



Study of Knowledge of Hand Disinfection and Dental Impressions in Everyday Practice among Dental Students during a Pandemic by Coronavirus Disease 2019

Velina Stoeva^{1*}, Tanya Bozhkova², Aleksandar Atanasowski³, Veselina Kondeva³

¹Department of Epidemiology and Dental Medicine, Faculty of Public Health, Medical University, Plovdiv, Bulgaria; ²Department of Prosthetic Dentistry, Faculty of Dental Medicine, Medical University, Plovdiv, Bulgaria; ³Department of Pediatric Dentistry, Faculty of Dental Medicine, Medical University, Plovdiv, Bulgaria

Abstract

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***Correspondence:** Dr Velina Stoeva, PhD, Department of Epidemiology and DM, Faculty of Public Health, Medical University, Plovdiv, Bulgaria. E-mail: velina1111@mail.bg
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BACKGROUND: Dentistry is risky for acquiring and spreading a lot of infections. Patients in dental practice, especially those treated with dental prostheses, are at high risk both for acquisition and as a source of infectious diseases.

AIM: Our study aims to estimate the level of knowledge about transmission of infections, hygienic disinfection of hands, and dental impressions among dental students during a pandemic of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)/coronavirus disease 2019 (COVID-19).

MATERIALS AND METHODS: An online anonymous survey was conducted among 106 students of dental medicine from the Faculty of Dental Medicine - Plovdiv, Bulgaria.

RESULTS: According to 8.5% of students, hands are a factor for transmission of infections only if they are visibly contaminated and 2.8% do not think that hands are a factor. 19.3% believe that dental impressions could be a factor in transmitting microorganisms from the dentist to the dental technicians only if they are visibly contaminated and 1.8% deny this possibility.

CONCLUSION: In our country, it is necessary to be done and implement in practice a protocol for disinfection of impressions and prostheses, as they are epidemiological factors for the transmission of microorganisms between the dental office and the dental laboratory. The results in practice, after the implementation of the protocol, should be checked regularly.

Introduction

The epidemiological study of infections, that could be acquired, because of dental treatment is a major challenge and benefits both patients and dental staff. The dental staff includes not only dentists but also dental nurses, dental technicians, administration, and others.

In Bulgaria, dental students during their daily training and clinical work are in direct contact with a huge number of patients who can be a source of various infectious diseases. From the 4th year of their training, they began clinical practice, conducting a variety of treatment activities. Patients in dental practice, especially those treated with dental prostheses, are at high risk both for acquisition and as a source of infectious diseases. There is a risk of cross-contamination of dental instruments and dental impressions for fixed and removable prosthodontics and transmission of infections, both from patient to patient, from doctor to patient, and along with the chain doctor - dental technician and dental technician-doctor.

Dentistry is risky for acquiring and spreading respiratory infections, as many instruments and devices are used, which form and spray a fine water aerosol containing microorganisms [1], [2], [3].

Infections can be transmitted in dental practice in several ways: direct - contact with blood, oral fluids, or other contaminated materials; indirect - contact with contaminated objects, such as instruments, environmental surfaces or equipment, dental impressions, and prostheses; contact of the conjunctiva, nasal or oral mucosa with droplets containing micro-organisms spread over long distances by sneezing, coughing, or speech and inhalation of microorganisms that can remain in the air for a long time [3], [4], [5], [6], [7], [8], [9].

During the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)/coronavirus disease 2019 (COVID-19) pandemic, in which the world has been since the beginning of 2020, it is important to know, assess, and control the risk of transmission of this infection, as the dental office is at risk. The place for the spread of this virus – it is easy because there it is possible to have multiple transmission of the virus [10].

Dentists have daily direct and indirect contact with saliva, blood, and instruments, dental impressions, surfaces that could be contaminated, and making the dental office a place for the spread of viruses, bacteria, and fungi, including SARS-CoV-2/COVID -19 [11].

Hence, it requires dental students to know and follow the rules of disinfection at the workplace, hands, dental impressions, and so on and prevention of the spread of hospital-acquired infections (HAI), especially in the context of the COVID-19 pandemic.

