

Implemented Protocols for Emergency Dental Treatment and Personal Protective Equipment Used by Pediatric Dentists during COVID 19 Pandemic

Samah M Awad* and Hany M Saber

Associate Professor, Pediatric Dentistry and Dental Public Health Department, Faculty of Oral and Dental Medicine, Cairo University, Egypt

***Corresponding Author:** Samah M Awad, Associate Professor, Pediatric Dentistry and Dental Public Health Department, Faculty of Oral and Dental Medicine, Cairo University, Egypt.

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Abstract

Introduction: Because of the special nature of dental settings, it has been postulated that the risk of cross-infection of COVID-19 may be high between dentists and their patients.

Aim: To identify implemented emergency dental treatment and infection control protocols and personal protective equipment (PPE) used by pediatric dentists during COVID 19 pandemic.

Methods: This cross-sectional study was carried out using an online survey questionnaire from May 8th to June 20th, 2020. The questionnaire was divided into four sections; first section comprised dentist data, second section included questions on the used PEE, third section targeted infection control protocols in operating rooms, and fourth section focused on the protocol taken for the provision of dental treatment during the pandemic. Questionnaire was validated ahead of sharing the link with participants. All variables were described by frequencies and percentages. A chi-squared test was applied to assess relationship between gender and years of experience versus other variables. Significance level was considered at $P < 0.05$; while $P < 0.01$ was considered highly significant. Two-tailed tests were assumed throughout the analysis.

Results: Completed questionnaires ($n = 350$) were included in the study comprising 80.65% of total participants. Females represented 74% whereas 26% were males. Regarding years of experience, pediatric dentists possessing experience less than 5 years, experience of 5 - 10 years and more than 10 years were 48.29%, 20.00% and 31.71% respectively. Highly statistical differences were noted comparing responses of males and females. No statistically significant differences were revealed between the use of PPE among males and females except for using face shield and overshoes/clinic wipe-able footwear. No statistically significant differences were noted between the positive responses of any survey questions and using PPE versus the years of experience.

Conclusion: In an attempt to limit the spread of COVID-19, majority of the participants of the current study, irrespective of gender and years of experience, have furthered the implementation of infection control and dental treatment protocols, history taking questions and PEE usage.

Keywords: *Emergency Dental Treatment during COVID-19; History Regarding COVID-19 Symptoms; Infection Control Protocols; PPE in Dental Settings during COVID-19*

Introduction

The outburst of novel coronavirus disease has greatly impacted all life characteristics worldwide [1]. On February 11th, 2020, the World Health Organization (WHO) used the term COVID-19 to describe the latest strain of coronavirus [2]. Further, on March 11th, 2020,

the WHO has declared the COVID-19 as a pandemic disease after its global widespread few months after its outbreak [3,4]. COVID-19 is caused by an RNA virus that is claimed to cause acute and severe infection in the respiratory system. It has been speculated that it can spread from infected individuals, whether symptomatic or asymptomatic, probably through hands, saliva, nasal droplets, and surface contacts [5,6]. Its average incubation period has been documented to range from 4 to 14 days [7]. According to the WHO report in February 2020, the median time from symptom onset to clinical recovery for mild cases is approximately 2 weeks and is 3-6 weeks for severe or critical cases [8].

The most characteristic signs and symptoms of COVID-19 usually are upper respiratory tract infection accompanied by high-grade fever and dry cough [9]. It has been highly recommended universally to quarantine or rather self-isolate any suspected individual for at least 14 days or until the investigation by the real-time polymerase chain reaction (RT-PCR) can be encountered [10]. Elderly patients especially with underlying chronic debilitating diseases have been considered at a higher risk of getting infected compared to younger, healthy individuals possessing stronger immune systems [11].

Even though on March 16th, 2020 the first clinical trial for the COVID-19 vaccine was initiated by the National Health Institute (NHI) in the USA, to date, unfortunately, there is no antiviral vaccine available on the market [4]. As a result, in most countries, unless directed otherwise, patients have to rely on supportive therapy and or palliative treatment until the body's immune system can eliminate this infection or reach out to healthcare authorities in case the condition is deteriorating and the infected patients require hospitalization [12].

