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ORIGINAL RESEARCH

# Disinfection of dental impressions: knowledge and practice among dental technicians

This article was published in the following Dove Press journal:  
*Clinical, Cosmetic and Investigational Dentistry*

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**Background:** Dental impressions are a common source for transmission of infection between dental clinics and dental labs. Dental impressions can be cross-contaminated by patient's saliva and blood, which then cross-infect the dental casts poured from the impressions.

**Objective:** To evaluate the current practices of disinfection of dental impressions and their protocols and to assess the knowledge of cross-infection control among dental technicians in Jordan.

**Method:** Dental technicians (n=85) completed a self-administered questionnaire about their practices of disinfection for dental impressions.

**Results:** The distribution of dental technicians was 63.8% fixed prosthodontics, 23.5% removable prosthodontics, 7.8% orthodontics, and 4.8% maxillofacial prosthodontics. The majority of the laboratories did not have instructions related to disinfection of impressions. About 50% of technicians were vaccinated against HBV. About 44.7%, and 42.9% of labs reported that they never disinfect alginate or silicon impressions, respectively. In addition, the majority of lab owners (53%) believed that the dentist should disinfect the impressions before shipping them to dental laboratories, while (45%) believed that disinfecting the impressions is the responsibility of the dental assistant. Moreover, about 38% of this study population reported not using gloves in their labs. In those labs where disinfection was used, 51% used spray disinfection whereas 32.6% used immersion disinfection. The cost of disinfectant was ranked as the most important factor (51.3% of the cases) for the dental technician to choose the disinfectant followed by its effectiveness.

**Conclusion:** Dental technician practices in impression disinfection was not satisfactory, therefore, education programs about impression disinfection are needed.

**Keywords:** disinfection, dental impressions, knowledge, practice, dental technicians

## Introduction

Disinfection of dental impressions is an essential routine that aims to protect dental personnel, who handle impressions or casts, against exposure to diseases brought about by contact with microorganisms such as viruses; hepatitis B, hepatitis C, herpes, and HIV, and *Mycobacterium tuberculosis* (Hemalatha & Ganapathy, 2016). Impression materials that have been exposed to infected saliva and blood provide a significant source of such infectious agents.<sup>1</sup> The British Dental Association in the Health Technical Memorandum 01–05 recommends disinfection and decontamination of dental impressions before dispatching them to the dental laboratories, and states that the responsibility for ensuring dental impressions are both disinfected and labelled as such before being sent to dental laboratory lies solely with the

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dentist who should inform the dental lab technicians about the status of impression disinfection.<sup>2</sup> Such recommendations do not exist in Jordan. In addition, there are no explicit guidelines by the Jordanian Dental Association (JDA) on impressions disinfection. Most dentists rely on their undergraduate basic educational experience regarding the topic of infection control to minimize the potential for cross infection.

In 2017, the Jordanian Dental Association (JDA) made continuing education a mandatory requirement for all registered dentists. Rules of continuing medical education provide that dentists comply with completing continuing education courses every five years in order to meet their licensure renewal requirements. These courses are likely to update dentists' knowledge and improve the standards of infection control for the benefit of the dental team.

Dental impressions contaminated with patient's saliva and blood may cross infect the dental casts poured from them. Contaminated impressions and casts<sup>3</sup> thus become tools for the transmission of both bacteria and viruses between clinics and dental laboratories.<sup>4</sup> In addition, casts poured from impressions can carry microorganisms and these may perhaps spread to other parts of the dental laboratory during trimming of the casts or dies.<sup>5</sup>

It is a recommended practice for dentists to send a label indicating the status of impressions as "disinfected impressions" to the dental laboratory in order to protect the dimensional stability and the surface detail reproduction of the impressions. This practice can eliminate possible uncertainty facing dental technicians when they receive the impressions and prevent repetitive disinfection.<sup>6,7</sup> It is known that a variety of chemical agents can be used efficiently for impression disinfection<sup>8</sup> provided that each type is applied to the impression according to the manufacturer's instructions. However, it has been reported that rinsing the impression with water solely does not remove contamination,<sup>9</sup> therefore disinfecting of the impression and further rinsing the disinfectant off is required. As chemical disinfection is a surface phenomenon, it is important that prior to immersion in the disinfectant, the impressions surface is washed to remove obvious debris so that contact with the disinfectant solution is maximized.

Al-Dwairi<sup>10</sup> investigated the awareness and practices of disinfection in Jordan in 2007 and reported that there was lack of compliance with infection control procedures of dental technicians working in commercial laboratories. In the UK, a study assessed the awareness of disinfection routine practices applied to dental impressions among both

dentists and dental technicians to assess the practices, knowledge and trust between these two members of the dental team<sup>11</sup> with regard to impression disinfection. A common recommendation was that professional communication and cooperation between the dental laboratories and dentists is essential to ensure that appropriate cleaning and disinfection protocols are followed for impressions.<sup>12</sup> Distrust between dental technicians and dentists could result in repeating disinfection procedures of impressions by dental technicians even after being disinfected by dentists risking dimensional changes and alterations to the accuracy of the impression material.<sup>6</sup> This study aimed to examine the knowledge and practice of routine disinfection for impressions among Jordanian dental technicians and the level of communication that currently exists between dentists and dental technicians.

