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Surveillance of Infection Control in Dental Settings During Covid-19 Pandemic

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Abstract

Objective: Fluorescence marking is a cost-effective method to evaluate the completeness of cleaning in clinical surfaces. The aim of this study is to evaluate the potential sources of infection by surveillance of frequently contacted surfaces in the clinic and patient waiting areas in dental practice by fluorescent marker.

Materials and methods: The surfaces that are frequently contacted by patients, clinicians, and the staff in the clinic, local intervention room, and patient waiting room were determined. Fluorescent marker dye was applied onto frequently contacted surfaces. Following cleaning after the patient's discharge, the dye-applied surfaces were examined with a fluorescent lamp.

Results: The surfaces in the patient waiting area were observed to have the highest scores in terms of the frequency of the touches. According to the fluorescent marker method, 50 % of the frequently contacted surfaces were scored as totally clean, 17 % were partially clean, and 33 % were not clean.

Conclusion: This study suggests that the fluorescent marker method is an easy and practical method that can be used for the surveillance of surface cleaning in dental settings. More careful and strict hygiene regimens are required not to overlook any potential source of infection, such as the patient waiting area, and eliminate the potential routes of the spread of infection.

Keywords: Decontamination, Cross-Infection, Equipment Contamination

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INTRODUCTION

An outbreak of an unknown origin emerged in late December 2019 in China and spread rapidly all over the world. The pathogen responsible for this epidemic, named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is a new type of coronavirus virus that infects mammals and humans (1-3). SARS-CoV-2 is reported to be transmitted via inhalation of the pathogenic virus that can hang in the air, direct contact with patient materials like blood or saliva, and also indirect contact with contaminated tools and/or environmental surfaces in dentistry (4). During dental procedures, droplets and aerosol particles can hang in the air for long periods and then settle on peripheral surfaces. Live viruses are reported to be present in the saliva of infected individuals; thus, all horizontal surfaces can serve as a secondary source for transmission of SARS-CoV-2. Additionally, the fact that patients can spread the virus increases the risk in dental practice dramatically (4-6).

It has been reported that SARS-CoV-2 can survive up to 72 hours to 7 days on various surfaces (4, 7). Considering the persistence of coronavirus on inanimate surfaces is important in terms of preventing the spread of the virus in this way (8, 9). Regardless of the route of transmission, the minimal viral load of SARS-CoV-2 that will cause the disease has not yet been determined. Thus, all aerosol-contaminated surfaces that have been contacted by physicians or patients should be considered potentially contaminated (10).

Direct or indirect contact with bodily fluids and infected dental tools creates a potential path for the spread of the microorganisms. Also, contaminated surfaces in dental settings can potentially contribute to cross transmission of these pathogens (4,11). Thus, the dental clinician, staff and patient may be at risk of cross-infection in the dental environment (10).

To evaluate the completeness of cleaning in clinical surfaces, a number of techniques have been proposed, including bioluminescence, microbiological count, and fluorescent markers (11,12). The fluorescent marker technique demonstrates the physical removal of an applied substance by making the remaining substance visible after washing with UV light and has been used in numerous hospital wards (11).

The aim of this study is to determine the underestimated potential sources of infection by surveillance of frequently contacted surfaces in the clinic and patient waiting areas in dental practice.

METHODS

This pilot study was approved by the Ethics Committee of Ordu University (No:2020/144) and constituted of two parts. In the first stage, to determine the surfaces that are frequently contacted by patients, physicians, and the staff in the clinic, local intervention room, and patient waiting room, two researchers

performed observation independently during the peak hours of the clinic (10-12 am, 2-4 pm) for a week. 4 randomly selected dental units from the clinic and local intervention room, and the patient waiting area were observed. The 10 most frequently contacted surfaces were determined. In the second stage, fluorescent marker dye (Sanitest, Sanidez Tic. Ltd., Istanbul, Turkey) was applied onto frequently contacted surfaces, previously determined by researchers (M.T.A., D.T.), of a dental unit in the clinic and local intervention room and surfaces in the patient waiting room following the terminal cleaning at the end of the day. The dye was applied with a reference created from acetate paper by researchers (M.T.A., D.T.) to ensure standardization (Figure 1). Because the marker dye is transparent, it is not visible in normal light but shows a fluorescent view under UV light. The fast-drying dye consists of a material that is completely obtained from natural products and has no toxic effect. Also, the marker dye is resistant to abrasion but can easily be removed when wiped with a damp cloth. After the discharge of the patient dental unit was cleaned by the staff blinded to the study. Subsequently, the dye applied surfaces were examined with a fluorescent lamp. The surfaces from which the paint has been completely removed will be scored as completely clean, partially clean if some of it has been removed, and dirty if there is no change in the dye.

Figure 1. Reference used for the application of the fluorescent dye

IBM SPSS Statistics for Windows software (version 23.0, IBM Corp, Chicago, USA) was used. Categorical variables are presented as n (%). The frequency of the touches among the surfaces was compared with the Kruskal-Wallis test. The significance level was accepted as 0.05.