According to the WHO situation report of this pandemic, to date, more than 14 million cases have been reported and more than 600,000 patients have died around the world due to the COVID-19 pandemic [13].

Many restrictions have been imposed to limit the spread of the COVID-19 due to its high spreading potential besides the absence of international verified treatment protocol and antiviral vaccine supported by clinical trials and evidence-based data [14]. This has varied from one country to another according to national views and feasible strategies. Therefore, mostly, social gathering has been limited, schools and universities have been shifted towards online teaching, sports activities and events have been postponed until further notice and even travel restrictions or bans have been executed in some countries. Moreover, several individuals, in a trial to limit the spread of the disease, have tried to self-quarantine to positively play their role in their community and practise social distancing of 6 feet (2 meters) when obliged to communicate [15].

Amidst this pandemic, healthcare facilities can't have this luxury of simply shutting down or shift to working from the home strategy. Besides, the fact that healthcare professionals are more prone to encounter an infected patient [16]. Dentists, specifically, not only, work at close contact with their patients but also are subject to the splatter of aerosol and salivary secretions [16,17].

It is thought that the transmission of COVID-19 occurs mainly through respiratory droplets and contact with contaminated surfaces [18]. The former route is assumed to be the most predominant. To date, some observational studies showed that masks and N95 respirators used by healthcare workers create a protective effect of up to 80%. Nevertheless, the evidence base is still sparse and the compliance of using the masks or respirators was not consistent among these studies [19].

Because of the special nature of the dental settings, it has been postulated that the risk of cross-infection may be high between dentists and their patients. In light of such data, many dental organizations have suggested limiting the provision of dental care in dental offices to treatment to emergency cases and preferred to defer routine dental treatments post the pandemic uprising.

Further, it has been suggested that infection protocols should be implemented to abide by more strict regulations in dental practices in countries that have been affected by COVID-19 [17].

Aim of the Study

To identify the implemented infection control protocols for emergency dental treatment and personal protective equipment used by pediatric dentists during the COVID19 pandemic.

Subjects and Methods

This cross-sectional study was carried out using an online survey questionnaire from May 8th, 2020 to June 20th, 2020. The survey was designed using SurveyMonkey and was validated using a pilot study before sharing the survey link among participants. The online survey link was shared with pediatric dentists through social media applications. The investigators received responses from survey monkey after each survey submission. Pediatric dentists comprised the study participants, neither other dental specialists nor dental students were included in this study.

The questionnaire was designed to include 10 closed-ended questions, the investigators intended to focus the study on infection control implementations during the COVID-19 pandemic and thereby, to be concise, constrained the number of questions aiming to reduce the time taken by the participants to complete the survey to encourage participation. The questionnaire was divided into four sections; the first section comprised dentist data, whereas the second section included questions on the used Personal Protective Equipment (PEE), the third section targeted the infection control protocols in operating rooms and, finally, the fourth section focused on the protocol taken for the provision of dental treatment during the pandemic.

Statistical methods

Data was gathered, tabulated and subjected to statistical analyses which were performed using SPSS in general (version 20), while Microsoft Office Excel was used for data handling and graphical presentation. All variables were qualitative categorical variables and therefore were described by frequencies and percentages. A chi-squared test of independence was applied to assess the relationship between gender as well as years of experience and other survey variables. Significance level was considered at $P < 0.05$ (S); while $P < 0.01$ was considered highly significant (HS). Two-tailed tests were assumed throughout the analyses for all statistical tests.

Results

A total of 434 pediatric dentists participated and submitted the filled-out questionnaires, out of which 350 (80.65%) questionnaires were completed. The statistical analyses were performed only using the completed questionnaires and therefore the 84 incomplete questionnaires were excluded from the study. The average time taken to complete the questionnaire was 00h:02m:06s.

