Knowledge, attitude, and practice on various disinfectants used for impression materials among dental students and dental practitioners

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ABSTRACT

Background: Impression materials taken directly from a patient’s mouth are often contaminated with saliva and blood; making it an agent for cross contamination. Thus, it can act as a mode of transmission for many viruses and other microorganisms. Although it is common to only rinse these impressions, no specific methods of disinfection have been used during dental practice. Aim: The aim of the study was to study the knowledge and understanding of dentists on the various disinfectants that are used for dental impressions. Materials and Methods: A questionnaire consisting of 15 questions were distributed to 100 participants, in which includes undergraduates and dentists at Saveetha Dental College. The sample size of this questionnaire-based study is 132 population. This study was conducted with 100 participants, thus it is sufficient for the required sample size. Results: A vast majority of them agree that the main importance of disinfecting is to prevent cross-contamination (65%, n = 65), following that is to protect the impression from any physical changes (18%, n = 18), to produce a more detailed registration of the dentition (12%, n = 12), and to produce a more detailed registration of the dentition (5%, n = 5). The majority of the participants said that the most preferred method of disinfecting using chemical disinfectants is by immersing the impression (60%, n = 60) while some believe that spraying the surface is much more preferred (31%, n = 31). Conclusion: It was, thus, concluded that both students and graduates are well aware regarding the importance of disinfection of impression materials. In the future, it would be better to further and continuously practice these methods of disinfection as a regular practice.

KEY WORDS: Cross contamination, Decontaminating, Disinfection, Impression material, Sterilization

INTRODUCTION

One of the major problems that without doubt most dental professionals face is cross contamination. During the fabrication of prosthesis, special care should be given for every step, especially impressions as they are of a main concern. This is because impressions are known to be a main source of infection for any potentially infectious material.[1,2]

Based on new researchers, approximately 67% of materials being sent to dental laboratories contain various infectious microorganisms. These microorganisms include Streptococcus species, Anitratus species, Klebsiella species, and Candida species, just to name a few.[3] The American Dental Association has also urged for the practice of disinfecting impression trays beforehand as a protocol.[4]

In most dental practices, it has become a common method to just wash the impression under running tap water. However, studies have shown that it only removes 40% of the present bacteria.[5] Taking this into account, as an alternate option, the most frequently used chemical disinfectants include alcohols, aldehydes, chlorine, and ammonium.[6]

Although many chemicals are described as suitable to use for disinfection, it does not necessarily mean that it has high compatibility with all forms of impression materials. When a disinfectant is being chosen, there are two main factors that come into consideration; which in this case is its capability to remove the microbial infection and the effect it puts on the material that is used.[7,8]

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Received on: 27-10-2017; Revised on: 24-11-2017; Accepted on: 18-01-2018
Since these are chemical agents, it should be used as instructed by the manufacturer. Chemicals work as a surface agent by eradicating any present blood and saliva initially through a method of brushing and rinsing.\[10-13\] However, out of all the available methods, immersion is considered to be the most effective.\[11-13\] When compared to spraying, this method will lessen the possibility of inhaling the disinfectant and at the same time providing an even better surface coverage. According to the British Dental Association, more recently, it was advised to only practice the method of either immersion or dipping, more so the latter to prevent the distortion of the impression material.\[14\]

Through this study, a better understanding can be established from the perspective of dentists in regard to the current ways of decontaminating and disinfecting impression materials.

MATERIALS AND METHODS

A questionnaire consisting of 15 questions were distributed to 100 participants, in which includes undergraduates and dentists at Saveetha Dental College.

The sample size of this questionnaire-based study is 100 population. This study was conducted with 100 participants; thus, it is sufficient for the required sample size [Figure 1].

Both of these groups were initially acquired as to whether they disinfect impressions that were made and if so, what methods were used (washing with tap water, brushing away the debris, etc.). Concerning the dental technicians as well, these clinicians were ascertained if a form of communication was established between them and the technicians regarding any bloodborne virus carriers and a detailed description of the disinfectants that were used.

To assess their knowledge, they were questioned on the various disinfectants that are currently being used (particularly chemical agents) including a newer form of disinfection where ultraviolet (UV) rays are used. Depending on the type of impression materials used, these clinicians were asked what would be the best method as well as what effects could these agents exhibit on the impressions that were made including the mode of action that they follow.

At the end of the questionnaire, they were asked about their opinions on the necessity of a better of understanding and practice in regard to disinfecting impression materials among dental staffs.

Data collection and analysis were done through Microsoft Excel 2017.

RESULTS

Out of all the 100 questionnaires that were distributed, all 100 were returned with completion. The return rate was successfully 100%.

