

Dental Laboratories: Neglected Importance of Infection Control

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Article Type:

Original Article

Article History:

Received: 21 Jan. 2019
Revised: 12 Feb. 2019
Accepted: 07 Mar. 2019

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Abstract

Background and objectives: Dental technicians are in indirect contact with patients. Microorganisms find their way to dental labs through dental impressions. Infection control is a critical procedure to prevent the spreading of diseases. The objective of this study was to evaluate the levels of infection control knowledge and practice and the factors affecting them, in DLs in Yazd – Iran.

Methods: All dental labs in Yazd – Iran were visited and all working technicians were asked to fill questionnaires including knowledge and practice questions. Data was analyzed using t-test via SPSS 17.

Results: Out of 26 filled questionnaires 73% and 50% of the technicians had respectively poor awareness and practice. Regarding adherence to infection control procedures, technicians with higher work experience had significantly higher scores (p value = 0.015). Technicians educated in the field of dental technologies had significantly higher awareness and practice scores (p value= 0.015, 0.029).

Conclusion: Technicians who have been trained at dental schools have higher knowledge and practice regarding infection control. Since dental labs are not obligated to hire only these technicians, workers without related education are occupied in dental labs. This result in the unfortunate status of infection control in dental labs. The poor status of infection control in dental labs can contribute to spread infections to patients and the related healthcare team.

Keywords: Endodontics; Nanomaterials; Nanostructures; Nanotechnology

Introduction

Dental laboratory (DL) workers are not in direct contact with patients, but they are categorized as members of dental healthcare team. CDC and other related organizations

consider infection control to be an essential part of DLs' work(1).

Dental impressions are taken in clinic and sent to DLs where technicians pour stone casts from them. Dentists and dental

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technicians are both responsible for infection control(2, 3). Blood-borne microorganisms can be transmitted to the impressions via blood or saliva. As a result of not following the principles of infection control, they can be transmitted to the technicians or/and other patients receiving their prosthesis from the laboratory. Several studies conducted on cultures taken from DLs showed high level of contamination which suggest that DLs usually neglect standard decontamination procedures (4-9).

As new materials and techniques emerge in dental profession, dental technicians contribute more and more to dental treatments(10). In Iranian dental schools, there is a study field preparing technicians to work in DLs. But it is not obligatory for the DLs to hire only academically educated technicians.

This study was designed to evaluate the levels of infection control knowledge and practice and the factors affecting them, in DLs in Yazd – Iran.

Materials and Methods

All of the working DL technicians in Yazd – Iran, were included in this cross-sectional study. Study was explained to them and they were asked to fill the questionnaires. Technicians who did not consent to fill the questionnaires were excluded from the study.

1) Demographic information (age, gender, work experience and field of education)

2) Questions evaluating technicians' knowledge regarding proper disinfecting methods of dental impressions, casts and instruments. (Proper method and time for disinfecting alginate and elastic based impressions, sterilization of instruments, burs and heat sensitive materials and disinfection of removable prosthesis and gypsum casts)

3) Questions evaluating technicians' adherence to infection control procedures. (vaccination against hepatitis B, wearing protective goggles, mask, gloves and clinic attire, disinfecting prosthesis, changing pumice slurry, using sterilization methods,

cleaning and disinfection workplace and disinfecting instruments)

Validity of the questions was confirmed by faculty members of dental school of Shahid Sadoughi University of Medical Sciences. A pilot study was carried out to confirm the reliability of the questions.

Data was collected, entered into SPSS17 and analyzed using T-test.

Results

Out of 32 technicians working in DLs in the city, 26 cooperated with this study (response rate = 81%).

35% of the technicians were aged above 30 years and had a work experience of over 5 years (Table 1).

73% of technicians had a low overall awareness score (below 50%). 80% of the technicians had insufficient knowledge regarding proper disinfecting methods for dental impressions, also 61% and 96% had low knowledge scores regarding disinfection of casts and instruments, respectively.

50% of technicians had been following infection control almost thoroughly (scores above 70%). 76% of the technicians were vaccinated against hepatitis B. during work hours 53% were wearing gloves, as for mask it comes to 42%. 88% were wearing clinical attires and 65% were wearing protective eye wears. 42% had been using sterilization methods. 88% clean their work surfaces daily. 36% disinfect hand instruments.

Technicians with higher work experience, while having the same knowledge as rather new working technicians, had a significantly higher adherence to infection control procedures (Table 2; P-value= 0.841, 0.015).

