Practice of Cross-infection Control for Dental Impression in Commercial Dental Laboratory

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ABSTRACT

Introduction: Dental professionals are at the risk of exposure to wide varieties of microorganisms from blood and saliva of patients to airborne infection from microbial-laden aerosols and spatter created during laboratory procedures. Dental laboratories are usually disregarded when planning effective infection and exposure control measures. Contaminated impression may act as a vehicle for transmission of infectious agents.

Objective: The objective of this study was to assess the practice of dental technicians towards infection control and to evaluate practice of the same for dental impressions in commercial dental laboratories.

Methods: Self-administered standard questionnaire was distributed to 35 dental laboratories and 31 participated in the study. The answers were collected by the investigators themselves. The data obtained were computed and analysed to find the results.

Results: Among all dental laboratories, 21 (67.75%) ensure dental impression is disinfected in clinic. 18 (58.06%) wear gloves when receiving clinical items and 27 (87.10%) transfer the items in separate sealed plastic bag. Of all, 25 (80.64%) of the dental laboratories have separate receiving area for dental impression and 23 (74.19%) of the dental technicians continue to wear protective barriers (gloves, mask and apron) during work. In total, 29 (93.55%) of the dental laboratories confirmed, none of their technicians has ever attended any course or training in cross-infection control.

Conclusion: The practice of cross-infection control for dental impression in commercial dental laboratories is acceptable. There should be proper guidelines from the regulating body on the protocol of infection control and laboratory waste disposal.

Keywords: Cross-infection control; dental impression; dental laboratory.

INTRODUCTION

Dental professionals, whether working with patients in clinics or in dental laboratories, are always at risk of exposure to a wide variety of microorganisms from blood and saliva of patients and also to airborne infections from microbial-laden aerosols and spatter created during laboratory procedures.[1] Sixty-seven percent of the impressions, dentures, crowns and wax occlusal rims showed microorganisms of various pathogenicity which included Enterobacter cloacae, Escherichia coli, Klebsiella oxytoca, and many others.[2] Contaminated impression and prosthesis may act as vehicles for transmission of infectious agents, to and from the dental clinics and the laboratories. Literature suggests various preventive measures to control cross-infection: vaccination against susceptible infections, use of effective barriers (gloves, mask, eye glasses, and preventive clothing), use of chemical agents for disinfection of dental impressions both in clinics and dental laboratories, and proper management of clinical and laboratory waste.[3,4] Although the practice of infection control should be strictly implemented in dental clinics, dental laboratories are usually disregarded when planning effective infection and exposure control measures. The objective of this study was to assess the practice of dental technicians toward infection control and to evaluate the practice the same for dental impression in commercial dental laboratories.

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METHODS

This is a descriptive cross-sectional questionnaire-based study. Ethical approval for the study was granted by Institutional Review Committee of Kathmandu Medical College on 20th May 2019. Convenience (non-probability) sampling method was used for data collection. Sample size

was calculated using following formula: Sample size (n) = 4pq/e2

Where, p = Prevalence from previous study; q = 100-p; and e = margin of error. Sample size calculation has been done taking into consideration, the involvement of study participants in research from study done by Sedky[5] which was found to be 92% for dental technicians.

Putting this value into formula, (for dental technicians)

p = 92%; q = 100-92= 8%; e = 10% of 92

$$\text{Actual sample size(n)} = \frac{4 \times 92 \times 8}{\left[\frac{10}{1000} \times 92\right]^2}$$

= 2944/84.64

= 34.78

Rounding off, the sample size for dental technicians was taken as 35.

Commercial dental laboratories receiving dental impressions from dental clinics were included in the study. Self-administered standard questionnaire with reference to similar survey[5] was prepared and distributed to 35 dental laboratories in Kathmandu. The purpose and nature of the study were clearly mentioned in the consent form both in English and Nepali language. Out of 35 dental laboratories, 31 participated in the study. The answers were collected by the investigators themselves. The data obtained were computed in Microsoft Excel (2016) and analysed to find the results.

RESULTS

The questionnaire and the responses are illustrated in Table 1.

Table 1: Questionnaire and response, n (%).

