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Original Article

Practices Related to Infection Control during COVID-19 Times among Dental Practitioners in Hubli–Dharwad: A Cross-Sectional Survey

Hema Tyavanige Shekharappa, Prateek Bolar, Preetha J. Shetty

Department of Public Health Dentistry, SDM College of Dental Sciences, Shri Dharmasthala Manjunatheswara University, Dharwad, Karnataka, India

Abstract

Background: In view of the global crisis due to the pandemic, dental practitioners are one of the high-risk categories in acquiring and spreading the infection due to their close approximation with the oral cavity. In this regard, dentists play a major role in preventing cross-contamination by following proper infection control protocol. **Aim:** This study aimed to assess the practices related to infection control protocol regarding COVID-19 among dental practitioners in Hubli–Dharwad. **Materials and Methods:** A cross-sectional study was conducted between September and October 2020 for 2 months. One hundred and fifteen IDA-registered dental practitioners were randomly selected, and a pretested close-ended questionnaire comprising 28 questions related to infection control practices was distributed. The questions were designed to mimic a usual clinical scenario when the patient walks in for a treatment. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 22, Chi-square test was used to compare the groups, and the value of P was set at $P \leq 0.05$. **Results:** Majority of the practitioners were following the proper infection protocol related to COVID-19. However, the proper method of donning and doffing of personal protective equipment (PPE) (59%) as well as disposal of PPE (56%) was not followed appropriately. A statistically significant difference was observed in relation to the location of the clinic the usage of consent forms ($P = 0.017$) and performing aerosol-generating procedures ($P = 0.016$). With respect to the professional years of experience, a statistically significant difference was observed related to the air conditioning of dental clinics ($P = 0.031$) and the type of filters installed ($P = 0.007$). **Conclusion:** Infection control protocol was followed properly by most of the practitioners; however, continuing dental education and short-term courses will add to increased awareness regarding infection control during the times of new infection.

Keywords: COVID-19, dental practitioners, infection control

Introduction

An outbreak of novel coronavirus disease (COVID-19) in China has influenced every aspect of life. Health-care professionals are at risk as they come in direct contact with the infected persons, especially dentists are exposed to a higher risk of getting infected due to close contact with infected patients.[1] The New York Times has reported dentistry as one of the most exposed professions to the COVID-19 contagion.[2] This is due to the chances of cross-infection during clinical practice. The sources of infection could be patients' oral fluids, blood, material contamination, contaminated instruments, or surfaces of the dental unit being contaminated with aerosols generated through the use of handpieces and ultrasonic scalers.[2,3] These can be the source of infection for not only dentists and assistants but also patients visiting the clinic.[2] For these reasons, the coronavirus infectious disease-2019 (COVID-19) pandemic has put enormous pressure on health-care systems around the world.[1] Dentistry has had to adjust to the new epidemic situation to not only bring relief to suffering patients but also to avoid becoming a source of SARS-CoV-2 transmission. The COVID-19 outbreak has revealed numerous

Address for correspondence: Dr. Hema Tyavanige Shekharappa, Department of Public Health Dentistry, SDM College of Dental Sciences, Shri Dharmasthala Manjunatheswara University, Dharwad - 580 009, Karnataka, India.
E-mail: hemats2611@gmail.com

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shortcomings in the dental care system, especially regarding the insufficient coordination of health services related to the pandemic.[4] Hence, it becomes very essential to establish a clinical protocol to be applied and followed in one's practice to avoid new infections and progressive spread of the virus. Therefore, the use of disinfectants and personal protective equipment (PPE) remains essential for the proper care of the patients in dental setup.[2]

It is proven that questionnaire-based studies play an important role in gathering information regarding preferences, attitudes, opinions, and experiences of participants; however, the data collected have to be interpreted carefully.[5] In view of the global crisis due to the pandemic, the present questionnaire-based study aims to assess the practices related to infection control protocol regarding COVID-19 among dental practitioners in Hubli–Dharwad.

Materials and Methods

Ethical clearance and informed consent

The ethical clearance was obtained from the institutional review board of the university (SDMCDS IEC. No. 2021/S/COMM/64). The electronic informed consent was obtained from the participants before the start of the study. Detailed information about the purpose of the study was written in the Google Forms and those who consented to participate in the study after reading the consent form were allowed to proceed further with the questionnaire.