A majority of the respondents are between the ages of 18 and 25-years-old (56%, n = 56) and 26–35-years-old (30%, n = 30) category, while a lower percentage of respondents were of ages 36–45 years old and above 45 years old [Figure 2].

In regard to their gender, a higher percentage of females (58%, n = 58) were involved in this study compared to males (42%, n = 42) [Figure 3].

Initially, the participants were assessed on their own practice of disinfecting impressions that were made, and a majority of them do disinfect before sending it for processing (57%, n = 57). However, almost half do not practice this 43%, n = 43 [Figure 4].

A greater number of them practice disinfecting the impressions through washing with tap water (55%, n = 55) while most of them also use chemical agents as a method (30%, n = 30). In contrast, only a few just brush away the debris present (11%, n = 11) [Figure 6].

A vast majority of them agree that the main importance of disinfecting is to prevent cross-contamination (65%, n = 65), following that is to protect the impression from any physical changes (18%, n = 18), to produce a more detailed registration of the dentition (12%, n = 12) and to produce a more detailed registration of the dentition (5%, n = 5) [Figure 5].

In relation to that of dental technicians, most of the respondents inform the lab whenever they encounter bloodborne virus carriers (70%, n = 70). In regard to this, the remaining 30% do not inform the lab of such information [Figure 7].

More than half of them do agree of the necessity in informing in detail the method of cleaning and disinfection toward the dental technician (96%, n = 96) [Figure 8].
According to their knowledge, a majority of them agreed that the most commonly accepted disinfectants are chemical agents and through the usage of radiating rays (37%, \( n = 37 \)). A few of them also agreed that the accepted way can simply be through physically removing any debris or body fluids that are present (13%, \( n = 13 \)) and through exposing the impression to sun exposure (6%, \( n = 6 \)) [Figure 9].

A vast amount agreed that using a clinical UV chamber can provide a better form of disinfection (76%, \( n = 76 \)) [Figure 10].

Ideally, according to a majority of the participants, the wavelength of the UV rays should be of a range between 200 and 280 nm (55%, \( n = 55 \)), while others agreed that it should be more than 280 nm (25%, \( n = 25 \)) and <200 nm (20%, \( n = 20 \)) [Figure 11].

From a list of chemical agents that can be used, nearly half of the participants picked sodium hypochlorite as the most commonly used (48%, \( n = 48 \)). Coming in second was both impression disinfectant spray and hydrogen peroxide (16%, \( n = 16 \)) which is followed by dettol (10%, \( n = 10 \)), ammonium compounds and ethanol (5%, \( n = 5 \)) [Figure 12].

The majority of the participants said that the most preferred method of disinfecting using chemical disinfectants is by immersing the impression (60%, \( n = 60 \)) while some believe that spraying the surface is much more preferred (31%, \( n = 31 \)) [Figure 13].

In regard to different forms of impression material used, in case of alginate compounds, nearly half of them said that sodium hypochlorite (49%, \( n = 49 \)) is the

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![](image1.png)

**Figure 2:** Age of participants

![](image2.png)

**Figure 3:** Gender of participants

![](image3.png)

**Figure 4:** Practice of disinfecting impressions beforehand

![](image4.png)

**Figure 5:** Importance of disinfecting impressions

![](image1.png)

**Figure 6:** Practice of disinfecting impressions beforehand

![](image1.png)

**Figure 7:** Inform technician of bloodborne carriers

![](image1.png)

**Figure 8:** Necessity of a written communication

![](image1.png)

**Figure 9:** Commonly accepted disinfectants

![](image1.png)

**Figure 10:** Better disinfection for ultraviolet chambers

![](image1.png)

**Figure 11:** Ideal wavelength of ultraviolet rays
best option which is followed by hydrogen peroxide (24%, n = 24) and alcohols (17%, n = 17) [Figure 14].

When it comes to zinc oxide eugenol (ZOE), all three of the options were commonly selected with sodium hypochlorite being the most (39%, n = 39). According to most of the respondents, both the surface details and dimensional stability would get affected when disinfectants are used (57%, n = 57) [Figure 15].

Based on the results, a majority of the participants believed that the most common mode of action for chemical agents is through the destruction of cell membrane (44%, n = 44). Following that, some agreed it is caused by protein coagulation (31%, n = 31), substrate competition (15%, n = 15) as well as the removal of sulfhydryl groups (10%, n = 10) [Figure 16].

Of those participating, a little over half believed that it is necessary for training in regard of impression disinfection (51%, n = 51) [Figure 17].

