EVALUATION OF CROSS INFECTION CONTROL AWARENESS AND PRACTICES IN DENTAL LABORATORIES

[1]ASMA NAZ, [2]SAIMA HANIF, [3]BHARAT KUMAR, [4]HIRA MUSHARRAF, [5]MUNEEB AHMED LONE, [6]ANJUM TARIQ

ABSTRACT

Cross infection is the physical transfer of harmful microorganisms from one person, object, or place to another. This is due to contamination in dental clinics, laboratories, improper protocol and the dental technicians are highly affected. The purpose of this study was to assess knowledge and infection control practices among dental technicians. This cross sectional study was carried out among dental technicians working in government and private dental laboratories of Karachi from July 2018 to December 2018. A questionnaire comprising of 15 questions regarding cross infection control was used to collect data. Out of 80 dental technicians, 62 responded, among them 12 were females and 50 were males. Only 8.1% of the technicians regularly wore gloves, while 22.6% wore protective eyeglasses and 3.2% used face shield regularly. 50% technicians wore lab coat while working. Items received from the dental clinics were regularly disinfected by 38.7% of technicians, only 32.3% regularly disinfected their work before sending back to the clinics and 19.4% of technicians regularly sterilized laboratory instruments. Pumice slurry and curing water were regularly changed by 30.6%. More than 50% of technicians stated that proper infection control measures increased the monetary burden on dental labs. The results of this study show that infection control protocols were not adequately practiced by dental technicians working in various dental laboratories of Karachi. Therefore, awareness should be created among dental technicians about cross infection control and dental laboratories should be monitored properly for observing cross infection control standards.

Keywords: *Cross-infection, Infection control, Dental laboratory*

This article may be cited as: Naz A, Hanif S, Kumar B, Musharraf H, Lone MA, Tariq A. Evaluation of Cross Infection Control Awareness and Practices in Dental Laboratories. Pak Oral Dent J 2020; 40(2):98-102.

INTRODUCTION

Issues of cross infection and contamination in clinics and laboratories is of extreme concern. It has been noted that cross infection among dental technicians is because of inadequate and contaminated impressions and other clinical materials.[1] Studies in recent years have shown that more than half of the prostheses arriving from dental laboratories were infected with bacteria from the mouth of the patient.[2] The lathes and pumice used for finishing of prostheses in laboratories are the most prominent contributors of contamination.[3]

The root causes of the contamination caused by pathogenic microorganisms have been identified and ways to reduce them have been well documented. A national study of cross infection reported that ninety percent of all fractured dentures that were sent to various laboratories to be repaired were contaminated with pathogens.[4] Many studies have also hinted at pumice being greatly contaminated with bacteria including micrococcus, pseudomonas, alcaligenes, and gram negative bacilli of acinetobacter.[5] As these organisms are alien to a human oral cavity, they can prove to be fatal for the health of the patients whose dentures are infected with these microorganisms and the staff

[1] Asma Naz, Associate Professor Prosthodontics, Jinnah Medical and Dental College, Karachi, Pakistan Email: drasma_naz@hotmail.com

[2] Saima Hanif, Senior Lecturer, Oral Biology, Jinnah Medical and Dental College, Karachi, Pakistan Email: shanif73@gmail.com

[3] Bharat Kumar, Assistant Professor, Prosthodontics, Dow International Dental College, Dow University of Health Sciences, Karachi, Pakistan Email: bharat_khemani84@yahoo.com

[4] Hira Musharraf, Senior Lecturer, Prosthodontics, Dow Dental College, Dow University of Health Sciences, Karachi, Pakistan Email: hira_m57@live.com

[5] Muneeb Ahmed Lone, Assistant Professor, Prosthodontics, Dr Ishrat-Ul-Ebad Khan Institute Of Oral Health Sciences, Dow University of Health Sciences, Karachi, Pakistan Email: Email: muneeblone@gmail.com

[6] Anjum Tariq, Associate Professor, Department of Dental Materials, Jinnah Medical and Dental College, Karachi, Pakistan Email: anjtar1@hotmail.com

Received for Publication: Aug 2, 2019
First Revision: Oct 9, 2019
Second Revision: Dec 18, 2019
Approved: Jan 4, 2020

who handle the infected equipment. A research study reported ten distinct cases where technicians working in dental prosthetic laboratories had been suffering from infection caused by mycoplasma pneumonia.[5,6] Sofou A etal[2] tested impressions of patients who were known cases of tuberculosis and reported that 12% of the impressions were infected with mycobacterium tuberculosis This deduction makes it imperative that impressions and prostheses are disinfected in the dental clinic before being sent to and on return from the dental laboratory.

