Contamination in Dental Chair

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Abstract:

Aim:

To estimate the contamination in various sites of a dental chair.

Objective:

The goal of the study is to determine the rate of contamination and risk of cross infection.

Materials and method:

Moisten swabs are used to collect specimens by swabbing technique. The samples are collected from the contact sites such as instrument tray handle, light handle and head rest of the dental chair. The samples are inoculated in blood agar medium to enumerate the number of bacteria present.

Purpose of study:

To explore the importance of infection control and the modalities to be followed up by the operator in order to control contamination and spread of infection to at most possible rate.

***Keywords*: Contamination, Dental chair , Aerosols, Bacteria.**

INTRODUCTION:

Contamination refers to the non-intended or accidental introduction of infectious material like bacteria, yeast, mould, fungi, virus, prions, protozoa or their toxins and by-products.Bacteria are microorganisms with a size of up to 5 µm and represent the most important group of pathogens when discussing contamination.Viruses are subcellular biological objects with a size of 20-200 nm. They exist with and without envelopes. Prions are infectious protein particles. They are the smallest pathogens, which are below 5 nm in size. Both prions and viruses are particles without own metabolism.

Clinical contact surfaces are surfaces that come in contact with sprays, spatters, contaminated instruments, and the dental worker's gloved hand. These include dental light handles, chair switches, X-ray equipment, computer keyboards, reusable containers of dental materials, and other items used during dental treatment. An effective way to protect some clinical contact surfaces is to use plastic barriers. Because barriers can become contaminated, they should be removed and discarded after each patient while the dental worker is still gloved.

Clinical contact surfaces that are not barrier-protected must be cleaned and disinfected between patients. CDC guidelines state that an EPA-registered disinfectant with a minimum kill claim of HBV and HIV should be used on contaminated clinical contact surfaces. When the surface is visibly contaminated with blood, an intermediate level disinfectant should be used.

Materials and methods of study:

Moisten swabs were used to collect specimens by swabbing technique. The cotton swab was dipped in saline and the samples were collected. The specimens were collected from sites where the dental practitioners gloved hand contacts the dental chair during the procedure such as instrument tray handle, light handle, and head rest of the dental chair. The collected samples were inoculated in blood agar and incubated for 24 hrs to enumerate the number of bacteria present. Samples were collected from 10 different chairs in the above mentioned.

Discussion:

Certain surfaces, especially ones touched frequently (e.g., light handles, unit switches, and drawer knobs) can serve as reservoirs of microbial contamination, although they have not been associated directly with transmission of infection to either dental health-care professionals (DHCP) or patients. In the story above, hepatitis B transmission did occur in October 2001 after routine extractions. Cleaning and disinfecting environmental surfaces can be a life or death task for patients in any dental facility. Transfer of microorganisms from contaminated environmental surfaces to patients occurs primarily through DHCP hand contact. When surfaces are touched, microbial agents can be transferred to instruments, other environmental surfaces, or to the nose,

mouth, or eyes of workers or patients. Although hand hygiene is key to minimizing this transferal, barrier protection or cleaning and disinfecting of environmental surfaces also protects against health-care–associated infections.

Environmental surfaces are divided into clinical contact surfaces and housekeeping surfaces. Housekeeping surfaces such as floors, walls, and sinks have limited risk of disease transmission. Action plan for cleaning and disinfecting surfaces in patient-care areas should consider written standard operating procedures that consider the following:

- The potential for direct patient contact.
- The degree and frequency of hand contact.
- Potential contamination of the surface with body substances or environmental sources of microorganisms.

Cleaning is the necessary first step of any disinfection protocol. Cleaning is a form of decontamination that renders the environmental surface safe by removing organic material and visible soils, all of which interfere with microbial inactivation. If a surface has not been cleaned first, the success of the disinfection process can be compromised. If a surface cannot be cleaned adequately, it should be protected with barriers. Barrier protection of surfaces and equipment and small buttons or switches can prevent contamination of clinical surfaces including those hard to clean.

When barriers are not being used, surfaces should be cleaned first, then disinfected between patients using an EPA-registered hospital disinfectant with an HIV, HBV claim (low-level disinfectant) or a tuberculocidal claim (intermediate-level disinfectant). An intermediate-level disinfectant should always be used when a surface is visibly contaminated with blood or other potentially infectious material (OPIM). As stated earlier in this article, environmental surfaces can become contaminated via sneezing and coughing, which can contaminate work surfaces. This, in turn, can cause the transmission of disease. Potentially infected bacteria or blood and saliva cannot always be seen. Treatment areas should be kept free from clutter (e.g., papers, supplies, and equipment) to expedite cleaning and disinfecting treatment areas between patients.