Out of the completed questionnaires, females represented the majority of this study participants, as 240 (74%) participants were females whereas 90 (26%) were males. Regarding the years of experience, pediatric dentists with experience less than 5 years were 169 (48.29%), while those with experience ranging from 5 - 10 years were 70 (20.00%) and 111 (31.71%) were the pediatric dentists possessing more than 10 years of experience.

Figure 1 presents the results regarding the use of PPE among the study participants. As anticipated, the highest PPE in use was gloves (100%) while the lowest was the N95 mask reaching only (21.43%).

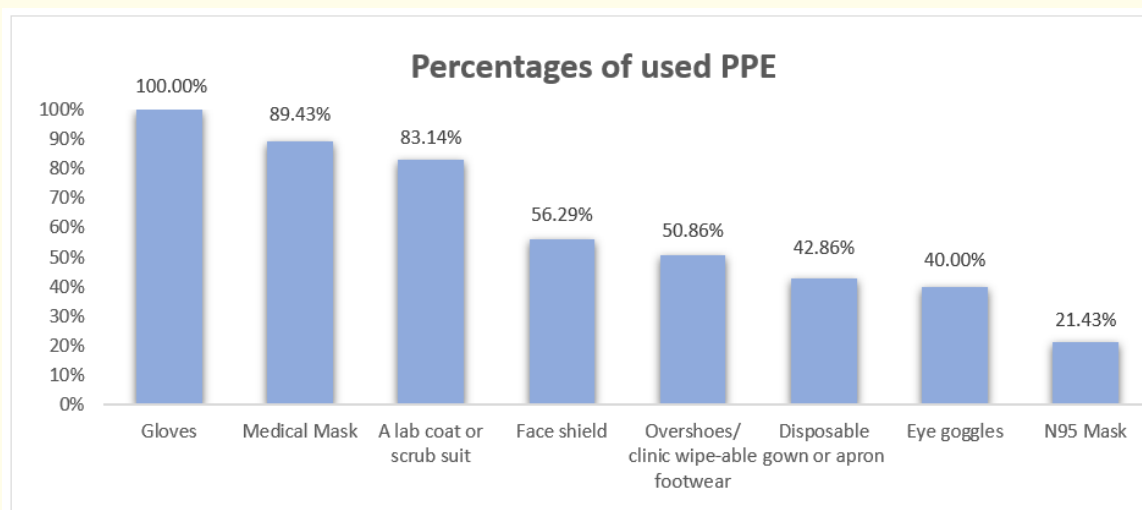


Figure 1: Percentages of used PPE among the study participants.

Figure 2 shows the percentages for using PPE among males and females. No statistically significant difference was revealed between the use of PPE among males and females except for; using the face shield which was used by (66.92%) of females and (25.56%) by where a highly significant statistical difference was revealed $p = 0.000$ ($p\text{-value} < 0.001$), and the use of overshoes/clinic wipe-able footwear which was used by (47.31%) of females and (61.11%) of males where a statistically significant difference was revealed $p = 0.024$ ($p\text{-value} < 0.05$).