Dental laboratory technicians have an equal responsibility to adopt appropriate infection control measures as is for the dental specialist in a dental practice. All items sent from dental clinics such as impressions, plaster models, jaw registration bases and other prosthetic appliances if not properly disinfected before handling can lead to cross-contamination and cross infection to laboratory personnel. Implementation of infection control protocols and procedures, coupled with effective communication among the dental practitioner and technician, can help in creating a safe environment for personnel exposed to potential occupational risks.[7]

Sammy KC, Benjamin SN conducted study among dental technicians and result showed poor compliance to infection control procedures by most dental laboratories, only 33.33% carried out disinfection of dental impressions.[8] While in Gupta[9] study 30.76% of the dental technicians disinfected all impressions and mostly use immersion technique for disinfection. Al-Dwairi ZN[1] study showed 16 % of technicians wore gloves, 35% eye glasses, 40% protective face shield while working, and only14% had received an HBV vaccination. Despite of all these, cross infection control measures in clinical and laboratory area are still poor which highlights the need for awareness programs of continuously educating the dental team about cross infection control protocol following these measures especially in the department of prosthodontics.[10,11]

The objectives of this study was to assess knowledge and practices of cross infection control measures among dental technicians. This study will help us improving overall cross infection control and prevention of cross infection among dental technicians, clinical dental professionals and patients.

MATERIALS AND METHODS

This cross-sectional study was carried out among dental technicians working in the government institutes and private dental laboratories of Karachi for from July 2018 to December 2018. A structured questionnaire containing 15 questions related to cross infection were distuibuted among technicians if they used each of the following infection control practices: gloves, protective eyeglasses and face shields, lab coat had hepatitis B virus vaccination, laboratory work disinfection when sent to or received from dental offices, type and mode of disinfection and regularly changing water pot or pumice slurry and instruments sterilizations. Finally, technicians were asked if infection control procedures imposed a financial burden on them, along with demographic details such as age, gender, duration of experience was formulated to collect data. Written informed consent was taken from all participants were included in the study. Eighty survey questionnaires were distributed by the researchers among dental technicians working in various dental laboratories. The researcher was present at all times to clear any question that was not clearly understood by the participants. All the forms were scanned for missing data, and all such forms were excluded from the final analysis. Data was entered and frequencies and percentages were calculated using SPSS v. 21.0.

RESULTS

Out of 80 dental technicians contacted, 62 complete forms were received, giving a response rate of 77.5%. Twelve (19%) of the study participants were females while there were 50 (81%) males (Fig 1) with a mean age of 32.82 ±8.14. Fig 2 represents frequency and percentages of their age groups. 34% of technicians were working in government institutes and 66% were in private dental laboratories. Fig 3 represents duration of their working experience. Further details can be seen in table 1-2.

DISCUSSION

The contamination of prosthodontics items with infectious agents between the dental laboratory and clinic are mostly due to lack of adherence to proper infection control procedures.[12] This study is the first of its nature which has been done to evaluate the control procedures by dental technicians working in dental laboratories. As opposed to strict adherence to infection control procedure in universities and hospitals, these are often overlooked in local public institutes and private laboratories, that is why these were the focal point of the study. The questionnaire has a surprising response rate of 77.5% which further justifies the fact that dental technicians do recognize the matter as one of utmost importance.