Study population and sample size

A cross-sectional survey was conducted among practicing dentists of Hubli–Dharwad, Karnataka, India, during September–October 2020. The information regarding the dental practitioners was collected from the local branch of the Indian Dental Association. A pilot study was conducted among 20 subjects; with 90% power and 5% alpha error, the sample size calculated was 114, which we rounded off to 115. A convenience sampling technique was used to collect the information.

Instrument development

A self-designed questionnaire written in the English language was constructed by a research expert for the study. The questionnaire was pretested for content validity and was revised according to the feedback. The test–retest validity of the questionnaire was found to be 0.089 ($P \leq 0.05$). The final questionnaire contained the data regarding the demographic profile of the patients and 28 questions pertaining to practices related to infection control protocol for COVID-19. The questions were divided into preprocedural, during procedure, and postprocedural practices related to infection control. The questionnaire was made available using online mode as Google documents and the link was circulated among the practitioner using E-mails and through messages shared on mobile phones.

Statistical analysis

Data entry was done using a Microsoft Excel spreadsheet and statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 22.0. Categorical variables were presented using frequency and percentage. To assess the role of sociodemographic characteristics on practice, differences in sociodemographic status with respect to infection control practices were compared using Chi-square test. The level of significance was set at $P \leq 0.05$.

Results

According to the demographic details of the study subjects who participated in this survey, female dentists were in higher number than male dentists. Majority of the participating dentists had professional experience less than 5 years. Two-third of the dentists were employed in private hospitals and least in government hospitals. Most of the study population had their practices or had their working bodies in urban areas and the latter has their location in rural parts [Table 1].

The questionnaire was divided into three sections namely, preprocedural, procedural, and postprocedural categories. The responses were tabulated as frequency and percentage of correct answers to each question [Table 2].

When the comparison was made between the gender for each item, there was a statistically significant ($P = 0.027$) difference observed between the gender with respect to the usage of postprocedural rinse, with females practicing more postprocedural rinse compared to males.

With respect to the clinic locality, the following items showed a statistically significant differences between the groups the usage of consent forms before treating the patients during COVID-19 pandemic ($P = 0.017$), whether they perform aerosol-generating procedures in their operatory ($P = 0.016$), preferred material of gloves during COVID-19 times ($P = 0.009$), and at what point in time do

Table 1: Demographic details of the study subjects

Demographic details	Categories	*n* (%)
Gender	Male	40 (34.8)
	Female	75 (65.2)
Professional experience (years)	<5	52 (45.2)
	5-10	25 (21.7)
	11-15	13 (11.3)
	>15	25 (21.7)
Professional setting	Employed in a private hospital	72 (62.6)
	Owner of private practice	34 (29.6)
	Employed in the government hospital	9 (7.8)
Number of dental assistants and/or secretaries	None	39 (33.9)
	1	29 (25.2)
	2/3	29 (25.2)
	>3	18 (15.7)
Location of your clinic	Urban	88 (76.5)
	Rural	27 (23.5)
Total		115 (100)