According to the World Health Organization, the hands of medical staff are a factor in the transmission of microorganisms, both from patient to patient and on different objects in the environment of the dental office. Most microorganisms can survive for a long time in the absence of an effective control measure [4], [5], [6], [7], [8], [9].

Knowledge and observance of the rules of good medical practice are a daily professional obligation of doctors of all specialties, and training on these issues should begin with the start of clinical work with patients [1], [2].

Aim

The aim is to study the level of knowledge about transmission of infections, hygienic disinfection of hands, and dental impressions among dental students during a pandemic of SARS-CoV-2/COVID-19.

Materials and Methods

An online anonymous survey was conducted, through a specially developed form, among a total of 106 students of dental medicine from the 4th, 5th, and 6th course from the Faculty of Dental Medicine - Plovdiv, Bulgaria. The questionnaire contains 15 questions related to the methods of hand and impressions disinfection and dental prostheses used disinfectants and their methods of application. The study was conducted in February - May 2021. The results were processed with SPSS v. 18 at a significance level of $p < 0.05$ and visualized by charts in Excel 2016.

Results

The dental students who are included in our study are 39.6% - 4th course, 34% - 5th course, and 26.4% - 6th course. 69.8% are women and 30.2% are men. More of the surveyed students (88.7%) think that by hands is possible to transmit microorganisms from

person to person. According to 8.5% of students, hands are a factor only if they are visibly contaminated and 2.8% do not think that hands are a factor.

The answers to the question "Why hand disinfection is necessary?" are presented in Figure 1.

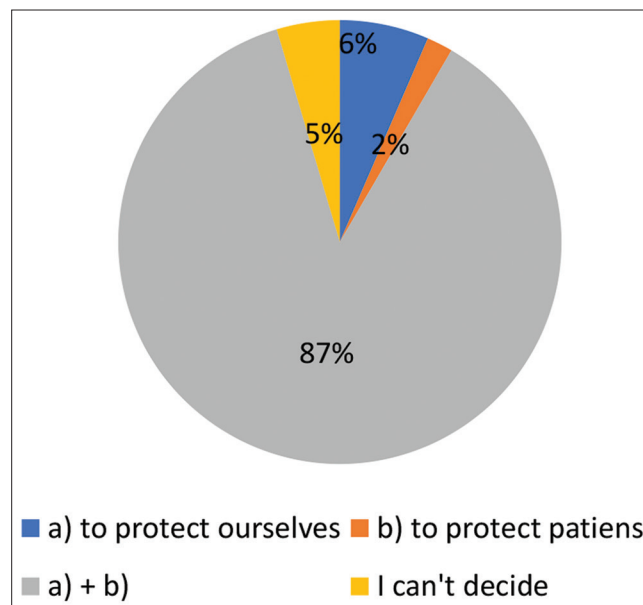


Figure 1: Distribution of respondents according to the answers why hand disinfection is necessary

Among the respondents, 76.6% answered correctly that hygienic hand disinfection is carried out after working with the patient and wearing gloves, but 18.7% believe that it is enough to disinfect their hands only if they are torn. The answers to the question "How do you disinfect your hands?" are presented in Figure 2.

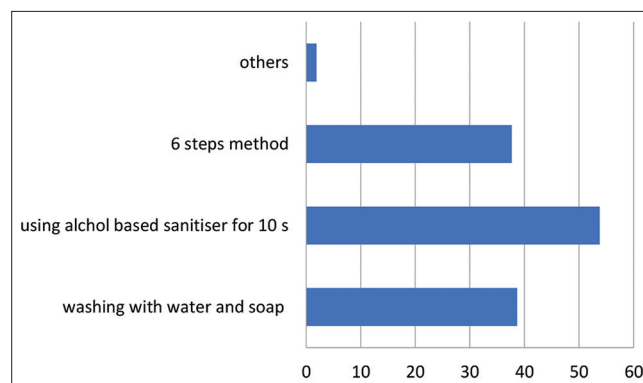


Figure 2: How do you disinfect your hands?