The lack of infection control poses a serious health threat to dental laboratory technicians as they are at risk of an infection. Hence, the routine practice of using personal protective equipment is imperative. This study concluded that 8.1% of technicians used gloves regularly when handling dental materials that are received from clinics, leaving them exposed to serious health hazards. These finding are almost similar to the

TABLE1: RESPONSE OF QUESTIONS RELATED TO CROSS INFECTION CONTROL AWARENESS AND PRACTICES AMONG DENTAL TECHNICIANS

	Regularly	Occasionally	Never
Q:1 Wear gloves when receiving clinical items from dental clinics	5(8.1%)	33(53.2%)	24(38.7%)
Q:2 Wear protective eyeglasses during laboratory work	14(22.6%)	38(61.3%)	10(16.1%)
Q:3 Wear protective face shields during laboratory work	2(3.2%)	31(50.0%)	29(46.8%)
Q:4 Wear protective lab coat/apron	26(41.9%)	31(50.0%)	5(8.1%)
Q:5 Vaccinated against HBV	Yes 45(72.6%)		No 17(27.4%)
Q:6 Ensure that clinical items had been disinfected in the clinic before you receive them	14(22.6%)	41(66.1%)	7(11.3%)
Q:7 Disinfect clinical items if not disinfected in clinic	24(38.7%)	32(51.6%)	6(9.7%)
Q:8 Disinfect laboratory work before sending to clinic	20(32.3%)	31(50.0%)	11(17.7%)
Q:9 Change pumice slurry and water of pressure pot	19(30.6%)	32(51.6%)	11(17.7%)
Q:10 Do you use proper disposal system for waste in the laboratory	Yes 29(46.8%)		No 33(53.2%)
Q:11 Instruments sterilization	12(19.4%)	34(54.8%)	16(25.8%)
Q:12 Infection control measures pose a financial burden	Yes 34(54.8%)		No 28(45.2%)

TABLE 2: RESPONSE OF QUESTIONS RELATED TO DISINFECTION AND METHOD OF STERILIZATION

	Immersion	Spraying	Never		
Q: 13 If you disinfect the impressions/ prosthesis/ clinical items, then what is the mode of disinfection	24(38.7%)	32(51.6%)	6(9.7%)		
Q:14 What types of products are typically used for disinfection	Sodium hypochlorite	Gluteraldehyde	Soap & water	Never	
	21(33.9%)	27(43.5%)	8(12.9%)	6(9.7%)	
Q:15 Mode of sterilization	Autoclave	Dry heat oven	Chemical disinfection	Hot water sterilization	Never
	19(30.6%)	8(12.9%)	15(24.2%)	4(6.5%)	16(25.8%)

