

# Infection Control Practices Followed by Postgraduate Residents of Public and Private Dental Institutions of Karachi During the COVID-19 Pandemic



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**OBJECTIVE:** To gain an insight into cross infection protocols being followed by dental postgraduate residents in the prevention of the spread of coronavirus.

**METHODOLOGY:** A cross-sectional survey-based study was conducted using questionnaires, which were distributed among dental postgraduate residents working in different public and private institutes in Karachi, through social media. Data was analysed using SPSS, version 21.0 with p-value <0.05 to determine significant differences between both sectors.

**RESULTS:** Ninety seven residents from both institutes responded. 60 (93.75%) and 29 (87.87%) residents from the public and private institutes respectively, reported to having the patient's temperature checked with an infrared thermometer. However, a lower compliance was noted in regard to the use of hand sanitization with a hydro alcoholic solution by both institutes with 28 (43.75%) from public and 24 (72.72%) from private institutes. 11 (17.18%) residents from public institutes responding with disposal of PPE after every patient, whereas 1 (3.03%) resident from a private institute responded with disposal after every patient. However, due to a smaller sample size, the differences were not statistically significant.

**CONCLUSION:** The pandemic has exposed numerous shortcomings in the dental healthcare system, regardless of the sector. Since COVID-19 is likely to become an endemic, compliance with cross infection protocols needs to be improved so as to prevent its rapid spread. In a third world country like Pakistan, where resources are already scarce, greater emphasis needs to be placed on funding the dental healthcare system to enhance basic cross infection controls.

**HOW TO CITE:** Rana AK, Adnan S, Abidi SYA. Infection control practices followed by postgraduate residents of public and private dental institutions of Karachi during the COVID-19 pandemic. J Pak Dent Assoc 2022;31(4):182-187.

**DOI:** <https://doi.org/10.25301/JPDA.314.182>

*Received: 04 January 2022, Accepted: 13 September 2022*

## INTRODUCTION

Coronavirus 2019 (COVID-19), originally discovered in Wuhan, China, has rapidly spread globally, resulting in the 2019-2020 pandemic, as declared by the World Health Organization (WHO) and the Public Health Emergency of International Concern (PHEIC).<sup>1</sup> It has wreaked havoc, leaving economies, cultures, and societies distraught.<sup>2</sup> It began with a few cases of severe pneumonia of unknown etiology detected by local hospitals using a surveillance system developed in 2003 after the severe acute respiratory syndrome (SARS) outbreak.<sup>3</sup> All cases were being linked to the Huanan seafood market.<sup>4</sup>

The primary route of transmission seems to be through human to human interaction between COVID-19 affected individuals via airborne droplets.<sup>5</sup> The virus also has been known to possess the ability to persist outside a living host, in the form of aerosol or on fomites, hence the main mode of contagion seems to be through inhalation of aerosol droplets.<sup>6</sup>

The extensive spread of the disease before detection may be attributed to an extent to its incubation period, estimated to range from two to fourteen days, averaging at about 6 days.<sup>7</sup> This incubation period between infection and symptoms allows pathogens to move covertly across borders before being detected.

Due to close contact of dental practitioners and their patients, they are exposed to saliva, blood and other bodily fluids, putting them at a greater risk of coronavirus infection. Dental practitioners are faced with two major concerns. Firstly, the ease of spread of the viral agents due to aerosol droplets generated with the use of ultrasonic instruments.<sup>8</sup>

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Furthermore, the persistence of aerosol droplets in the air and on operating surfaces placing the practitioner at risk after removal of all PPE and exposure to it.<sup>9</sup> In addition to the lack of interpersonal distance, dental treatment requires the use of instruments that generate aerosol, increasing the risk of airborne infection in a closed operating room.<sup>10</sup> The ongoing pandemic has proven that people can be coronavirus positive and spread the viral agents around without any signs or symptoms of the biological agent.<sup>11</sup> As a precautionary measure, the dental team, apart from performing the double triage, should consider each patient as coronavirus positive until proven otherwise and use personal protective equipment in all cases.<sup>12</sup>

With over a million people of the population being infected, it has become prudent to set in place rigid and precise operating protocols capable of classifying dental procedures centered on risk assessment for the dental team, as well as for the patients.<sup>13</sup> The Center for Disease Control has published guidelines that should be implemented in dental care settings in the prevention of the spread of the coronavirus.<sup>14</sup> The aim of the study was born from the awareness that a necessary change in the decision making process is required. It involves highlighting the relevant changes that have taken place in order to build protocols and provide practical advice addressed to dentists, to assess and modulate the risks of contagion in the dental practice.