Table 2: Descriptive statistics showing the correct responses

Questions	Options	*n* (%)
Preprocedural		
Q1. Do you practice the usage of consent forms, before treating the patients during COVID-19 pandemic?	No	8 (7.0)
	Yes	107 (93.0)
Q2. Do you carry out your dental practice, according to the "information of the level of the pandemic and the recommendation of the line of treatment to be carried out" proposed by the IDA?	No	3 (2.6)
	Yes	112 (97.4)
Q3. How long do you maintain a time gap between subsequent patients? (min)	10-15	53 (46.1)
	15-20	26 (22.6)
	20-30	36 (31.3)
Q4. Is your dental clinic air conditioned	No	53 (46.5)
	Yes	61 (53.5)
Q5. If air conditioned, do you use filters	No	27 (44.3)
	Yes	34 (55.7)
Q6. Which among the following, would you install or have installed in your operatory?	HEPA filters	58 (50.4)
	Negative filters	2 (1.7)
	UV filters	41 (35.7)
	Others	14 (12.2)
Q7. Do you practice the usage of protective cling film around the surfaces of the dental chair?	No	40 (34.8)
	Yes	75 (65.2)
Q8. Do you disinfect the dental chair between two consecutive patients?	No	4 (3.5)
	Yes	111 (96.5)
Q9. Choice of disinfectant that you use to disinfect the parts of a dental chair and clinical surfaces within 3 feet diameter of the work area?	0.1% Sodium hypochlorite	65 (56.5)
	3% H_2O_2	11 (9.6)
	70% alcohol	36 (31.3)
	Quaternary ammonium compounds	3 (2.6)
Q10. Which of the following material of gloves would you prefer to use during these times?	Latex	62 (53.9)
	Latex over nitrile	21 (18.3)
	Nitrile	32 (27.8)
Q11. Are you aware of the EU standards set for the usage of gloves, goggles, and face shields?	No	44 (38.3)
	Yes	71 (61.7)
Q12. Do you use tele counseling to screen patients for nonemergency cases?	No	44 (38.3)
	Yes	71 (61.7)
Q13. If yes, what form of telecommunication to screen patients would you think is the most helpful?	Live video	23 (32.3)
	Store and forward	14 (19.7)
	Mobile health system	34 (47.8)
Q14. How much do you think is the effectiveness of screening patients using telemedicine on a scale of 1-10?	1	2 (1.7)
	2	2 (1.7)
	3	4 (3.5)
	4	7 (6.1)
	5	24 (20.9)
	6	25 (21.7)
	7	27 (23.5)
	8	16 (13.9)
	9	7 (6.1)
	10	1 (0.9)
During procedure		
Q1. Does your team follow the standard handwashing procedures recommended by WHO?	No	1 (0.9)
	Yes	114 (99.1)
Q2. Do you keep your dental staff updated about the handwashing procedure biannually?	Sometimes	14 (12.2)
	No	4 (3.5)
	Yes	97 (84.3)

Contd...

Table 2: Contd...

Questions	Options	*n* (%)
	During procedure	
Q3. For how long do your practice the hand wash technique? (s)	10-20	38 (33.0)
	20-30	55 (47.8)
	30-40	11 (9.6)
	40-60	11 (9.6)
Q4. At what point in times do you wash your hands	Before and after each treatment session	2 (1.7)
	Before wearing and after the removal of PPE	109 (94.8)
	Before contact with instruments that have been sterilized	2 (1.7)
	Following the washing of dental instruments	2 (1.7)
Q5. Do you practice the usage of rubber dams for aerosol-generating procedures?	No	68 (59.1)
	Yes	47 (40.9)
	Postprocedural	
Q1. Do you practice the usage of postprocedural rinse?	No	44 (38.3)
	Yes	71 (61.7)
Q2. If yes, which among the following mouth rinses do you use as a postprocedural rinse for patients?	-	
	0.2% Chlorhexidine	36 (31.3)
	0.2% Povidone iodine	33 (28.7)
	1.5% H_2O_2	7 (6.1)
	Others	1 (0.9)
Q3. Which among the following sequences do you remove your PPE kit postprocedure?	Goggles, mouth mask, gown, and gloves	31 (27.0)
	Gown, gloves, goggles, and mouth mask	47 (40.9)
	Gown, goggles, mouth mask, and gloves	31 (27.0)
	Mouth mask, goggles, gloves, and gown	6 (5.2)
Q4. Do you disinfect the dental water lines?	No	36 (31.3)
	Yes	79 (68.6)
Q5. If yes which among the following do you use to disinfectant the waterlines?	Hypochloric acid	4 (3.5)
	Hypochlorous acid	13 (11.3)
	Sodium chlorite	3 (3.8)
	Sodium hypochlorite	59 (74.6)
Q6. Which color bag do you dispose of the doffed PPEs	Black	29 (25.2)
	Black, Red	1 (0.9)
	Black, Yellow	2 (1.7)
	Red	28 (24.3)
	Red, Yellow	4 (3.5)
	Yellow	51 (44.3)
Q7. Post-AGP are you aware and follow the multi-bucket technique to disinfect the floor?	Aware and follow	59 (51.3)
	Unaware and do not follow	56 (48.7)
Q8. Does your housekeeping staff wear the recommended PPE?	No	42 (36.5)
	Yes	73 (63.5)
Q9. Do you evaluate the exhaust and outlet of high-volume evacuation in your operatory?	No	48 (41.7)
	Yes	67 (58.3)

