



STUDY OF THE LEVEL OF KNOWLEDGE ABOUT HAND DISINFECTION AND THE APPLICATION OF ROUTINE DISINFECTION MEASURES AMONG DENTAL TECHNICIANS

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ABSTRACT

Purpose: To study the level of knowledge about hand disinfection and the application of routine disinfection measures in everyday practice among dental technician students from the Medical College of Plovdiv and practicing dental technicians.

Material and methods: For the period September 2019 - January 2020, an anonymous 19-question survey was conducted among a total of 92 dental technicians. All statistical analyses were performed with SPSS version 24. A p-value below 0.05 was considered statistically significant.

Results: Of the respondents, 34.8% (n = 30) were students, and 65.2% (n = 62) were practicing dental technicians. The majority (77.2% (n = 71)) rate the hands as a factor for the transmission of microorganisms from person to person, but for 16.3% (n = 15), the hands pose a risk only if they are visibly contaminated. Only 31.5% (n = 29) disinfect their hands for the recommended 30 seconds. When working with dental impressions and dentures, 59.8% (n = 55) know that they must always be disinfected before working with them. The most commonly used preparations for disinfection of impressions are alcohols in 44.6% (n = 41), but 22.8% (n = 21) wrongly only use water and soap. Only 1/3 correctly state that the finished dentures should be disinfected before being handed to the dentist.

Conclusion: Effective communication and coordination between the dental laboratory technicians and the dental office staff are critical components of a successful infection control program related to dental care.

Keywords: dental technician, dental impression, disinfection,

INTRODUCTION

In dental practice, there is a real risk of microorganisms being transferred, both from the dental office to the dental laboratory and vice versa. If the contaminated with biological secretions from the patient (blood, saliva, etc.) impression materials or finished crowns, bridges, overdentures, and partial, temporary and permanent dentures are not decontaminated properly, they can serve as a factor for the transmission of microorganisms.

There is abundant evidence of the primary role of the hands of medical staff as a factor in the transfer of microorganisms, and accordingly, knowledge and application of the rules for proper hand disinfection are the basis of the prevention of the spread of infections in the dental office/dental laboratory [1-4].

There is a risk of cross-contamination from dental instruments and dental impressions for fixed and removable dentures, as well as transmission of infections, both patient-to-patient, doctor-to-patient, and through the doctor-dental technician and dental technician-doctor chain. There is a risk of contamination and the spread of respiratory infections in dentistry due to the use of many instruments and devices that create and spray a fine water aerosol containing microorganisms [4, 5].

Infections can be transmitted in a number of ways in the dental office: directly - through contact with blood, oral fluids, or other contaminated materials; indirect - contact with contaminated objects such as instruments, surrounding surfaces or devices, dental impressions, and prostheses; Contact with the conjunctiva, nasal or oral mucosa with droplets containing microorganisms and spread over long distances by sneezing, coughing or speaking, as well as inhalation of microorganisms that can remain airborne for a long time [5, 6, 7].

In the conditions of the COVID-19 pandemic, in which the World finds itself since the beginning of 2020, it is extremely important to know and observe the rules of good dental practice, in particular dental laboratories, and to apply them in everyday practice in order to control and reduction of dental care-associated infections (DAIs) [8, 9].

The aim of this study is to investigate the level of knowledge about hand disinfection and the application of routine disinfection measures in everyday practice among dental technician students from the Medical College of Plovdiv and practicing dental technicians.

MATERIAL AND METHODS

In the period of September 2019 - January 2020, an anonymous survey was conducted among a total of 92 practicing dental technicians from Plovdiv and students from the Medical College - Plovdiv on their knowledge of disinfection, sterilization, and their practical application in daily work. Respondents answered anonymously by filling in a 19-question questionnaire designed for the study. For descriptive statistics, continuous variables were displayed as the median and interquartile range (median \pm IQR) and categorical variables as counts and percentages. All statistical analyses were performed with SPSS version 24 (IBM Corporation, New York, NY). A p-value below 0.05 was considered statistically significant.

RESULTS

A total of 92 dental technicians were studied, with 34.8% (n=32) being students and 65.2% (n=60) practicing dental technicians, with no statistically significant difference between the proportions of men and women. The median age of the respondents was 43 years, with a minimum of 19 and a maximum of 62.