## METHODOLOGY

After taking approval from the ethical committee, extensive literature search items were selected for the questionnaire. The pilot study was conducted to ascertain any complexity in the questionnaire and perform changes accordingly.

The framework for the survey form for the present study centered on feedback from postgraduate residents employed in either public or private institutions regarding their concerns about personal protective equipment. In addition, pertinent literature search was made to identify items that could be modified and used in the local context. The process ensured that relevant items were developed for the questionnaire. The final survey included nine sections ranging from patient screening, patient's entry, appointment scheduling, access modalities for dental staff, personal protective equipment for non-sterile procedures, clinical procedures performed, removal of personal protective equipment and treatment room disinfection.

The first section recorded the primary demographic data of the participants. The second section consisted of items related to preoperative triage to establish the urgency for treatment. The third section contained questions related to

precautionary measures being taken on the patient's entry into the clinical setting. The fourth section assessed the importance regarding social distancing and waiting room organization. The fifth section assessed the access modalities for dental office staff. The sixth section established the importance given to the usage of personal protective equipment for non-sterile procedures. The seventh section addressed disinfection protocols during clinical procedures performed. The eighth section was focused on determining the training regarding adequate disposal of personal protective equipment. The ninth section dealt with protocols regarding treatment room disinfection after every patient.

## DATA COLLECTION

An equal number of public and private institutes were selected and a coordinator chosen from each institute to share the link to the questionnaire via social media. The link to the questionnaire along with the consent form was distributed among dental residents through a social media platform (Whatsapp®) for the sake of convenience and to ensure social distancing. The total population of dental postgraduate trainees in Karachi under CPSP is 203. As there was no specific outcome target, the sample size was calculated based on the assumption that the expected maximum frequency of the outcome factor is 50%. Using version 3.01 of Open Epi software for epidemiological statistics the required sample size for 95% confidence level was be 134 dental postgraduate trainees. However, only 97 residents responded.

Furthermore, the sample was stratified by the type of institute in order to get a more representative sample of the dental postgraduate residents in Karachi.

The instructions to fill the form were mentioned along with the link. The potential respondents were reminded at one week's interval to maximize the number of responses collected. Confidentiality of the data was ensured and only the primary investigators had access to any identifiers.

## DATA ANALYSIS

The data was analysed by using the Statistical Package for the Social Sciences (SPSS) software program, version 21.0 (IBM, Armonk, New York). Mean and standard deviation was be calculated for numerical data while frequencies and percentages were be analysed for the categorical variables. Two groups of participants based on type of institute were be tested with Chi-square test, and statistical significance was be set at p-value <0.05. Data was be entered via private computer with password protection and could be accessed only by the principal investigator.

## RESULTS

A total of 97 dental postgraduate residents participated in this study out of which 64 (65.97%) were practicing in public institutes and 33 (34.02%) in private institutes based in Karachi, Pakistan.

Of significance were the items in relation to the patient's entry into the dental office, where the patient's temperature was checked via an infrared thermometer and the provision of a hydro alcoholic solution. Of the participants, 60 (93.75%) and 29 (87.87%) residents from the public and private institutes respectively, reported to having the patient's temperature checked with an infrared thermometer, as shown in Table 1. However, a lower compliance was noted in regard

**Table 1: Patient Screening and Patient's Entry**

S.No	Question	Yes	No	Sometimes	Unsure
1.	Are the appointed patients called beforehand to conduct a telephonic survey evaluating their symptoms?				
	Public	6	46	7	5
	Private	9	21	2	1
2.	Are questions related to COVID infection being asked in patient's history?				
	Public	52	5	7	0
	Private	29	3	1	0
3.	Are attendants allowed with the patient?				
	Public	20	21	23	0
	Private	7	19	7	0
4.	Is the temperature of the patient checked using an infrared thermometer on entry?				
	Public	60	4	0	0
	Private	29	0	3	1
5.	Is the patient provided with a hydroalcoholic solution to sanitise hands?				
	Public	28	28	5	3
	Private	24	5	3	1