Mycobacterium TB (Mtb) has been a benchmark for dentistry for years. Mtb is a bacterium that is hard to kill because of its cell wall, which is 60% lipid. This TB bacterium is an aerobe; it needs oxygen to survive and can withstand weak disinfectants and survive in a dry state for weeks. TB is transmitted via airborne route. Potency against Mtb has been recognized as a substantial benchmark to measure germicidal potency. Mycobacterium has the highest intrinsic levels of resistance among the vegetative bacteria, viruses, and fungi; germicides with a tuberculocidal claim on disinfectant labels are considered capable of inactivating a broad spectrum of pathogens, including such less-resistant organisms as bloodborne pathogens (e.g., hepatitis B virus, hepatitis C virus and HIV).

Microbial aerosols and spatter may be generated through several dental procedures, including the use of hand pieces and drills, ultrasonic scalers, and air and water syringing. Many studies have been done to investigate which procedure generates more airborne microbial contamination . Ultrasonic scaling seems to be the greatest producer of contaminated aerosols and spatter . In most of those studies the authors evaluated the number of bacteria during a single period of time, from 10 minutes to 3 hours.With more exposure time, it is probable that the mean density of the microbial colonies would be higher.

Almost every study cited used a non- selective medium, such as blood agar. When an aerobic bacterium settles and grows as a colony, it is counted as a colony forming unit, or cfu. In most of the studies, the total number of cfus produced after the dental procedures were counted. This allows the quantification of viable bacteria settled, but does not give a specific indication of oral contamination.Previous studies have shown that higher levels of bacterial aerosols are registered after dental procedures when compared to those determined pre-operatively.

High technology has provided dentistry with infection-control–friendly equipment. Cleankeys is a flat keyboard that saves time when cleaning and disinfecting any operatory or for the administrative staff. This style of keyboard eliminates worries about spilled liquids or food lodging in between the keys. This keyboard has a mouse included to guard against contamination and promote easy cleaning.

Result: Table 1

Sample no.	Instrument tray handle	Head rest	Light handle
1.	250	250	60
2.	200	800	25
3.	100	200	150
4.	75	350	100
5.	80	860	28
6.	180	300	700
7.	25	100	50
8.	300	250	100
9.	400	300	200
10.	360	25	70

The above table shows the number of colonies estimated in each chair at all the three sites.

Conclusion:

There should be awareness and precautions that are necessary should be taken as it plays an important role in the prevention of cross contamination. It is the pivotal role played by the dental team to prevent or to minimize the rate of cross contamination to at most possible rates. It occurs mostly with the three aspects:

1. The gloved hand can contaminate the surfaces touched.
2. When one hand is ungloved and the other is gloved, washing the hand cannot be done efficiently, thus leading to contamination.
3. Contaminating once hand by wearing the used gloves once again.

One solution for overcoming such issues can be by using "Food handler" gloves or overgloves available. Another solution can be use of cotton pliers, Salad tongs or forceps to open the drawer and then clean cotton pliers can be used to grasp the needed items.

References:

[1] CDC Centers for Disease Control and Prevention, Hepatitis B Virus Transmission in a Dental practice
[2] Morrison A, Conrad S. Dental burs and endodontic files: are routine sterilization procedures effective? J Can Dent Assoc. 2009 Feb;75(1):39. Republished in: Tex Dent J. 2010 Mar;127 (3):295-300.
[3] Smith A, Dickson M, Aitken J, et al. Contaminated dental instruments. J Hosp Infect. 2002 Jul;51(3):233-5.
[4] Gordon W, Atabakhsh VA, Meza F, Rizoiu I, Stevens R, et al. The antimicrobial efficacy of the erbi-um, chromium:yttrium-scandium-gallium-garnet laser with radial emitting tips on root canal dentin walls infected with Enterococcus faecalis. JADA 2007; 138(7):
[5] Smith AJ. Decontamination of dental burs. British Dental Journal 197, 623 (2004).
[6] Whitworth CL, Martin MV, Gallagher M, et al. A comparison of decontamination methods used for dental burs. British Dental Journal, Vol 197 No. 10.
[7] Bennett P, Grove P, Perera L, McLean I. Potential vCJD Transmission Risks Via Dentistry: An Interim Re-view. Presented to the Spongiform Encephalopathy Advisory Group (SEAC), 14th December 2007.
[8] Bagg J, Sweeney CP, Roy KM, Sharp T, Smith A. Cross infection control measures and the treatment of patients at risk of Creutzfeldt Jakob disease in UK general dental practice. Br Dent J 2001; 191(2):87–90.
[9] Taylor DM. Inactivation of prions by physical and chemical means. J Hosp Infect 1999; 43 Suppl: S 69–76
[10] Ingrosso L, Pisani F, Pocchiari M. Transmission of the 263K scrapie strain by the dental route. J Gen Virol 1999; 80:3043–7.
[11] Adams DH, Edgar WM. Transmission of agent of Creutzfeldt-Jakob disease. Br Med J 1978; 1(6118): 987.
[12] Ito M, Ashoori M, Osuka S, Matsuyama M, Usami T, Kaneda T. International Conference on AIDS, Cross-contamination risks of invasive dental procedures using high-speed handpieces. Int Conf AIDS. 1994.