According to more of the respondents (42.7%), the time for which they disinfect their hands is 1 min, 26.4% - 30 s, 20.9% - 2 min, and the least indicated <15 s. The answers given by the respondents about the method of hand disinfectants are shown in Figure 3.

A major percentage of respondents 78.9% think that dental impressions could be a factor in transmitting microorganisms from the dentist to the dental technicians, 19.3% believe that this is possible only if they are visibly contaminated, and 1.8% deny this possibility. The answers to the question "Why

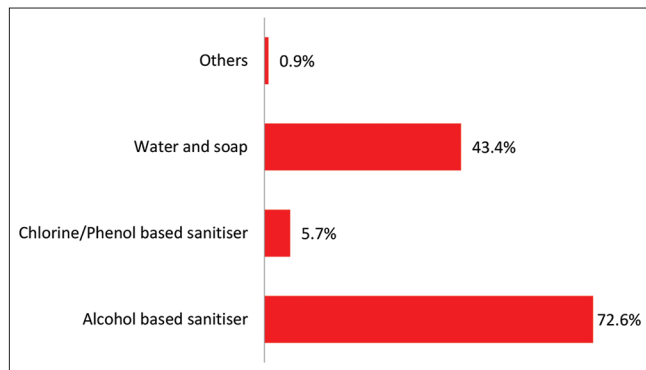


Figure 3: Distribution of respondents according to the method of hand disinfection

should we disinfect dental impressions?" are shown in Figure 4.

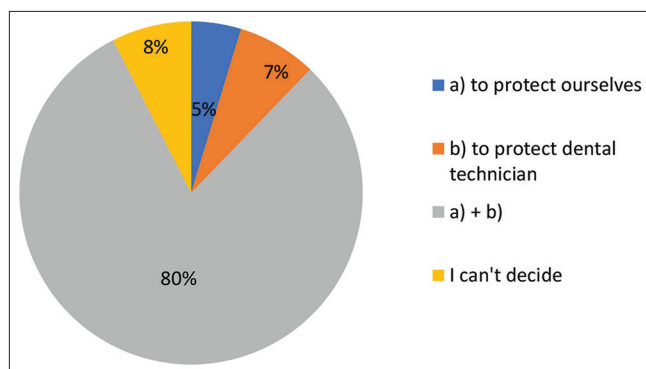


Figure 4: Distribution according to answers "Why should we disinfect dental impressions?"

Sanitizers that are used for disinfection of dental impressions are shown in Figure 5.

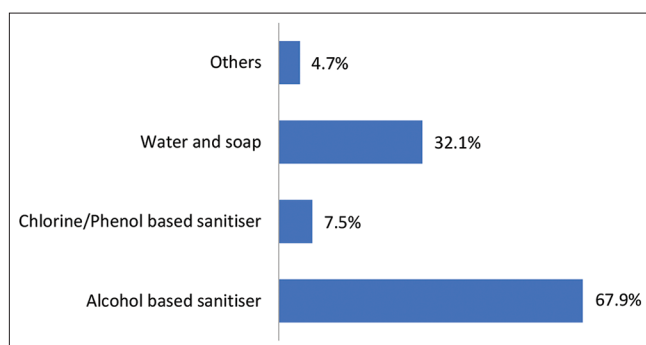


Figure 5: "How disinfect dental impressions"

According to 75.5% of the respondents, fixed and removable prosthodontics should be disinfected by the dentist, 18.9% believe that dental technicians have to disinfect it, and 8.5% do not disinfect impressions. The answers are given by the students to the question "What sanitizers do you use most often for disinfection of prostheses?" are shown in Figure 6.

Only 17% of students have been vaccinated against COVID-19, 18.9% want to be vaccinated but have not yet and 64.2% have not been vaccinated and do not intend to do this.

