

# Knowledge and practices about sterilization and disinfection

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## ABSTRACT

**Aims:** The aim of the present study was to evaluate the knowledge and practices employed for infection control in dental laboratories. **Materials and Methods:** A preformed questionnaire comprised of 16 questions related to infection control measures was prepared. This questionnaire based survey was then conducted among dental technicians of 60 dental colleges in East India. Data were then recorded and analyzed. **Results:** Majority of impressions/prosthesis were carried in plastic bags (93.8%) by laboratory attendants to the laboratory. The responses revealed that majority of impressions were received after wearing gloves (54.6%) from dental attendant. Majority of dental technicians (78.1%) admitted in their responses that they are not aware of infection control measures taken in dental laboratory. Only 32.8% technicians were found to practice disinfection procedure after receiving impression/prosthesis in laboratory from dental operator. Among protective wears, 70.3%, 95.3%, 32.8%, and 92.2% technicians were found to use gloves, Apron, eye shield, and face mask, respectively. Among all respondents, 59.3% were found to be vaccinated for hepatitis B vaccine. **Conclusion:** There is lack of knowledge and motivation among dental technician to practice infection control measures in dental laboratories of dental institutes in North India.

**Keywords:** Infection control, laboratories, laboratory technicians

## Introduction

Dentistry is the field of surgery which involves exposure of blood and saliva. Human saliva is reported to be comprised of 750 million microorganisms which could lead to cross contamination and occupational exposure to blood and saliva borne diseases.<sup>[1]</sup> Dental healthcare professionals are always at high risk of cross infection while treating patients due to constant exposure with body fluids, such as saliva and blood. Henceforth, in last 2 decades infection control has become apparent and has

been resulted in impressive protocols to prevent the spread of disease among dental staff and patients.<sup>[2]</sup>

Infection control is rigidly performed in dental operator and especially surgical operatories, but dental laboratories are often ignored and overlooked. This could lead to cross infection among dental technicians from pathogenic microorganisms attained by infected impressions, prosthesis, and clinical material received.<sup>[3,4]</sup> Infection control in dental laboratories was first suggested by American Dental Association (ADA) by following guidelines of the Centers for Disease Control (CDC) for “Universal Protection” for health care workers and patients from pathogenic infections in 1987. It was published first in 1986 and revised in 1993.<sup>[5]</sup>

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Dental casts are very difficult to disinfect as compared to impressions because the microorganisms can penetrate inside the gypsum material leaving viable oral bacteria for as long as a week even in set gypsum. Henceforth, it is of utmost importance to disinfect dental impression immediately after receiving from dental operator.<sup>[6]</sup>

Although many issues and measures have been addressed for infection control measures but still unfortunately the hygiene remains substandard in dental laboratories due to negligence or lack of awareness among dental technicians. Hence, it becomes important to assess knowledge and motivation among dental technicians to maintain infection control in dental laboratory.

As the human saliva comprises of millions of microbes leading to cross contamination and occupational exposure to blood and saliva-borne diseases from pathogenic microorganisms attained by infected impressions, prosthesis, and clinical material received. Furthermore, dental personnel is at 5–10 folds higher risk of getting infected from hepatitis B infection as compared to general population. Therefore, the present study purposed to assess the knowledge and practices employed for infection control in dental laboratories, so that the blood-borne and saliva-borne diseases can be controlled, thereby decreasing the morbidity and mortality.

## Materials and Methods

### Study design and population

The present study included 60 dental colleges from various parts of East India including West Bengal, Orissa, Bihar, Chattisgarh, Jharkhand and Assam. Dental technicians of selected dental colleges were recruited for the study. Prior to the initiation of the study, ethical clearance and written consent was obtained from the Institutional Ethics Committee (Taken on 04-10-2019) and dental technicians, respectively.

### Questionnaire

A pre formed questionnaire was prepared which was comprised of 16 questions [Table 1]. The questionnaire was prepared based on language known to the respondents. The questions were prepared to assess the knowledge, attitude, and practices employed for infection control in dental laboratories. No time limit was imposed on participants so as to reduce induced error. Data were then recorded and tabulated in excel sheets for analysis.

### Statistical analysis

Data were tabulated and examined using the Statistical Package for Social Sciences Version 20.0 (IBM SPSS Statistics for Mac, Armonk, NY: IBM Corp, USA). Descriptive statistical analysis had been carried out in the present study. Results on categorical data were presented as Frequency distribution.