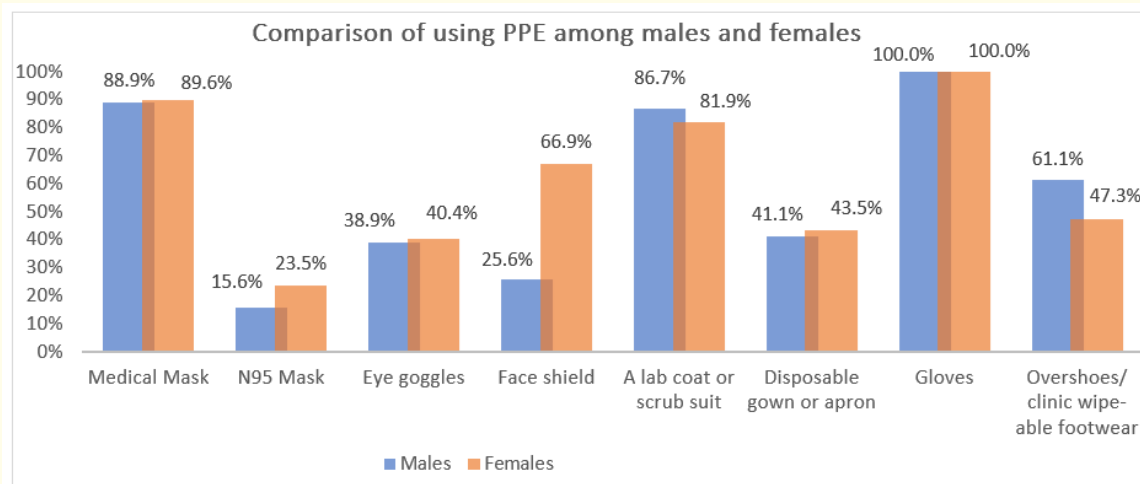


Figure 2: Comparison of using PPE among males and females.

Table 1 shows the frequency and distribution of participants' responses regarding practices during the COVID-19 pandemic. The highest positive response was (94.3%) for allowing only one parent to accompany the child during treatment, whereas the lowest response was (41.43%) for implementing the use of preoperative antimicrobial mouth rinse.

Questions	No		Yes	
	Frequency	Percentages	Frequency	Percentages
Q1: Are you currently using disinfectants are appropriate for SARS-COV-2 in healthcare settings?	40	11.43%	310	88.57%
Q2: Have you used the operatories in a rotating fashion between procedures in case you have more than a dental chair in the office?	141	40.29%	209	59.71%
Q3: Have you contacted patients before emergency dental treatment to take history related to COVID-19 symptoms or recent travelling?	161	46.00%	189	54.00%
Q4: Have you informed your patients to wait in the car or outside the office till they are informed to by phone?	200	57.14%	150	42.86%
Q5: Have you allowed only be one parent accompanying the child during treatment?	20	5.71%	330	94.29%
Q6: Do you implement the use of preoperative antimicrobial mouth rinse?	205	58.57%	145	41.43%
Q7: Do you limit/ avoid the use of the air-water syringe?	124	35.43%	226	64.57%

Table 1: Participants' responses regarding practices during the COVID-19 pandemic.

Table 2 shows the results of the Chi-squared test and the p-values of survey questions regarding infection control practices among males and females in the study.

	Males				Females				Chi-squared test	P-Values
	No		Yes		No		Yes			
	F	%	F	%	F	%	F	%		
Q1	7	7.78%	83	92.22%	33	12.69%	227	87.31%	1.60	0.20658*
Q2	11	12.22%	79	87.78%	130	50.00%	130	50.00%	39.66	0.00000**
Q3	25	27.78%	65	72.22%	136	52.31%	124	47.69%	16.20	0.00006**
Q4	63	70.00%	27	30.00%	137	52.69%	123	47.31%	8.18	0.00424**
Q5	8	8.89%	82	91.11%	12	4.62%	248	95.38%	2.27	0.13222*
Q6	77	85.56%	13	14.44%	128	49.23%	132	50.77%	36.36	0.00000**
Q7	7	7.78%	83	92.22%	117	45.00%	143	55.00%	40.49	0.00000**

Table 2: Chi-squared test and the p-values of survey questions regarding infection control practices among males and females in the study.

F: Frequency; %: Percentages.

*P > 0.05 No significant difference was noted.

**P < 0.001 Highly statistically significant difference was noted.

Table 3 shows that no statistically significant differences were noted between the positive responses of any survey questions and the years of experience.

	Less than 5 Years				5 to 10 Years				More than 10 Years				Chi-squared test	P-Values
	No		Yes		No		Yes		No		Yes			
	F	%	F	%	F	%	F	%	F	%	F	%		
Q1	19	11.24	150	88.76	8	11.43	62	88.57	13	11.71	98	88.29	0.01	0.99274*
Q2	72	42.60	97	57.40	23	32.86	47	67.14	46	41.44	65	58.56	2.04	0.35973*
Q3	83	49.11	86	50.89	25	35.71	45	64.29	53	47.75	58	52.25	3.78	0.15130*
Q4	98	57.99	71	42.01	38	54.29	32	45.71	64	57.66	47	42.34	0.29	0.86301*
Q5	8	4.73	161	95.27	5	7.14	65	92.86	7	6.31	104	93.69	0.64	0.72653*
Q6	97	57.40	72	42.60	41	58.57	29	41.43	67	60.36	44	39.64	0.24	0.88579*
Q7	58	34.32	111	65.68	20	28.57	50	71.43	46	41.44	65	58.56	3.28	0.19360*

Table 3: The statistical analysis of the years of experience in comparison to the responses.