RESULTS

The surfaces in the patient waiting were area observed to have the highest scores in terms of the frequency of the touches. However, no significant difference was observed among the 10 surfaces in terms of the frequency of contacts (p=0.437). According to the fluorescent marker method, of the 18 high-touch surfaces to which the dye was applied, 9 surfaces (50 %) were totally clean, 3 surfaces (17 %) were partially clean, and 6 surfaces (33 %) were not clean (Figure 2).

Table 1. Scoring of the surfaces after fluorescent marking

		CL			LIR			PWA		
		NC	C	PC	NC	C	PC	NC	C	PC
1	Bracket Table		x			x				
2	Dental Chair Backrest		x				x			
3	Dental Chair Headrest		x			x				
4	Door Password Panel		x			x				
5	Mobile Cabinetry		x			x				
6	PC Monitor	x			x					
7	Reflector			x	x					
8	Dental Chair Armrest		x		x					
9	Sitting Area							x		
10	Patient Admission Desk							x		

CL: Clinic, **LIR**: Local intervention room, **PWA:** Patient waiting area, **C:** Clean, **NC:** Not clean, **PC:** Partially clean

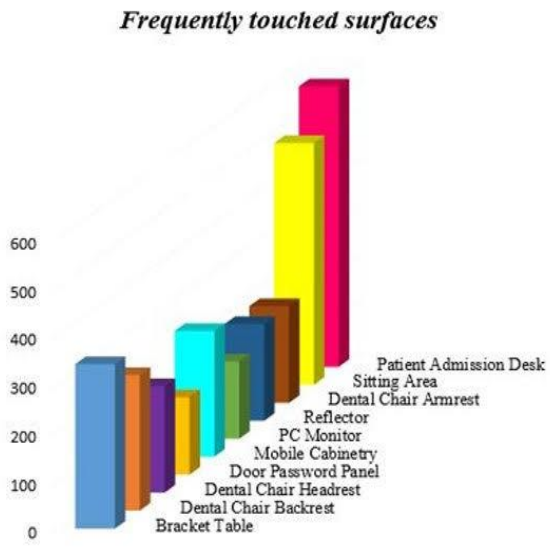

Figure 2. Graph showing the top 10 most touched surfaces.

DISCUSSION

Because of the spilt water and aerosols, the highest amount of contamination has been reported to occur around the oral cavity. After the treatment was completed, the aerosols are hanging in the air in the clinic. It is claimed that <5 μm aerosols can be entrained into the air and transported over distances up to 1 m (10). In fact, the inactivation time of the SARS-CoV-2 on surfaces is still not clear. Kampf et al.(8) found that at room temperature, human coronaviruses can remain infectious on surfaces for up to 9 days. According to Van Doremalen et al.(7), transmission of SARS-CoV-2 to the surfaces may occur since the virus can remain alive and infectious for hours or days. Ye et al.(13) have recently reported surfaces contaminated with SARS-CoV-2 in patient care areas in the hospital environment. Thus, transmission via contaminated intimate surfaces is a crucial factor in terms of coronaviruses' super spread.

If the virus transfers to hands or equipment, it will lead to infection through contact with the mucous membranes by indirect contact if the concentration is above the infectious dose. Furthermore, the time spent in the dental clinic could lead patients to be infected. Thus, an effective hygiene protocol is vital for healthcare settings like dental practice (14, 15). To determine sites that could benefit from targeted cleaning attention several methods have been used previously (16). Fluorescence marking is reported as an inexpensive method that requires minimal equipment and improves practice (17). The Centers for Disease Control and Prevention suggested using fluorescent markers as a tool to evaluate surface cleaning (18). Therefore, we tested the surfaces using fluorescent dye. This method has been frequently used in hospital

settings however, to the best of our knowledge the present study is the first study used this method in dentistry.

In the present study, most of the surfaces were scored as clean in the clinic and local intervention room, however, the more frequently touched surfaces, when compared to the other eight surfaces in the patient waiting room, were scored as not clean. We think that this may be originated from the lack of appreciation or attention by staff for the potential role of these surfaces when compared to the surfaces in clinical areas in the transmission of SARS-CoV-2 rather than ineffective terminal disinfection cleaning in general. It may also be caused by overload or confusion regarding task sharing among staff.

CONCLUSION

More careful and strict hygiene regimens are required not to overlook any potential source of infection, such as the patient waiting area, and eliminate the potential routes of the spread of infection.

Ethics Committee Approval: Approval for the study was obtained from the Ministry of Health (https://bilimselarastirma.saglik.gov.tr/) and Ordu University Clinical Research Ethics Committee with the decision number 2020/144.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: MTA, DT, MMO, Design: MTA, DT, MMO, Data Collection and Processing: MTA, DT, MMO, Analysis and Interpretation: MTA, DT, MMO, Writing: MTA, DT, MMO

Conflict of Interest: No conflict of interest was declared by the authors.

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