## Method

A questionnaire and covering letter was developed and distributed nationally to the owners of dental laboratories in Jordan (n=100). Prior to completing the questionnaire, it was piloted over a sample (n=7) of the target group to ensure the clarity of the questions. Approval of the Institutional Review Board (IRB) at Jordan University of Science and Technology (1/103/2017) was sought and obtained. This was conditional upon a named and signed consent form being completed and returned in advance of completing the questionnaire. The finalized questionnaire was randomly distributed nationally through the Jordanian Association Dental Lab Sciences Owners to sixty owners of dental technician's laboratories during the period from February May 2017-August 2017. Additionally, forty more owners were selected from the closing reception event organized by the Jordanian Association for Dental Owners on April 26, 2017. Questionnaire distribution was carried out personally by the first author. To ensure confidentiality, the questionnaire and the covering letter sheets were separated.

The questionnaire consisted of a number of closed-ended questions, one open-ended question, and two choices "yes or no". The questionnaire was divided into four sections. Section one: consisted of demographic information such as qualification, gender, and experience of the owners of dental laboratories. Section two: included questions about disinfection practices among dental technicians upon receiving impressions. Section three included questions on the condition of received impressions; labelled as disinfected or not disinfected. Section four included

questions on infection control measures; policy, and employee's vaccinations.

Data was statistically analyzed using the software package IBM SPSS version 25 (IBM, NY, USA). Chi Square test was used to assess associations among questionnaire items.  $P<0.05$  was considered significant.

## Result

Eighty-five questionnaires were returned completed by the consenting 100 directors of dental technician laboratories with some missing answers. The response rate was therefore 85%. Table 1 shows the characteristics of dental laboratories. The number of male directors was eighty-three (97.6%). The distribution of dental technicians was 63.8% fixed prosthodontics, 23.5% removable prosthodontics, 7.8% orthodontics, and 4.8% maxillofacial prosthodontics. About half of the directors and dental technicians were reportedly vaccinated against HBV. The majority (80.5%) of the laboratories did not have instructions related to disinfection of impressions (Table 1).

The different practices of dental technicians upon receiving the impressions are summarized in Table 2. Upon receipt of an alginate and silicon impressions, the majority (84–89%) reported always rinsing them with water. Different practices for the disinfection of alginate and silicone impressions were apparent. About two-fifths

**Table 2** The practices of dental technicians upon receiving the impressions

Questions	Answers	Count	Percentage
Do you wash the alginate impression?	Always Sometimes Never	75 7 2	89.3% 8.3% 2.4%
Do you wash the silicon impression?	Always Sometimes Never	70 11 2	84.3% 13.3% 2.4%
Do you disinfect the alginate impression?	Always Sometimes Never	25 22 38	29.4% 25.9% 44.7%
Do you disinfect the silicon impression?	Always Sometimes Never	26 22 36	31.0% 26.2% 42.9%
How do you disinfect?	Spray only Immerse only Spray and immerse Water then spray Water then immerse I don't know	11 5 1 14 11 7	22.4% 10.2% 2.0% 28.6% 22.4% 14.2%
Do you wear gloves?	Always Sometime Never	20 31 31	24.4% 37.8% 37.8%

**Table 1** Characteristics of dental laboratories in Jordan

Item	Choices	Count	Percentage
Gender/laboratory director	Male Female	83 2	97.6% 2.4%
Laboratory employee (dental technicians) specialty	Maxillofacial technicians Orthodontic technicians Fixed prosthodontics Removable prosthodontics	15 25 201 74	4.8% 7.8% 63.8% 23.5%
HBV vaccination of directors	Yes No	41 42	49.4% 50.6%
Reported HBV vaccination of Dental technicians	Yes No	164 151	52% 48%
Do you have disinfection instructions at your lab?	Yes No	16 66	19.5% 80.5%

of the labs reported never disinfecting alginate and silicon impressions and about a quarter reported that they sometimes disinfected impressions (Table 2). In the labs where disinfection was applied, 51% used spray disinfection (with or without water) whereas 32.6% used immersion disinfection (with or without water). About 38% reported not using gloves in their labs (Table 2).

Table 3 shows the disinfection status in which dental technicians received the impressions from the dentists. Although there is no recommendation on how dentists should send impressions to the lab. In this investigation, the majority (65.9%) reported that they received the impressions in special sealed bags and wrapped in wet tissue. Most dental technicians (71%) had no idea how the dentists had disinfected the impressions. In contrast, about 11% reported they received such a label most of the times from the dentists. The majority of the labs believed that the dentist (53%) or the dental assistant (45%) should disinfect the impressions before shipping them to the labs

**Table 3** Conditions in which dental technicians received impressions from the dentist

Questions	Answers	Count	Percentage
How do you receive the impressions?	In a specific bag In a bag and wet wrapped In any bag unwrapped Without a bag, only wet wrapped Differs from dentist to another	8 56 13 3 5	9.4% 65.9% 15.3% 3.5% 5.9%
Do you receive a note about disinfection?	Most of the time Sometimes Not at all	9 15 60	10.7% 17.9% 71.1%
Who should do the disinfection?	The dentist The dental assistant The dental technician	44 37 2	53.0% 44.6% 2.4%
When do you disinfect the impression upon receipt?	Within 5 min Within 10 min Within 30 min I don't know	19 8 7 16	38.0% 16.0% 14.0% 32.0%
Do you know what is the type of disinfectant used by the dentist?	Yes No	2 72	2.7% 97.3%

(Table 3). Variations in the time frame of disinfection of impressions received from dentist were noticed. Most of the labs (97%) reported that they did not know the type of disinfection used by the dentists.