F: Frequency.

*P > 0.05 No significant difference was noted.

Figure 3 shows that no statistically significant difference between the use of PPE compared to the years of experience was noted except for; the use of a lab coat or scrub suit which was used by a higher percentage of participants possessing more than 10 years of experience where a statistically significant difference was noted p = 0.045 (P-value < 0.05).

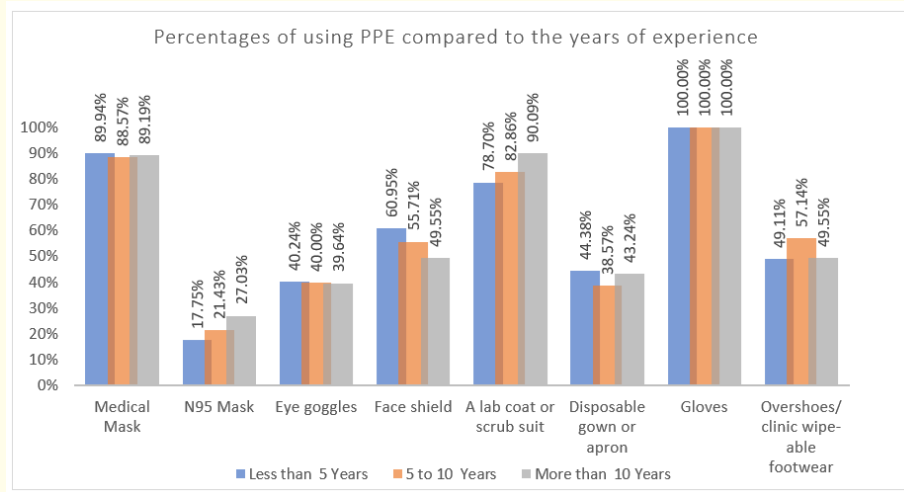


Figure 3: Percentages of using PPE compared to the years of experience.

Discussion

According to the COVID-19: Guidance for infection prevention and control in healthcare settings, issued jointly by departments of the Public Health-United Kingdom in 2020 as the official guidance, a hierarchy of control measures was suggested [20]. This relied on the fact that during the COVID-19 pandemic would not be feasible for providers of medical or dental services to operate under ‘business as usual’. This guidance included, but not limited to, early identification and reporting of cases, triaging of patients, implementing infection control measures, assessment of workforce as well as facilities’ proficiencies, in addition to engineering, administrative, and personnel requirements that could be proficiently implemented during the pandemic COVID-19 event [20,21].

Dental professionals should be well accustomed to how COVID-19 could spread and how to recognize patients with the possible common signs and symptoms of the disease. Further, to limit the spread of this disease, dental professionals should further their protective measures and infection control protocols during their practice [22].

Generally, it is not recommended for patients reporting COVID-19 symptoms to visit the dental clinic and in case this was encountered, the dentist is advised to ask the patient to quarantine and report to the infection control department as soon as possible [22] and to defer any elective treatment [23-25].

History taking is a critical step to limit the spread of this disease in the dental settings; signs and symptoms of the disease, history of travelling within the previous 14 days and history of contact with suspected cases are examples of questions to be asked to patients either before their dental visit and/or upon arrival to the dental office [26]. Regarding patients’ evaluation and triage, the participants were asked whether they had contacted the patients before emergency treatment to take history related to COVID-19 and the results were statistically significant. Among the participants of the study, 54% (72.22% of males and 47.69% of females) reported that they took the history from the patients before the emergency dental treatment. No significant difference was noted comparing the years of experience to the response of this question, where 50.89%, 64.29% and 52.25% were reported for participants with experience less than 5 years, experience ranging from 5 to 10 years and experience more than 10 years respectively.