## Results

Dental technicians from 60 dental colleges were recruited for the study. A total of 64 dental technicians responded

positively and participated in the present study. The responses in the present study stated that most of the dental technician received >30 (56.3%) impressions in a week. Majority of impressions/prosthesis were carried in plastic bags (93.8%) by laboratory attendants to the laboratory. The responses revealed that majority of impressions were received after wearing gloves (54.6%) from dental attendant. Majority of dental technicians (78.1%) admitted in their responses that they are not aware of infection control measures taken in dental laboratory.

Around 70.3% dental technician responded that they have been informed about the disinfection procedure of impressions/prosthesis while receiving from dental operator. A total of 56.3% dental technician stated that their laboratory have separate receiving area for laboratory work transfer. Only 32.8% technicians were found to practice disinfection procedure after receiving impression/prosthesis in laboratory from dental operator. Immersion method was found to be favored by majority of technicians (67.2%). Majority of respondents (45.3%) stated that they perform the immersion procedure for 10 min.

Among protective wears, 70.3%, 95.3%, 32.8%, and 92.2% technicians were found to use gloves, Apron, eye shield, and face mask, respectively. Among all respondents, 59.3% were found to be vaccinated for hepatitis B vaccine. Only 29.7% respondents stated that they change the pumice slurry after every case. But only 7.8% of technicians were found to add disinfectant in pumice slurry.

Among all technicians only few (23.4%) were found to disinfect the laboratory work before sending it to dental operator. Only 4.7% respondents accepted that they change water of pressure pot after each curing. A total of 81.2% respondents were found to follow proper disposal system instructions for waste disposal [Table 1].

## Discussion

Infectious diseases in dental clinic and laboratory could be transmitted to health care professional who are exposed to variety of microorganisms, such as HBV, HCV, HIV, mycobacterium, *Streptococci pseudomonas*, etc. Henceforth, it is mandatory for dental staff to attain universal precaution for preventing transmission of infectious diseases.<sup>[7]</sup> Choel *et al.*<sup>[8]</sup> in their literature review have stated that the prevalence of occupational hazard among dental technician was found to be 15.4%.

In the present study, it has been revealed that plastic bags were majorly used to carry impressions/prosthesis from operator to laboratory and only 4.7% attendants' use containers for transportation. According to guidelines stated by Occupational Safety and Health Administration (OSHA) "potentially infectious materials shall be placed in a container which prevents leakage. Labeling or color coding is required when such specimens/containers leave the facility."

**Table 1: Questionnaire and response of participants regarding infection control (n=64)**

Questions	Frequency	%
Q1: How many dental impression you receive in a week?		
A. <20	7	10.9
B. 20-30	21	32.8
C. >30	36	56.3
Q2: How do operatory attendant carry the impression from dental operatory?		
Plastic bag	60	93.8
Containers	3	4.7
Other	1	1.5
Q3: How do you receive impressions from dental attendant?		
Bare hands	26	40.7
Gloves	35	54.6
Other	3	4.7
Q4: Are you aware of infection control measures taken in dental laboratory?		
Yes	14	21.9
No	50	78.1
Q5: Does your dental surgeon have informed you about the disinfection procedure of impression/prosthesis received from dental operatory?		
Yes	45	70.3
No	19	29.7
Q6: Do you have separate receiving area in your laboratory?		
Yes	36	56.3
No	28	43.8
Q7: Do you disinfect the impression/prosthesis received in dental laboratory from operatory?		
Yes	21	32.8
No	42	65.6
Sometimes	1	1.6
Q8: If you disinfect, which procedure do you use for disinfection?		
Immersion	43	67.2
Spraying	20	31.2
Others	1	1.6
Q9: If you use immersion method, what is the duration for immersion?		
<10 min	22	34.3
10 min	29	45.3
>10 min	13	20.4
Q10: What universal protection wares you use in dental laboratory?		
Gloves		
Yes	45	70.3
No	19	29.7
Apron		
Yes	61	95.3
No	3	4.7
Eye shield		
Yes	21	32.8
No	43	67.2
Face mask		
Yes	59	92.2
No	5	7.8
Q11: Are you vaccinated for hepatitis B?		
Yes	38	59.3
No	26	40.7
Q12: Do you change pumice slurry after each case?		
Yes	19	29.7
No	45	70.3
Q13: Do you add any disinfectant to pumice slurry?		
Yes	5	7.81
No	59	92.2
Q14: Do you disinfect laboratory work before sending it to dental operatory?		
Yes	15	23.4
No	49	76.6

*Contd...*

Table 1: Contd...