**DISCUSSION**

Based on the current study that was done, almost half of the respondents do not disinfect impressions that were made (43%). This result is in contrast with that of a similar study made in Jordan by Almortadi and Chadwick, where almost all of the participants (94.9%) practice disinfecting their impressions after it was made. A high majority of these practitioners just wash the impressions that were made with tap water (55%) whereas based on a similar study that was made, only a quarter of the participants practice such a method (37.2%). Another similarity that could be found was also the fact that only a small amount of practitioners brush away the debris as an alternate method for disinfecting. Although it may seem that brushing the debris is not an effective method to practice, it was recommended to do both of these practices for a proper disinfection. The amount of practitioners who do wash their impressions is in contrast with that of an experience in UK dental clinics that was obtained from a study conducted by Blair and Wassell; where 100% have claim to practice it; making it somewhat of a slight concern. In European Union Schools; however, the results obtained in a study done by Muller-Bolla et al., estimated that 95% do so. Thus, it did not come as a surprise that in a study noted previously that an overwhelming amount of technicians have encountered impressions that were blood contaminated. The results of the present work indicated that more than half of the respondents do inform of any bloodborne viruses that are present in their patients to the technicians. This is somewhat in contrast to that of a different study where only 31.1% of their participants do so. This could be a troubling revelation, but at the same time, it could be unnecessary if a proper infection protocol was being followed in the first place. The reason behind this is also because it could lead to an improper disclosure of the patient’s personal medical history. When asked regarding the importance of a written communication to the dentist, almost all the respondents have agreed that it is necessary making it a slight difference to that of what they actually practice.

Coming into the topic of the knowledge of these practitioners, they believed that both using chemical agents and radiating rays are commonly accepted methods of disinfecting. This revelation is somewhat true; however, chemical agents have been found to be the most commonly accepted form of disinfection. Some studies have declared that only washing the impression is not sufficient as it only removes 40% of the present bacteria. On the other hand, another set of studies has shown that it could removes up to 90%.

A new form of disinfection has recently been implemented in daily practice, where UV rays are being
used. A majority of the participants believed that using a clinical UV chamber does help with providing a better form of disinfection. This statement is said to be true both in terms of its efficiency and ease of use. It has been a known fact for a long while that UV rays are effective in killing microbes and having the ability to do so without any chemicals or heat. Most UV chambers are available in most dental clinics as a way to sterilize the dental instruments that are being used. These UV rays efficiency will depend on the wavelength that they have; which in this case is between 200 and 280 nm.\[20\] Surprisingly, a majority of respondents are aware of such an information. This specific wavelength allows these bacteria reproductive ability to be halted and thus its inactivation will happen at a higher rate making it able to lower its threatening factor.

Since chemical agents are commonly used for disinfecting, an in-depth assessment was made to determine whether they are aware of what the most accepted chemical agents were. According to some guidelines, the most frequently accepted were chlorhexidine, sodium hypochlorite, glutaraldehyde, and iodine agents.\[21-23\] With that being said, it is a relief that almost half of them agreed that sodium hypochlorite is most accepted. Based on the recommendation by the Environmental Protection Agency, it is a form of chemical agent that is not only a good surface disinfectant and non-irritating, but it also is highly effective against a wide-spectrum of microorganisms.\[24\] In terms of the method that should be used, it is said that immersion is the most effective method. This is because this method allows for better contact of the solution with that of all of the surfaces of the impression. Thus, it is safe to say that a vast majority of the participants agreed to the same statement. In contrast, spraying will not be able to cover all the surfaces of the impression. The studies that are being reviewed takes into account three factors; which are the concentration and the type as well as its immersion times of the disinfection. Thus, making it slightly hard to determine the most suitable method that can be used.\[25\]

In relation to the specific type of impression material, when alginate compounds are used, sodium hypochlorite is the best agent to use. Based on the results of this study, it does correlate with that of the preferred result. Whereas for disinfecting ZOE, glutaraldehyde was much more preferred.\[26\] In this case, the current study showed that more practitioners assume that sodium hypochlorite is the most acceptable for this type of impression material. With the usage of disinfectants, there will always be a side effect especially when it comes to chemical agents. In this case, the most commonly affected would be both the surface details and dimensional stability. Although these changes were small, when dealing with procedures that require a higher degree of accuracy (e.g., fixed prosthodontics), these changes are of high significance.\[27-29\] At the end of the study, the practitioners were asked if it was necessary to have a separate on this matter. The results their opinions were split into two were 51% thought that it was necessary and the other half did not.

**CONCLUSION**

It was, thus, concluded that both students and graduates are well aware regarding the importance of disinfection of impression materials. In the future, it would be better to further and continuously practice these methods of disinfection as a regular practice.
REFERENCES


Source of support: Nil; Conflict of interest: None Declared