Currently, and to the best of our knowledge, there is no explicit guideline suggesting specific personal protective equipment for the protection of dental professionals from COVID-19 infection. Peng, *et al.* 2020 proposed, based on the mode of the spread of COVID-19 infection, three levels for protective measures; 1. Primary protection (which entails the regular precautions and standard measures like gloves and surgical mask), 2. Secondary protection (which adds further protection like wearing disposable hair cap, goggles, face shield and disposable aprons) and 3. Tertiary protection (which includes strengthened protection when contact patient with suspected or confirmed COVID-19 infection). Although the latter category is not expected to be treated in the dental clinic [22].

The use of PPE including: gloves, lab coats/gowns and masks, is highly endorsed to protect dentists from, possibly, infected secretions or blood. Furthermore, face shields and goggles are necessary especially when operating with the use of low or high-speed drilling with water spray [27]. As respiratory droplets are considered the main route of transmission of COVID-19 infections, respirators (e.g. authenticated N-95 masks) are decidedly recommended for routine dental practice during the pandemic [17]. Participants of the current study were asked to select the PPE used during the pandemic; as reported only 21.43% used the N-95 masks, no significant difference was noted when the use of PPE was compared in males and females except for the use of face shield and the wipe-able clinic shoes, likewise comparing the used PPE to the years of experience, a significant difference was only noted for the use of lab coat in participants with higher experience which was not noted for the use of disposable gown and the rest of the listed PPE items. Hand hygiene has been considered the most critical measure for reducing the risk of transmitting microorganisms to patients [28]. As anticipated all participants of the current study used gloves and followed hand hygiene before and after gloving and whenever it was needful.

It was declared that the COVID-19 virus could persist on surfaces for a few hours or up to several days. This could vary with changes in temperature, humidity and even the type of surface encountered [29]. This reinforced the need for good hand hygiene in addition to the utter need for meticulous, frequent and effective disinfection of all surfaces within the dental clinic including appliances, reception area, door handles and any other surfaces that could be contacted [22] and preferably using the disinfectants recommended by the Centre for Disease Control and Prevention (CDC) [30]. The participants of the current study were asked about implementing the use of appropriate for SARS-COV-2 in healthcare settings, 88.57% replied with yes and no significant difference was noted comparing neither gender nor the years of experience.

It was stated in the Centre for Disease Control and Prevention (CDC) guidelines for dental settings during the pandemic that it would be better to minimize the number of persons in the waiting or reception area. Further, it was suggested that patients might opt to wait in their vehicle or outside the clinic where they could be contacted by phone when it is their turn for dental care and dental clinics should not spare any effort to minimize overlapping of dental appointments [30]. Based on these guidelines, participants were asked if they had allowed only one accompanying parent, informed patients to wait in the car or outside the office and whether operatories were used in rotating fashion. Regarding gender, significant differences were noted in responses to the mentioned questions however no significant difference was noted among categories of years of experience.

Some studies had proved that using preoperative antimicrobial mouth rinse could help reduce the intraoral bacterial count [23,31]. In the current study, participants were asked whether they had implemented the use of mouth rinse preoperatively or not. A highly significant difference was noted, where female participants who encouraged this approach were more than males. In contrast, regarding the years of experience, no significant difference was noted.

Using rubber dams and high-volume suction could help minimize the spread of aerosol during dental treatment. Further, it was recommended that aerosol-generating procedures, as using the 3-way syringe, should be minimized as much as possible [17]. In the current study, participants were asked if they had limited or tried to avoid the use of air/water syringe in an attempt to limit the splatter during the dental procedures. A highly significant difference was noted, male participants who made this attempt were more than females. On the other hand, regarding the years of experience, no significant difference was noted.

Conclusion

In an attempt to limit the spread of COVID-19, the majority of the participants of the current study, irrespective of gender and years of experience, have furthered the implementation of infection control and dental treatment protocols, history taking questions and PEE usage.

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