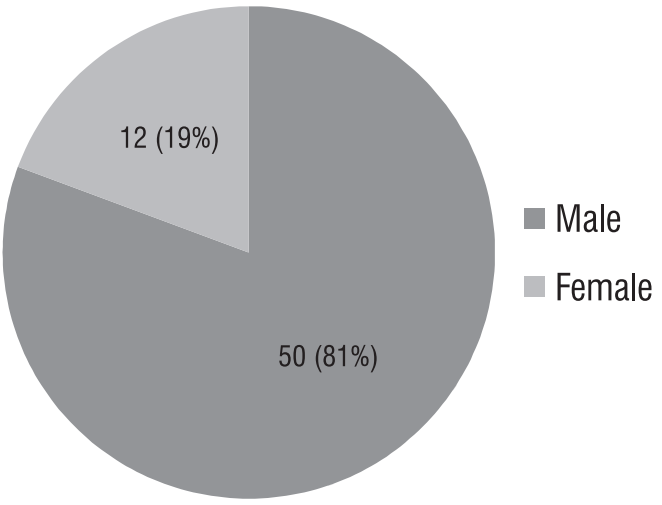

Fig 1: Gender wise distribution of dental technicians

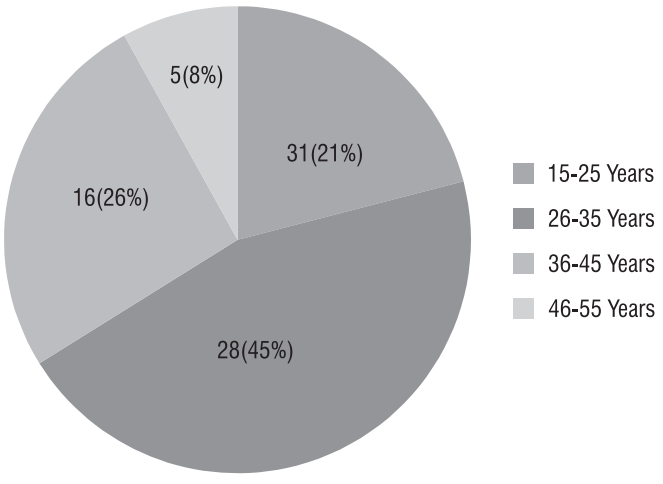

Fig 2: Age groups distribution of dental technicians

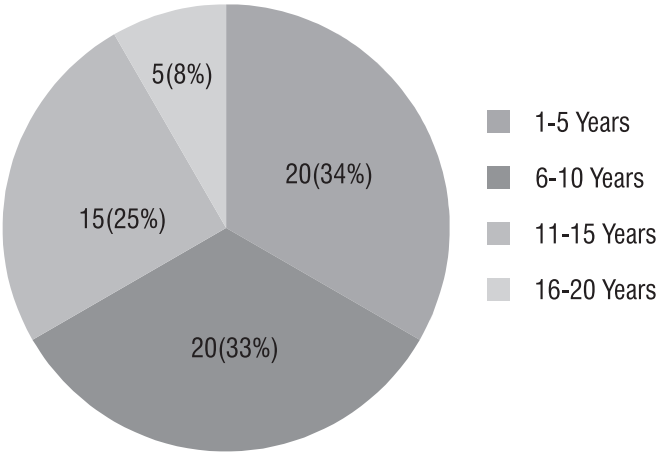

Fig 3: Experience of dental technicians

Al-Dwairi ZN[1] study in which 12% of dental technicians reported to wear gloves. This investigation showed that 61.3% of dental technicians occasionally wore protective eyeglasses, 50% face shields and lab coats, while only 22.6%, 3.2% and 41.9% regularly used these for their personal protection during lab work. This is far less than what was reported[13] in another study that showed that 74% technicians used protective eye wear during trimming and polishing prostheses. Al-Dwairi *et al.*[1] in their study reported that protective eyeglasses and face shields was used regularly by 35% and 40% of technicians respectively.

This study findings state that despite of reports of work-related infection of lab technicians with HBV, 72.6% of technicians in present study affirmed the fact that they were vaccinated against HBV. This is in stark contrast to results of studies of Al-Dwairi *et al,*[1] and Akeredolu *et al.*[14] in which only 10% and 24.4% technicians had been vaccinated for HBV.

Furthermore, only 22.6% of respondents said that they regularly disinfect items after receiving. These finding are similar to the study of Al-Dwairi *et al*[1]. The fact that contaminated impressions harbor microorganisms and transfer them to their surroundings further reiterates the fact that impressions should always be properly disinfected before the clinicians send to the laboratory. Another study reported that out of 400 U.S. dental laboratories, only about 44% were familiar with the status of disinfection of impressions that they received.[3] Sterilization procedures are in vogue to reduce spread of infections like tuberculosis, herpes, hepatitis B, C and AIDS among dental technicians and dental clinic staff.[15] Present study shows that only 19.4% of dental technicians regularly, while 54.8% occasionally carry out sterilization of lab instruments, and only 30.6% follow proper autoclave method. While Akeredolu *et al*[14] study reported that 53.5% of technicians never sterilized their hand instruments. This study also found that only 32.3% technicians properly disinfected work that had been done in laboratory before returned back to their respective clinics. For disinfection of the impressions and prosthetics lab work, majority of them used spraying method and only 38.7% used immersion method with 43% gluteraldehyde solution, sodium hypochlorite 34% and rarely with soap & water, while in Al-Dwairi ZN[1] study 20% of technicians regularly did proper disinfection of their lab work. Another similar study[14] showed that 59.6% dental technicians disinfect prostheses/denture prior to transfer to dental clinics. 42.30% of dental technicians used immersion while 25% spraying as a method of choice. These finding are in contrast with current study.