A part of the working dental technicians, 17.7% (n=11), have up to 5 years of work experience, 21.0% (n=13) - from 6 to 15 years, and 19.4% (n=12) - from 16 to 25 years. With 26-35 years of experience - 25.8% (n=16), whereas 16.1% (n=10) declare more than 35 years of experience. More than half of the respondents work in an independent medical-technical laboratory, followed by 40.3% (n=25) in an individual dental technician practice, and 8.1% (n=5) are teachers in the Medical college - Plovdiv.

Over 3/4 (77.2% (n=71)) rated hands as a factor in the transmission of microorganisms, for 16.3% (n=15), the hands of healthcare personnel hold a risk only if they were visibly contaminated, and 4.3% (n=4) could not rate the importance of hands in transmitting microorganisms, followed by 2.2% (n=2) who did not think that hands play any role.

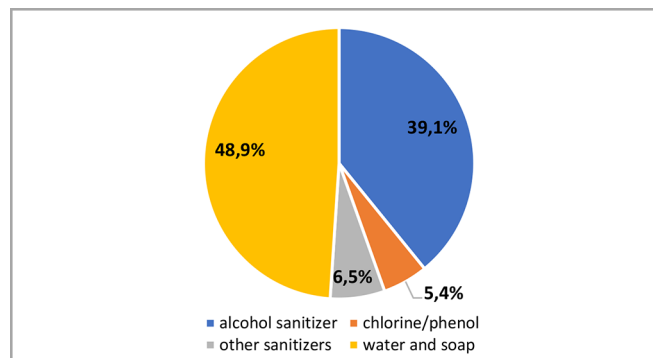
According to 14.1% (n=13), disinfection is for personal protection only, and 2.2% (n=2) disinfect hands to protect only patients, whereas 83.7% (n=77) carry out disinfection to protect themselves and the patients.

For 40.2% (n=37), hands should be disinfected after wearing gloves, and for 16.3% (n=15), this is not needed. Over 1/3 (37.0% (n=34)) consider that this is necessary only if the gloves are torn during work, and 6.5% (n=6) could not state.

More than half of the respondents claim that they disinfect their hands for 2 minutes (10.9% (n=10)) or for 1 minute (44.6% (n=41)). Only 31.5% (n=29) disinfected their hands for the recommended 30 seconds; for 13.0% (n=12), this activity took less than 15 seconds. The most frequently

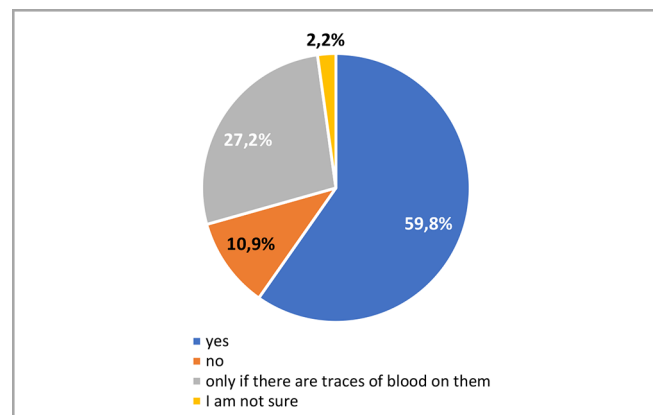
used disinfectants, 39.1% (n=37), were alcohol-containing. Interestingly, 5.4% (n=5) use chlorine/phenolic preparations, and 6.5% (n=6) claim that they use other disinfection products but do not specify. Half (n=44) considered handwashing with soap and water to be a method of disinfection. (fig. 1.)

Fig. 1. Distribution of responses according to the type hand sanitizer that is used



When working with dental impressions and finished fixed and removable prosthodontics, 59.8% (n=55) know that they should always be disinfected beforehand, but 10.9% (n=10) state not to know that this is mandatory and therefore do not apply it in their practice. For 27.2% (n=25) that is necessary only if there are traces of blood on the impressions, and 2.2% (n=2) could not decide. (fig. 2.)