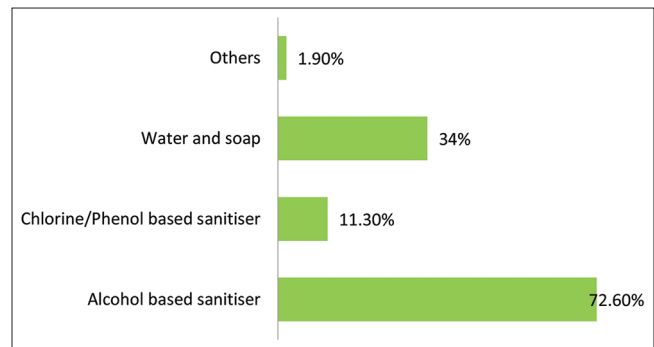


Figure 6: Disinfection of prostheses

Discussion

Hands as a factor for transmission of microorganisms from person to person and respectively an epidemiological factor for the spread of infections are estimated at 88.7%. According to 8.5%, hands are a factor only if they are visibly contaminated and 2.8% do not believe that with their hands, they can transfer microorganisms from one patient to another or surface. The hands of medical staff are a factor № 1 for the transmission of microorganisms [4], [5], [6], [7], [8], [9]. This requires all medical professionals to know and follow the rules of hand disinfection. The majority of respondents (87%) state that they perform hygienic hand disinfection at work to protect both themselves and their patients, 6% believe that they protect themselves, 2% that they protect the patient, and 5% could not answer why they are disinfecting their hands. The correct answer is that with everyday hygienic hand disinfection with alcohol-based sanitizers, we protect both themselves and their patients [1], [2], [3].

We did not get good enough answers to the question about hand disinfection after wearing gloves: 76.6% answered correctly that hygienic hand disinfection is carried out after working with the patient and wearing gloves. 18.7% believe that it is enough to disinfect their hands only if their gloves are torn during work, which makes us think that before contact with the patient, their hands are not disinfected, and 3% do not disinfect them at all, such as the categorical rules of all normative documents [1]. Both answers are unacceptable and make us doubt the real knowledge and observance of the antiepidemic measures. According to all health standards, the gloves are changed for each patient [1].

It is worrying that 38.7% of respondents perceive washing with soap and water as a method of hand disinfection. Hand washing, which achieves only mechanical decontamination, is the first and obligatory but insufficient step in proper hand hygiene. Students who use alcohol-based disinfectants are 53.8%, but in the insufficient 10 s, and 37.7% correctly apply the 6-step method. According to the WHO, the 6-step method, which must be performed in 30 s, achieves the best distribution of the disinfectant on the

surface of the hands and this method provides optimal protection [7], [8].

Regarding the answers given to the question about the time in which the hand disinfection is performed, we suspect an automatic answer to the question and not real knowledge and implementation of the rule. We need sufficiently 30 s for good hand hygiene. In another study of our team among general practitioners and nurses, we find close to these and unsatisfactory results, which speaks of unsatisfactory knowledge of the problem and the corresponding non-application in practice and by medical professionals [12].

Alcohol-based sanitizers for hygienic hand disinfection are used by 72.6% of respondents, 5.7% - phenols/chlorine preparations, 43.3% indicated water and soap as an answer, and only 0.9% - other. It is wrong to consider that by washing with soap and water, we achieve disinfection, also chlorine products, such as skin antiseptics. Alcohol-based combined products are used for hygienic hand disinfection [1], [2], [3], [7], [8].

78.9% of respondents said that dental impressions taken by the patient could be a means of transmitting microorganisms from the dentist to the dentist, but according to 19.3%, this is possible only if they are visibly contaminated and 1.8% deny this possibility. According to studies, mainly in foreign literature, different types of microorganisms could be transferred through the impression materials for both fixed and removable prosthodontics, so there is a real risk of transmission of infectious agents from the dental office to the dental laboratory and therefore disinfection of the impressions. by immersion or spraying with disinfectant solutions is now considered mandatory for effective infection control [13].

Cross infection control is a very important aspect of patient safety. Impression disinfection can prevent the spread of infection from dental clinic to dental laboratory technician, patients, and dental auxiliaries. It is the responsibility of the dentist to make an appropriate choice of disinfection method for different impression materials [14], [16].