Questions	Frequency	%
Q15: Do you change water of pressure pot after each curing?		
Yes	3	4.7
No	61	95.3
Q16: Do you have proper disposal system instructions for waste disposal?		
Yes	52	81.2
No	12	18.8

About 54.6% of the respondents stated that they take impressions from dental operatory while wearing gloves. Bhat *et al.*<sup>[9]</sup> revealed that adequate barrier system should be followed in the laboratory on a routine basis. Disposable gloves should always be used and should be appropriately disposed off after use.

On assessment of awareness among dental technician regarding infection control measures, it was found that only 21.9% participants were aware and employ infection control practices in dental laboratory. Al-Kheraif and Mobarak<sup>[10]</sup> resulted similar results and depicted that 87.5% of the respondents were unaware and did not follow any infection control procedure. They also emphasized on the matter that infection control measures in dental laboratory should not be overlooked and mandatory infection control training courses should be performed for the dental technicians in the dental institutes.

In the present study, 56.3% respondents revealed that they have separate receiving area in their laboratories. Kaul *et al.*<sup>[11]</sup> in their research have stated that separate zone for receiving laboratory materials is essential. 70.3% respondents have depicted that they had been instructed by the respective dental surgeon regarding infection control measures taken in dental laboratory. Kohli and Puttaiah<sup>[7]</sup> in their textbook have mentioned that along with proper instruction by dental surgeon to technician there should be descriptive labeling depicting whether the material is been disinfected or not.

Only 32.8% respondents stated that they disinfect all the impressions received from operatory. These results depict the negligence and unawareness of technicians towards maintaining hygiene. Marya *et al.*<sup>[12]</sup> stated that negligence in disinfecting could lead to cross contamination of laboratory area and could cause various infective diseases. Therefore, it is essential to disinfect any material contaminated by body fluids for your own protection.

Immersion technique of disinfection was depicted as method of choice by 67.2% respondents followed by spraying method. Ngpal and Chaudhary<sup>[13]</sup> in their study showed the similar findings and preferred immersion technique over spraying technique of disinfection as it constantly covers the entire surface of material disinfected.

Nearly 45.3% respondents answered that immersion methods requires immersing impression for 10 minutes and others responded <10 minutes and >10 minutes. These results depicted that the majority of technicians are unaware of disinfection

procedure. Kugel *et al.*<sup>[14]</sup> have stated that most of the dental technician were found to disinfect impressions by immersion longer than the recommended duration. The ideal time duration for disinfection of the impression was 10 min.

In the present study, the data depicted that 95.3% and 92.2% technicians were wearing apron and facemask respectively while working in laboratory as personal protective equipment (PPE). In addition, 70.3% and 32.8% respondents were wearing gloves and eye shield while working. Usage of eye shield while working in laboratory was found to be least in the present survey. Recommendations from OSHA<sup>[15]</sup> have suggested the use of protective wear like gloves, eye shield, apron, and face mask to reduce the risk of exposure by pathogenic organisms.

A total of 59.3% dental technicians were found to be vaccinated against hepatitis B virus infection. Only 29.7% participants were found to change pumice slurry after each case. The US Army Dental Care System<sup>[16]</sup> has suggested that pumice solution should be changed daily after each case, and the machines must be disinfected on a regular basis. Moreover only 7.8% technicians were found to add disinfectant in pumice slurry. Firoozeh *et al.*<sup>[17]</sup> have revealed that pumice slurry could lead to contamination to technicians. Henceforth, they advised the use of disinfectant to the pumice (0.2% chlorhexidine gluconate or 5% hypochlorite sodium). Among the respondents, only 4.7% technicians were found to change water of pressure pot after each curing. Dwairi *et al.*<sup>[18,19]</sup> depicted similar results and stated that majority of respondents did not change the pumice slurry and water in pressure pot.

Regarding disposal system for waste in the laboratory, it was found that 81.2% dental technicians were performing proper waste disposal system in laboratories. Waste disposal system in dental laboratories is a major concern as lot of medical waste is generated in laboratories. Proper waste disposal system is mandatory to prevent cross contamination and occupational exposure to potential pathogens causing disease. Henceforth, the dental institutes and dental clinics should have a contract with a professional waste management company which regularly removes the hazardous waste from the clinic.

## Conclusion

Within the limitations of the present study, it could be concluded that there is lack of knowledge and motivation among dental technician to practice infection control measures in dental

laboratories of dental institutes in North India. In dental institutes, OSHA and CDC guidelines should be made mandatory to reduce risk of exposure of pathogenic microorganisms among dental staff and patients. Proper training sessions should be conducted to increase awareness among dental technicians for their well-being. Further studies should be conducted to assess and evaluate the ignored aspect of infection control so that possible measures could be taken to resolve the issue.

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### Conflicts of interest

There are no conflicts of interest.

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