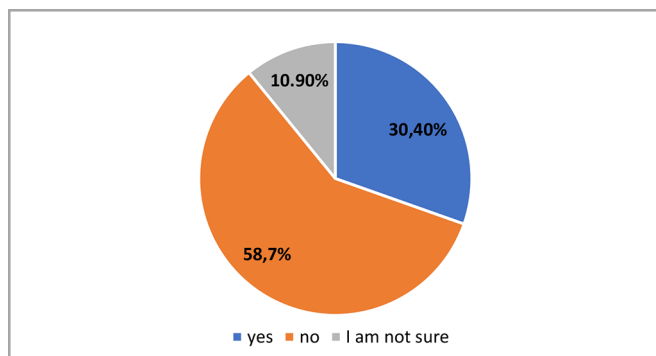
Fig. 2. Should dental impressions be disinfected?



The most commonly used preparations for disinfecting dental impressions were alcohols (44.6% (n=41)), while 29.3% (n=27) reported chlorine/phenolic preparations as their 1st choice, and 22.8% (n=21) typically use soap and water for disinfection. Other types of preparations are used by 3.3% (n=3).

According to 30.4% (n=28), finished fixed and removable prosthodontics should be disinfected before handing over to the dentist. More than half 58.7% (n=54) think that this is only the dentist's job and, therefore, do not perform it, and 10.9% (n=10) cannot state, which also suggests that they do not disinfect them. (fig. 3.)

Fig. 3. Should finished fixed and removable prosthodontics be disinfected?



Of those who finished prosthodontics, with equal relative shares of 19.6% (n=18), were those using alcohol-containing preparations phenols/chlorine-containing preparations. Over half use only water and soap, and 5.4% (n=5) - other means, but they do not specify what.

Regarding the wearing of protective equipment during work in the dental laboratory (gloves, masks, safety glasses), 54.3% (n=50) answered positive, 19.6% (n=18) did not protect themselves in any way during work, and 26.1% (n=24) use these means only sometimes.

Of those who use gloves at work, 31.5% (n=29) change them several times a day, 29.3% (n=27) change them when working with each individual print/design, 25.0% (n=23) use 1 pair daily, and 14.1% (n=13) replace them only if they break.

According to 25.0% (n=23), hepatitis B and C cannot be transmitted between the dental laboratory and the dental office through dental impressions and finished fixed and removable prosthodontics, and 73.9% (n=68) stated that this is possible. Of the respondents, 33.7% (n=31) were vaccinated against Hepatitis B, 38.0% (n=35) were not, and 28.3% (n=26) did not know.

DISCUSSION

For the prevention of infections related to medical and dental care, including dental technician laboratories, the knowledge and application in practice of the rules for the prevention of infections, the assessment of the risk of transmission of microorganisms through contaminated objects, instruments, dental impressions, and finished fixed and removable prosthodontics, etc., is of primary importance.

The first recommendations for infection control in the dental laboratory were published by the ADA in 1978. In 1986, the CDC outlined "universal precautions" to protect all healthcare personnel and patients from pathogens spread through blood and other body fluids. It is important to note that saliva is also a secretion through which infections can be transmitted, and this should be considered in the decontamination of impressions/finished prosthodontics [10-13].

Implementation of infection control protocols in practice, together with effective communication between the dental office and the dental laboratory, can ensure a safe working environment [14]. In carrying out this survey, we

found unsatisfactory knowledge on many of the set practically oriented questions and, therefore, the potential lack of application of this knowledge in practice.

According to the WHO and other health regulations that are being developed in Bulgaria, hands are a well-recognized first factor for the transmission of infections in medical/dental practice if they are not properly decontaminated between individual patients/work with impressions or ready-made prosthodontics [1-4]. We found that 1/4 of dental technicians don't know the importance of hand disinfection, which means they don't practice it, or practice it incorrectly, and put both dentists and their patients at risk. Furthermore, parts of the dental technicians didn't adhere to this protocol, wrongly considering hand washing for disinfection, using preparation different to alcohol, not using or changing gloves regularly and not disinfecting their hands for the recommended 30s, which shows lack of proper information and lack of responsibility.