65% of the technicians had a degree of "dental prosthesis technologies" while other 35% did not. Both knowledge and practice scores were higher in educated technicians (Table 3; P-value= 0.015, 0.029).

Table1 – Demographic information

		Frequency	Percentage
Age	Under 30	17	65
	Above 30	9	35
Gender	Female	8	30
	Male	18	70
Work experience	Under 5	17	65
	Above 5	9	35
Education	Prosthetics	17	65
	Non- Prosthetics	9	35

Table 2 – Infection control knowledge and practice according to work experience

Work experience	knowledge		practice	
	Mean	SD	Mean	SD
Under 5years	4.05	1.86	14.47	4.22
Above 5years	3.88	2.08	19.00	4.00
P-value	0.841		0.015	

Table 3 – Infection control knowledge and practice according to education

Education	knowledge		practice	
	Mean	SD	Mean	SD
Prosthetics	4.67	1.66	17.52	4.07
Non- Prosthetics	2.73	1.73	13.22	4.46
P-value	0.015		0.029	

Discussion

Dental healthcare team are at the risk of exposure to sources of infection. One way of cross-contamination in dental settings is through dental laboratories(11, 12). Principle of infection control in dental settings has been established by CDC in 2003 and been widely used since then(13). Today's decline in cross-contamination in dental settings has been due to applying these principles(14).

pollution of DLs in Shiraz – Iran and Yazd – Iran. Results in both cities suggested inappropriate level of infection control(16, 17).

These studies - along with ours - demonstrate unacceptable situation of infection control in DLs in Iran. Results in other underdeveloped and developing countries are in the same direction. Studies in Jordon, Saudi Arabia and India show unsatisfying knowledge and practice of infection control procedures in DLs(18-23).

This study was designed to evaluate the level of infection control knowledge and practice in DLs in Yazd – Iran and investigate factors affecting adherence to infection control principles in DL technicians. Hashemi-pour et al. conducted a similar study in Kerman – Iran. In their study 52% of technicians were vaccinated against hepatitis B. 23% were using gloves, 15.5% masks and 7.7% protective eye wears(15).Vojdani et al. and Lotfi-Kamran et al. investigated microbial Despite not affecting the knowledge, span of work experience affected the practice scores. This is consistent with Hashemi-pour's study in which infection control practice had a meaningful relationship with work experience. Since academic knowledge is acquired through education, it is reasonable that work experience per se is not capable of providing knowledge of proper techniques of disinfection.

Infection control is thought as a part of training programs in every health related profession. Dental technicians are considered

as dental healthcare personnel and are in indirect contact with patients which makes it essential for them to have proper comprehension of infection control procedures(1).

In this study, technicians educated in the field of prosthesis technology had significantly higher knowledge and adherence to infection control procedures.

When technicians understand the reasoning behind necessity of infection control they are more likely to adhere to its principles.

Unlike this study, Hashemi-pour *et al.* couldn't find a significant relationship between education and infection control practice. This might be due to the difference between their methods as they categorized education by the degree and did not specify whether the education is in the field of prosthesis technology(15).

Although there is an educational field for prosthetics technology in Iran, DLs are not obligated to hire only educated technicians.

McGARRY *et al.* stated university based education trains more knowledgeable technicians as it can establish educational standards for dental technologists. We suggest that there should be law enforcements for dental technicians to be educated in universities or at least enrolled in standard training programs(24).

Number of participants and evaluated items in this study are limited. Future studies can focus on larger groups and more items. Moreover, nature of practice questions makes it easy for the participants to guess the better answer therefore observational studies provide more reliable results.

Conclusion

Hiring workers without proper education in the field of dental technologies in DLs leads to occupation of individuals lacking proper knowledge and practice regarding infection control in dental health teams. This can have potential non reversible hazards for the patents and the technicians themselves.

Holding continuing education courses and regular inspection can help elevate the level

of knowledge and practice of infection control in dental laboratories.

Acknowledgments

We'd like to thank departments of prosthodontics of Yazd Dental School and dental laboratories of Yazd for their contribution to the study.

Declarations

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Conflict of interest

The authors declare that there is no conflict of interest.

Authors' contributions

All authors contributed equally to this work

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How to cite:

Salimi H., Golvardi Yazdi R. Dental Laboratories: Neglected Importance of Infection Control. *Jorjani Biomedicine Journal*. 2019; 7(1): 65-73.