Question	Response	Frequency
Number of impressions received in a week	<20	6 (19.36)
	20-30	6 (19.36)
	31-50	2 (6.45)
	>50	17 (54.83)
Do you ensure clinical items are disinfected in clinic before receiving them	Yes	21 (67.75)
	No	10 (32.25)
Do you wear gloves when receiving clinical items	Yes	13 (41.94)
	No	18 (58.06)
How to you carry impression from dental clinic to laboratory	Separate plastic bag with seal	27 (87.1)
	Separate plastic bag without seal	2 (6.45)
	Carry all impression from different clinic in same bag	2 (6.45)
Does your laboratory separate receiving area for dental impression	Yes	25 (80.64)
	No	6 (19.36)
Do you wear gloves, mask and apron during work	Yes	23 (74.19)
	No	8 (25.81)
Do you disinfect or wash dental impression after receiving in laboratory	No	7 (22.59)
	Wash and Spray with disinfectant	2 (6.45)
	Wash and dry with cotton	22 (70.96)
Have any of your employee attended any course for cross-infection control?	Yes	2 (6.45)
	No	29 (93.55)
Do you know what diseases can you contaminate if you don't follow proper infection control protocol?	No	7 (22.59)
	Yes (but cannot specify)	9 (29.03)
	Yes (can specify – Tuberculosis, Hepatitis , HIV)	15 (48.38)
Do you use proper disposable system for laboratory waste?	Yes	18 (58.06)
	No	11 (35.49)
	No response	2 (6.45)

DISCUSSION

Cross-infection is defined as the transmission of infectious agents between patients and staff within a clinical environment.[6] It can also take place between the patient and dental technicians by transferring contaminated items from dental clinics to dental laboratories and vice versa. Impression material exposed to infected saliva and blood may act as a source of transmission of microorganisms, which may lead to the spread of transmissible diseases such as acquired immunodeficiency syndrome (AIDS), hepatitis, herpes, tuberculosis and many others.[3,7] According to the study done in Nepal,[8] nearly 260,000 individuals are chronically infected with Hepatitis B Virus (HBV) and a majority of them are unaware of their infection.

Universal precautions guidelines advocated the avoidance of direct physical contact with "all moist and potentially infectious body substances," even if blood is not visible.[9] The British Dental Association,[10] Australian Dental Association,[11] and American Dental Association[12] have published guidelines that describe the infection control procedures, dental practitioners and their clinical support staff are expected to follow in a dental practice. Nepal also has published "Infectious Disease Control Guideline"[13] but less has been mentioned about the preventive measures in dental practice. As per international guidelines followed by many countries,[10,-12,14] dental impression should be disinfected with proper disinfecting chemicals following manufacturer instructions, with the labels attached before it leaves the dental clinic.

The result of the present study showed most of the dental laboratory receive more than 50 impressions in a week (54.83%). Majority of the laboratory technician ensured that the dental impression they are receiving from the clinic is disinfected (67.75%). They wear gloves while receiving clinical items (58.06%) and carry dental impression in a separate plastic bag with a seal (87.1%). After receiving the dental impression, for which most of them have a separate receiving area/unit (80.64%), only two of the 31 participating labs disinfect the impression after washing in running water, 22 (70.96%) labs only wash the impression and seven labs never wash or disinfect the impression. Repeated disinfection and selection of wrong disinfectants for any particular dental impression may have an adverse effect on the dimensional stability and surface details of the impression.[7] So it is essential to have adequate knowledge and proper communication between the clinic and dental laboratory in this regard.[10] Some labs mentioned the use of Dettol soap and water for disinfection.

Almost all (93.55%) of the participating labs mentioned their employees had never attended any course for infection control. When asked about types of diseases they can contaminate if they don't follow proper infection control protocol, we found that most of them were aware of the infectious diseases like Tuberculosis, Hepatitis, and HIV and therefore were found to using protective barriers like gloves, mask, and apron during work (74.19%). This is a positive finding when compared to a similar type of study, where the investigators reported the poor compliance of dental technicians in using protective barriers.[14]

Proper disposal of laboratory waste is a vital factor in infection control. Impression materials amount to 30% of the total solid waste generated in dental practice.[15] Eighteen dental labs said they use a proper disposal system for laboratory waste. When asked about the disposal method they follow for impression material, none was found to follow the proper guidelines.[15] This shows there is confusion among technicians regarding the disposal of dental laboratory waste.

Nepal Medical Council has recently introduced requirement of Continuing Professional Development (CPD) point for medical and well as dental professionals which includes infection prevention and control as mandatory verifiable CPD point to be accumulated in the given time period.[16] To the knowledge of the author, there is no evidence of any guidelines to be regulating and updating the dental laboratory personals or any curriculum to produce efficient manpower in the respective field.

The major limitation of this study is a significant risk of false-positive feedback and limited sample size.

CONCLUSION

Within the limitation of this study, the authors can conclude that the practice of cross-infection control for dental impression in the commercial dental laboratory is at acceptable level. However, it is recommended that the concerned authorities (regulating bodies) set guidelines and protocols for proper infection control and laboratory waste disposal.

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Conflict of Interest: None.

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