**Table 2: Appointment Scheduling and Waiting Room Organisation**

S.No	Question	Response (n)			
1.	Are the patients' appointments scheduled to ensure that the interpersonal distance of at least 2 metres in the waiting room is respected?	Yes	No	Sometimes	Unsure
	Public	14	42	5	3
	Private	14	16	3	0
2.	Is there a limit set to the number of patients that are being treated per day?	5-10	10-20	20-30	No Limit
	Public	10	8	8	38
	Private	8	5	3	17
3.	Are the dental workers required to disinfect their hands with hydroalcoholic solution or with running water and soap, for at least 1 min?	Before procedure	After every patient	End of the day	
	Public	44	2	18	
	Private	18	1	14	

to the use of hand sanitization with a hydro alcoholic solution by both institutes with 28 (43.75%) from public and 24 (72.72%) from private institutes.

A noteworthy concern were the responses regarding the

disposal of personal protective equipment with 11 (17.18%) residents from public institutes responding with disposal after every patient, 24 (37.5%) at the end of the day, and 29 (45.31%) responding with no disposal and re use of the equipment. Similarly, 1 (3.03%) resident from a private institute responded with disposal after every patient, 20 (60.06%) at the end of the day, and 12 (36.36%) responding with no disposal and re use of the equipment. The results are depicted in Table 3.

**Table 3: Personal Protective Equipment**

S.No	Question	Response (n)						
1.	Is the patient required to wear any personal protective equipment? Which PPE is the patient provided with: (multiple options can be chosen)	Gown	Eye Protection	Surgical Mask	Shoe Covers	No PPE provided		
	Public	3	3	35	3	28		
	Private	1	2	23	1	8		
2.	Are you required to wear PPE. Which PPE are you currently using?	Gloves	Gown	Eye Protection	Mask	Headgear	Shield	Shoe Covers
	Public	64	52	30	64	24	49	2
	Private	33	31	28	33	26	26	21
3.	Have you received any training regarding the proper use and disposal of PPE since the spread of the pandemic	Yes	No	Sometimes	Unsure			
	Public	8	54	2	0			
	Private	6	26	1	0			
4.	Are you being provided with the required PPE by your institute?	Yes	No	Sometimes	Unsure			
	Public	14	44	6	0			
	Private	9	20	4	0			
5.	How frequently is the PPE disposed?	After every patient	At the end of day	Not disposed/Reused				
	Public	11	24	29				
	Private	1	20	12				
6.	How are you disposing PPE?	Regular trash can	Special double layered garbage bag	Special double layered garbage bag with 0.5% hypochlorite solution				
	Public	16	48	0				
	Private	5	28	0				
7.	Have dental assistants received training on how to dispose PPE after covid 19?	Yes	No	Sometimes	Unsure			
	Public	10	43	0	11			
	Private	4	25	1	3			

**Table 4: Treatment Room Disinfection**

S. No	Question	Response (n)			
1.	Is accurate sanitizing (hypochlorite or 70% alcohol) carried out on all surfaces of the dental unit?	After every patient	End of day	Unsure	
	Public	13	27	24	
	Private	13	17	3	
2.	Is the sanitizing of the floors and other surfaces carried out	End of day	Alternate day	Once a week	Unsure
	Public	47	2	1	14
	Private	33	0	0	0
3.	Does the dental opd have a proper ventilation system with	Windows	Portable HEPA filters	Unsure	
	Public	1	21	42	
	Private	2	16	15	

Statistical significance was also related to items pertaining to the treatment room disinfection. A low compliance was noted, with 13 (20.31%) residents from public institutes and

13 (39.39%) from private institutes reporting accurate sanitization on all surfaces of the dental unit, as shown in Figure 4. However, a higher compliance was noted in regard to sanitizing of the floors and other surfaces being carried out at the end of every day by 47 (73.43%) and 33 (100%) residents from the public and private institutes respectively, as shown in Table 4.

In comparison, cross infection protocols being followed by residents from public and private institutes were computed, showing a marginally better compliance in the private institutes. However, due to a smaller sample size, the differences were not statistically significant.

## DISCUSSION

COVID-19, a rapidly spreading virus being transmitted by aerosols has made dental professionals re-evaluate their routinely followed infection control protocols. The protocol measures have been augmented and made more stringent to prevent the spread of the infection. In this context, the present study has provided insights into cross infection protocols being followed by dental postgraduate residents in the prevention of the spread of coronavirus from both public and private institutes across Karachi, Pakistan. The aim was to compare compliance with these protocols among residents in both settings.