Dental impressions are categorized as semicritical objects in dental practice and require a high level of disinfection or sterilization. Sterilization in an autoclave will impair the accuracy of the imprint dimensions and is therefore not feasible. Until 1991, the recommended procedure for disinfection of dental impressions was rinsing under running water, with which only 40% of bacteria, viruses, and fungi were removed and the potential for transmission of microorganisms remained there. Recently, it is recommended to pre-wash the impression with running water to dispose of all particles, blood, and saliva before the active disinfection procedure. Disinfection of dental impressions should be a routine procedure in the dental office and dental laboratory. However, most dental professionals in private clinics, hospitals,

dentistry, and prosthetic laboratories do not follow the necessary disinfection protocols. It is important to raise awareness among dental professionals involved in any process of processing, transporting, processing, and storing dental impressions [15].

The best mode of disinfection for dental impressions is by immersion, although spraying techniques are also available. This study compared the effectiveness of disinfectants with alcohol and aldehyde spray-on analog dental impressions in a clinical setting. Alcohol disinfection of dental impressions may be less effective than aldehyde spray and complete immersion of the impressions is recommended. Careful wetting or soaking of all impressions surfaces is very important when using a spray [16].

In Bulgaria, a method for photodynamic disinfection of prostheses and impressions in prosthetic dentistry has been developed and applied in practice to evaluate its effectiveness in comparison with some conventional disinfection methods. The method of photodynamic disinfection is a good therapeutic choice for effective control against diseases transmitted by oral microorganisms in prosthetic dentistry [17].

Regarding the means for disinfection of impressions and prostheses, we non-optimal answers, which makes us suspect ignorance and non-compliance with the guidance. In our country, the guidance for HAls requires that impressions have to be disinfected immediately after taking them [1]. All dentists, as well as students who have a clinical practice, should work under this guidance.

An author team from India offers protocols for disinfection of all types of impressions and finished prosthetic structures to avoid cross-transmission of infections between the dental office and the dental laboratory [8].

In a SARS-CoV2 pandemic, it is imperative that all health-care professionals, including dental students, know and strictly apply antiepidemic control measures, especially we have to have in mind the airborne transmission and resistance of the virus in the air and on surfaces with hours. Most dental procedures generate aerosols and fine droplets that may contain SARS-CoV-2, which explains the need for additional preventative measures to limit the spread of the virus. It is necessary for Bulgaria to conduct a detailed study of the routes of transmission of COVID-19 in dental clinics by aerosols and saliva and to prepare protocols for infection control, as proposed by authors from Tunisia [18], [19], [20], [21], [22].

64.2% of the surveyed students have not been vaccinated against COVID-19, 18.9% want to be vaccinated, and only 17% have been vaccinated. Because of the high risk of spreading this infection in dental practice, we believe that this percentage should be higher. During a pandemic, vaccination is the most reliable and cost-effective way to prevent the spread of COVID-19.

Conclusion

The knowledge of routine disinfection practices by the surveyed students is satisfactory, but we believe that more detailed consideration is needed in their study programs of prevention and control of infections, especially in the context of the COVID-19 pandemic, as some of the questions, we did not receive optimal answers. Respondents are at high professional risk for the spread of HAIs and this requires strict knowledge and implementation of the rules of good medical practice. In our country, it is necessary to be done and implement in practice a protocol for disinfection of impressions and prostheses, as they are epidemiological factors for the transmission of microorganisms between the dental office and the dental laboratory. The results in practice, after the implementation of the protocol, should be checked regularly.

