterial growth (Decraene *et al.*, 2008). Thus acting as a nidus for infectious pathogens like HIV, HBs Ag, etc. HIV continues to be a major global public health issue, having claimed more than 35 million lives so far. In 2016, 1.0 million people died from HIV-related causes globally (WHO Fact Sheets, 2017). Dental health care personnel can contribute to get control of this particular scenario, minimal effort can be made by treating every patient as immune compromised for which a thorough case history and making at least tridot testing mandatory in all clinical setups. Thus, health organizations developed guidelines to prevent or minimize threat to dental team's health (Matsuda *et al.*, 2011). The spread of microorganisms can be reduced by limiting surface contamination by microorganisms; adhering to good personal hygiene practices, particularly efficient hand hygiene; using personal protective equipment; using disposable products where appropriate (e.g. paper towels); and following risk minimization techniques such as using rubber dam and pre-procedural mouthrinsing (Pankhurst, 2017; ADA's Guidelines for Infection Control, 2015; Cottone *et al.*, 1996; Anil *et al.*, 1999; Recommended infection-control practices for dentistry, 1986 & 1993; US Department of Labor, 1991 & 2001).

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