Table 4 shows that the cost and effectiveness were ranked respectively as the most and second most important factor for the dental technician to choose the disinfectant.

## Discussion

Continuing Education Regulations for licensed dentists in Jordan, clearly states that every registered dentist should

**Table 4** Factors that determine the type of disinfectant used in dental laboratories

Factor	Count	Percentage
Cost	40	51.3%
Effect	14	17.9%
Odor and color	5	6.4%
Easy to use and prepare	7	9.0%
Recommendation by a friend	5	6.4%
Recommendation by a sales representative	7	9.0%

attend a workshop on infection control once every five years. Dentists who fail to comply with this requirement may be subject to disciplinary action by JDA including non-renewal of their registration.

It is recommended that dentists attach labels to impressions sent to dental labs indicating the disinfection status of the impressions. Since repetitive disinfection of impressions poses risk of changes in dimensional stability and surface detail reproduction, communication between dentists and dental technicians in this regards is essential.<sup>2</sup>

This study shows that a considerable number of dental technicians always disinfect the alginate impressions (29.4%) and silicone (31%) upon receipt regardless of whether they have been disinfected by the dentists. This approach follows the recommendations by Lepe and co-workers<sup>12</sup> who investigated the practices of workers in commercial dental laboratories in the UK. It is surprising that while some dental technicians reported washing the received impressions, others did not with some even thinking that washing the impression -with or without soap- is an acceptable disinfection practice. It is also clear that there was a wide variation in the chemical disinfectant solutions used by the dental technicians in this study. For example, some of the chemicals used were recommended for dental uses but others were not. This indicates confusion among dental technicians regarding disinfection and suggests that education in this area is required. Selection of the correct type of disinfectant for impressions is also very important as inappropriately selected disinfectants can induce changes in both the accuracy and details of impression<sup>13</sup>.

The findings of this study highlight an uncertainty among dental technicians concerning the responsible party for impression disinfection, and in relation to whether disinfection has taken place. Poor communication between dentists and technicians has been noted by other investigators previously.<sup>6,7</sup> In the UK, a survey reported

that the majority (94.9%) of dentists always disinfected the impressions, 3.8% sometimes, and 1.3% never disinfected impressions.<sup>11</sup>

An obvious additional approach to protect the dental technician from infection is the use of protective equipment such as wearing gloves. There was poor compliance with this requirement, with 31 respondents (37.8%) stating that they had never used gloves. This finding, however, demonstrates a progress in this area when compared to the findings of a previous survey of dental technicians in Jordan,<sup>10</sup> where only 12% of respondents reported wearing gloves when receiving dental impressions from various dental clinics. That study highlighted the absence of firm national rules by the Jordanian Association of Dental Owners regarding the management of impressions in dental laboratories and dental clinics.<sup>10</sup> In contrast, a study conducted in Saudi Arabia revealed that 60.87% of dental technicians knew that the impressions received from dental clinics were disinfected, and 56.25% of the dentists informed their laboratory technicians about the disinfection status. Therefore, dentists from the former study, followed the principles of impressions disinfection, and had a better compliance with safety procedures than reported by Jordanian technicians. Moreover, most dental technicians (64.29%) stated that there is an agreed disinfection protocol between the laboratories and the dental clinics in Saudi Arabia.

A further area for improvement suggested by this study is in the selection and application of disinfectant. Some dental technicians did not recognize that washing/rinsing impression with water is not a sterilization procedure. Although many dental lab directors mentioned commercial names of disinfectants bought out off the shelf for surface disinfection, these disinfectants were not suitable for use with impression materials, and in all cases, they could influence the accuracy of impressions. This study finding that a significant percentage of directors and dental technicians have not been reportedly vaccinated, suggests that vaccination against HB virus should also be reinforced.

## Conclusion

This study shows that practices and awareness of dental technicians regarding cross-infection control are less than ideal, and this might increase the risk of transmission of diseases. The findings of this study show that there is lack

of communication between dentists and dental technicians, and that there is a need for increasing awareness and establishing educational programs for both groups to decrease the risk of transmission of diseases in dental laboratories.

## Acknowledgment

The authors would like to thank Prof. Graham Chadwick, Professor of Operative Dentistry and Dental Materials Science at Dundee School for his effort on this paper and Dr. Mutamed Ayyash for his assistance in statistical analysis.

## Disclosure

The authors report no conflicts of interest in this work.

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