Hand hygiene is the most important and reliable measure that medical/ dental personnel can practice to prevent the transmission of infectious diseases. Hand hygiene in a dental laboratory should begin with washing hands with soap and water, thereby removing organic matter - blood and saliva, especially if the hands are visibly dirty. The next step should be drying the hands with disposable tissues and applying an alcohol-based disinfectant to the dry hands. The procedure should be performed before and after donning gloves, after removing gloves, when hands are visibly contaminated, after touching contaminated objects, and before leaving the laboratory work area [15].

In Romania [16], 37.5% consider the risk of infection transmission in the dental laboratory to be low, and similarly to us almost half always wear gloves, with hand disinfection being performed before donning gloves (15.8%) and after removing gloves (22.3%).

In Libya [17], 65.5% of participants were aware that wearing personal protective equipment is mandatory during work, and unlike our findings most adhered to changing torn gloves during work 76.5%, 87.2% for public and private laboratories respectively, and used facial masks 70.6%, 79.5% public and private respectively.

In Saudi Arabia [18], 57% answered positively when asked about their knowledge of occupational hazards management policy and procedures, and most state that personal protective equipment is mandatory in the laboratory, including gloves, face mask/ shield, and eye protection when operating rotatory equipment.

In Jordan [19] about 38% of participants did not use gloves in their labs, whereas in India [20], 73.07% stated that they use gloves, 90.38% - masks, and 57.69% - eye shields.

All impressions taken in the dental office and sent to the laboratory must be cleaned and disinfected by the dental staff who sent them. If the dental laboratory is not sure whether disinfection has been performed, the laboratory should perform it [12]. The first step in any infection control procedure is cleaning, with subsequently disinfection with an antimicrobial agent [10]. Dental impressions can be disinfected by spraying or dipping. The advantages of the

spray method are that less disinfectant is used, and often, the same product can be used to disinfect surfaces in the environment. [15, 21-23].

A contaminated dental impression will result in a contaminated plaster model. Due to potential damage to the model, it is more difficult to disinfect a cast than to disinfect an impression. Therefore, it is preferable to disinfect the impression before making a cast. If the model needs to be disinfected, a medium-level disinfectant spray followed by rinsing is recommended. If the plaster is disinfected for transport, it should be allowed to dry before packaging for shipment [22-25]. Contaminated fixed and removable dentures should also be disinfected before work in the dental laboratory. The prosthodontics should be scrubbed using an antimicrobial soap to remove debris. [15, 19].

In Romania [16], the disinfection of prosthetic items from the dental office was checked regularly by only 13.0%. In contrast, in Libya [17] most dental technicians 86.2% and 87.2% from public and private labs respectively responded that they disinfect all the impressions they receive from clinics. In correlation to our findings, most lab owners in Jordan [19] (53%) stated that the dentist should disinfect the impressions before shipping them to dental laboratories. In India [20], 71.15% of the technicians communicate with the doctor regarding the disinfection of impressions and 30.76% of the dental technicians disinfect all the impressions.

Disinfection of items leaving the dental laboratory is also needed. In Romania [17] this was performed by 81.3%, whereas in our survey less than 1/3 do it and over half of dental technicians think that it's the dentist job.

In addition, measures during the Covid-19 pandemic, as well as the period after, must be followed with maximum precision, due to the increased risk of contamination and

transmission of the infection. [26, 27].

Regarding hepatitis B, the risk of its transmission in dental practice is high [28], which ¾ of our study participants state. Therefore vaccination against the disease should be recommended for everyone working in the dental field, including dental technicians [29]. Similarly to us, the technicians in a Romanian [16] study claimed that they are vaccinated against hepatitis B virus at a rate of 38.0%, 40.4% had a valid hepatitis B vaccination in Saudi Arabia [18], whereas in Libya [17] the rate was much higher at over 2/3, 78.84% in India [20] and about 50% in Jordan [19]. We consider the 1/3 of dental technicians already vaccinated in our study as a percentage that's too low we need to focus on promoting the vaccine to this demographic.

CONCLUSION

The same infection control protocols applied in the dental office should also be followed in the dental laboratory. Observing standard precautions, using aseptic techniques, adhering to strict disinfection and sterilization procedures, and wearing appropriate personal protective equipment can prevent transmission of infections from contaminated impressions/dentures, etc., entering the dental laboratory. Effective communication and coordination between the dental laboratory and the dental office is a critical component of a successful infection control program, as is the education of future and working dental technicians on the issue.

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