Majority of the technicians (69.23%) changed pumice slurry after regular intervals[9], 86% of technicians never changed pumice slurry[1], while in this study 51.6% of technicians occasionally and 17.7% never considered to change pumice slurry and curing water bath. 53.2% of labs of this study did not have proper disposal system for waste, which is not similar to the finding of Gupta S[9] study that reported that 91% of their labs have proper disposal system.

In the present study, 54.8% of laboratory technicians affirmed that practicing proper infection control measures carry increased financial burden.

CONCLUSION

It was concluded that infection control practices were mostly neglected.

REFERENCES

1 Al-Dwairi ZN. Infection Control Procedures in Commercial Dental Laboratories in Jordan. J Dent Edu. 2007;71(9):1223-27.

2 Sofou A, Larser T, Fiehn NE, Owell B. Contamination level of alginate impressions arriving at a dental laboratory. Clin Oral Investig. 2002;6(3):161-65.

3 Kugel G, Perry RD, Ferrar M, Lalicata P. Disinfection and communication practices: a survey of U.S. dental laboratories. JADA. 2000;131(6):786-92.

4 Shah R, Collins JM, Hodge TM, Laing ER. A national study of cross infection control: 'are we clean enough?'. BDJ. 2009;207(6):267-74.

5 Agostinho AM, Miyoshi PR, Gnoatto N, Paranhos Hde F, Figueiredo LC, Salvador SL. Cross contamination in the dental laboratory through the polishing procedure of complete dentures. Braz Dent J. 2004;15(2):138-43.

6 Sande MA, Gadot F, Wenzel RP. Point source epidemic of Mycoplasma pneumoniae infection in a prosthodontics laboratory. Am Rev Respir Dis. 1975;112(2):213-17.

7 Kohn WG, Harte JA, Malvitz DM, Collins AS, Cleveland JL, Eklund KJ. Cover story guidelines for infection control in dental health care settings-2003. J Amer Dent Ass. 2004;135(1):33-47.

8 Sammy KC, Benjamin SN. Infection control mechanisms employed by dental laboratories to prevent infection of their dental technicians/ technologists. J Oral Health Craniofac Sci. 2016;47:1-11.

9 Gupta S, Rani S, Garg S. Infection control knowledge and prac-

tice: A cross-sectional survey on dental laboratories in dental institutes of North India. J Ind Prosthc Soc. 2017;17(4):348-54.

10 Hanif M, Shaikh Ma, Fazal M. Analysing the knowledge & practice of cross infection control among pakistani & swedish dental students. PODJ. 2019;39(2):149-54.

11 Hakam FA, Khalil A, Khan SU, Shakir S. Cross-infection control practices in prosthodontics among undergraduate students, graduates and post-graduate students: a cross-sectional study. PODJ. 2018;38(3):385-89.

12 Kugel G, Perry RD, Ferrar M, Lalicata P. Disinfection and communication practices: a survey of U.S. dental laboratories. J Amer Dent Ass. 2000;131(6):786-92.

13 Vázquez-Rodríguez I, Estany-Gestal A, Seoane-Romero J, Mora MJ, Varela-Centelles P, Santana-Mora U. Quality of cross-infection control in dental laboratories. A critical systematic review. Int J Qual Health Care. 2018;30(7):496-507.

14 Akeredolu PA, Sofola OO, Jokomba O. Assessment of knowledge and practice of cross infection control among Nigerian dental technologists. Niger Postgrad Med J. 2006;13(3):167-71.

15 Oosthuysen J, Potgieter E, Fossey A. Compliance with infection prevention and control in oral health-care facilities: a global perspective. Int Dent J. 2014;64(6):297-11.

16 Gray J. Infection control: beyond the horizon. J Hosp Infect. 2015;89(4):237-40.

CONTRIBUTIONS BY AUTHORS

1 Asma Naz:	Contributed to Perception of idea, wrote introduction, literature review and gave final approval.
2 Saima Hanif:	Contributed to data analysis, discussion.
3 Bharat Kumar:	Contributed to data collection, wrote result.
4 Hira Musharraf:	Contributed to writing discussion, references.
5 Muneeb Ahmed Lone:	Contributed to data collection, literature review.
6 Anjum Tariq:	Contributed to data collection, wrote abstract.