About 9.37% of the residents from public institutes reported to performing a telephonic triage with the patient compared with 27.27% residents from private institutes. However, a higher compliance was noted by the participants from both institutes, in taking the patient's history in relation to COVID-19 symptoms, prior contact with a COVID-19 positive patient and recent travel. Telephonic screening of patients before the dental visit is recommended to identify the patients with suspected or possible COVID-19 infection as well as to establish the urgency of treatment required. According to the guidelines provided by the American Dental Association, all elective dental care procedures must be shelved, however, the results of this study do not conform to the guidelines.

Dentists from the private sector are known to uphold a certain standard where cross infection protocols are concerned, however due to the financial impact left by COVID-19, postgraduate residents from private institutes, in addition to those from public institutes, reported that they were not being provided personal protective equipment by their institutes and had to arrange their own.<sup>15</sup> Appropriate training regarding its disposal is another vital step in the prevention of spread of such a contagious virus. Residents from both sectors reported to have not received any formal training regarding the disposal of the personal protective equipment.

In addition, a majority of residents from both public and private institutes reported that the patient was also not provided with any personal protective equipment. A surgical mask was the only form of personal protective equipment that was provided to majority of the patients in both institutes. A likely implication of the above could be the deficiency in funding received by public institutes. A study done by Hams Abdelrahman reported that 75% dentists worldwide were forced to shut down their practices during the first wave, adding to the financial crisis.<sup>16</sup>

The lack of availability of personal protective equipment has remained an issue worldwide and with a constant influx in cases, the healthcare system in Pakistan came under pressure with supplies being stretched forcing doctors and dentists to work with limited to no personal protective equipment with many being required to reuse it.<sup>17</sup> This trend was noted by residents from both public and private institutes. Absence of knowledge around adequate training regarding the disposal of personal protective equipment is a vivid reflection of the lack of health education workshops and decreased willingness to attend them as concluded by a study done by Khalid Almas.<sup>18</sup> A research conducted in Poland found that about 71.2% of the participating dentists entirely suspended their dental practice due to similar reasons.<sup>19</sup>

The current study provided an encouraging insight onto hand hygiene practices before and after treating every patient. This step is vital in prevention of the spread of COVID-19. The guidelines provided by the WHO for infection control states that frequent hand washing and disinfection with a hydro alcoholic solution can help evade the spread of respiratory viruses.<sup>20</sup>

There was low compliance regarding organization of the waiting room to allow for adequate interpersonal distance with majority of the residents from both sectors reporting no changes in the daily limit of appointed patients. The most likely implication could be due to the financial impact already left on the respective businesses during the initial lockdown in the country during which the frequency of patients at dental practices had significantly declined and the costs of the personal protective equipment having been borne entirely by the employer.<sup>21</sup>

Ventilation systems using HEPA filters are imperative to help prevent the spread of the virus by reducing airborne contaminants. However, a very low proportion of residents reported to employing their use, a likely reason being their high cost and maintenance.<sup>22</sup>

A study conducted in Pakistan concluded that additional educational measures should be taken on the mechanism of the spread of COVID-19, while also encouraging patients to be more cautious towards the cross-infection control measures being employed.<sup>23</sup>



## LIMITATION

There was no specific outcome target therefore the sample size happened to be quite small. Similarly, the data that was collected was centered on quantitative responses; hence the conceivable reasoning behind the participants responses was not determined.

## CONCLUSION

The rapid spread of the corona virus led to the closure of many public and private dental offices, with the remaining practices struggling to keep up with cross infection protocols and procurement of personal protective equipment while maintaining a steady patient flow. The pandemic has exposed numerous shortcomings in the dental healthcare system across both the public and private sectors. The trend observed during the course of the study showed that the public sector was more greatly affected due to the paucity of resources allocated for cross infection controls.

Since COVID-19 is likely to become an endemic, compliance with cross infection protocols needs to be improved so as to prevent its rapid spread. In a third world country like Pakistan, where resources are already scarce, greater emphasis needs to be placed on funding the dental healthcare system to enhance infection control protocols.

## ACKNOWLEDGEMENT

None

## CONFLICT OF INTEREST

None declared

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