References

- Guidance of Ministry of Health No. 3 from 8.05.2013 for the Management and Control of Nosocomial/Hospital-Acquired Infections; 2013.
- Stoeva V. Dissertation "Infections in Dental Practice: Prevention and Control"; 2017.
- Terry KL, Crego N. Special focus issue: Pediatrics. *AORN J*. 2016;104(1):P10-2.
- AORN Period Briefing Guideline first Look Guideline for Hand Hygiene; 2016.
- Backman C, Zoutman DE, Marck PB. An integrative review of the current evidence on the relationship between hand hygiene interventions and the incidence of health care-associated infections. *Am J Infect Control*. 2008;36(5):333-48. <https://doi.org/10.1016/j.ajic.2007.08.007>
PMid:18538700
- Pires D, Soule H, Bellissimo-Rodrigues F, Gayet-Ageron A, Pittet D. Daniela pires hand hygiene with alcohol-based hand rub: How long is long enough? *Infect Control Hosp Epidemiol*. 2017;38(5):547-52. <https://doi.org/10.1017/ice.2017.25>
PMid:28264743
- Boyce JM, Pittet D, Healthcare Infection Control Practices Advisory Committee, HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. Guideline for hand hygiene in health-care settings. Recommendations of the healthcare infection control practices advisory committee and the HICPAC/SHEA/APIC/IDSA hand hygiene task force. Society for healthcare epidemiology of America/association for professionals in infection control/infectious diseases society of America. *MMWR Recomm Rep*. 2002;51(RR-16):1-45, quiz CE1-4. <https://doi.org/10.1086/503164>
PMid:12418624
- World Health Organization. WHO Guidelines on Hand Hygiene in Health Care. Geneva: World Health Organization; 2009.
- Rotter ML. Arguments for alcoholic hand disinfection. *J Hosp Infect*. 2001;48 Suppl A: S4-8.
PMid:11759024
- Melo Neto CLM, Bannwart LC, de Melo Moreno AL, Goiato MC. SARS-CoV-2 and dentistry-review. *Eur J Dent*. 2020;14(S01):S130-9. <https://doi.org/10.1055/s-0040-1716438>
PMid:32932534
- Mayta-Tovalino F, Diaz-Soriano A, Munive-Degregori A, Pérez-Vargas F, Luza S, Bocanegra R, Mauricio F. Proposal for a provisional protocol for the care and identification of dental transmission routes of COVID-19 in Latin America: A literature review. *J Clin Exp Dent*. 2020;12(10):e979-90. <https://doi.org/10.4317/jced.57762>
PMid:33154801
- Stoeva V, Batselova H, Atanasovski A. Study the level of knowledge about hygienic hand disinfection among GPs and nurses. *Prev Med*. 2021.
- Kotsiomiti E, Tziaila A, Hatjivasiliou K. Accuracy and stability of impression materials subjected to chemical disinfection-a literature review. *J Oral Rehabil*. 2008;35(4):291-9. <https://doi.org/10.1111/j.1365-2842.2007.01771.x>
PMid:18321265
- Khan MW. An overview of dental impression disinfection techniques-a literature review. *JFDA*. 2018;27(4):208.
- Somasundram J, Geetha RV. Disinfection of impression material-a review. *Eur J Mol Clin Med*. 2020;7(1):2451-60.
- Al Shikh A, Milosevic A. Effectiveness of alcohol and aldehyde spray disinfectants on dental impressions. *Clin Cosmet Investig Dent*. 2020;12:25-30. <https://doi.org/10.2147/ccide.s233336>
PMid:32104101
- Vlahova AP, Kisov CK, Popova EV, Haydushka IA, Mantareva VN. A new method for photodynamic disinfection of prosthetic constructions and impressions in prosthetic dentistry. *Folia Med*. 2012;54(1):51-7. <https://doi.org/10.2478/v10153-011-0078-6>
PMid:22908831
- Upendran A, Gupta R, Geiger Z. *Dental Infection Control*. Treasure Island, FL: Stat Pearls; 2020.
- Afef A, Dorsaf T, Eya M, Lamia O, Nabih D. Routes of transmission and control protocols of COVID-19 in dental clinics: An overview. *Int J Drug Res Dent Sci*. 2020;2(4):73-83.
- Fini M. What dentists need to know about COVID-19. *Oral Oncol*. 2020;105:104741. <https://doi.org/10.1016/j.oraloncology.2020.104741>
PMid:32380453
- Lewandowsky S, Cook J, Schmid P, Holford DL, Finn A, Leask J, *et al*. COVID-19 Vaccine Communication Handbook. A Practical Guide for Improving Vaccine Communication and Fighting Misinformation; 2021. Available from: <https://www.skstoc19vax>. [Last accessed on 2021 Feb 20].
- General Dental Council. Standards for the Dental Team; 2021. Available from: <https://www.standards.gdc-uk.org/assets/pdf/standards%20for%20the%20dental%20team.pdf>. [Last accessed on 2021 Feb 08].