EU: European, AGP: Aerosol-generating procedures, COVID-19: Coronavirus disease-2019, PPE: Personal protective equipment, H_2O_2: Hydrogen peroxide, IDA: Indian dental association, HEPA: High efficiency particulate air, UV: Ultraviolet

they wash their hands (0.003). Other questions did not show any statistically significant difference between the groups in relation to the locality of the clinic [Table 3].

When different responses with respect to years of professional experience were compared, a statistically significant difference was observed related to the air conditioning of the dental clinic (P = 0.031), the type of filters installed in their operatory (P = 0.007), and their awareness about the European standards set for the usage of gloves, goggles, and face shields (P = 0.013) [Table 4].

Discussion

As the pandemic sowed up, cases globally have been rising at an alarming rate. It marks the renascence of our familiar enemy – the disease-causing viruses and bacteria that have killed more people than any other cause throughout human history.[6]

The skyrocketing number of cases and increased death rates ring a bell to act efficiently at these challenging times. It has been a strenuous task for the health-care fraternity to manage

Table 3: Comparison of different responses with respect to the location of the clinic

Questions	Options	Urban, *n* (%)	Rural, *n* (%)	*P*
Use of consent forms before treating patients during COVID-19 times	Yes	85 (96.6)	22 (81.5)	0.017*
	No	3 (3.4)	5 (18.5)	
Do you perform aerosol-generating procedure	Yes	66 (75)	13 (48.1)	0.016*
	No	22 (25)	14 (51.9)	
Which material gloves do you use during these COVID-19 times	Latex	54 (61.4)	8 (29.6)	0.009*
	Latex over nitrile	12 (13.6)	9 (33.3)	
	Nitrile	22 (25)	10 (37)	
At what point of time do you wash your hands?	Before and after each treatment session	2 (2.3)	0	0.003*
	Before and after the removal of PPE	86 (97.7)	23 (85.2)	
	Before contact with instruments that have been sterilized	0	2 (7.4)	
	Following the washing of dental instruments	0	2 (7.4)	

*$P \leq 0.05$. COVID-19: Coronavirus disease-2019, PPE: Personal protective equipment

Table 4: Comparison of different responses with respect to years of professional experience

Questions	Responses	Years of experience				*P*
		<5, *n* (%)	5-10, *n* (%)	11-15, *n* (%)	>15, *n* (%)	
Is your clinic air conditioned?	Yes	18 (34.6)	5 (20)	5 (38.5)	15 (60)	0.031*
	No	34 (65.4)	20 (80)	8 (61.5)	10 (40)	
Which one have you installed in your operatory?	HEPA filters	30 (57.7)	12 (48)	6 (46.2)	10 (40)	0.007*
	Negative ion filters	0	0	0	2 (8)	
	UV filters	18 (34.6)	13 (52)	4 (30.8)	6 (24)	
	Others	4 (7.6)	0	3 (23.1)	7 (28)	
Awareness of the European standards for usage of gloves, goggles, and face shields	Yes	27 (51.9)	16 (64)	6 (46.2)	22 (88)	0.013*
	No	25 (48.1)	9 (36)	7 (53.8)	3 (12)	

*$P \leq 0.05$. HEPA: High efficiency particulate, UV: Ultraviolet

COVID-19, a respiratory ailment caused by severe acute respiratory syndrome coronavirus-2 (SARS CoV2).

According to the Occupational Safety and Health Administration, dental health-care personnel are at very high risk of acquiring the infection as they work close to the patient's oral cavity.[7]

Therefore, a better understanding of the structure of the virus, clinical features, modes of transmission, and testing methods is essential that could help form protocols for dental procedures to identify cases and prevent further spread of infection to the patients and dental auxiliaries.[8]

Hence, the purpose of this survey was to gather information regarding measures taken to combat and prevent the further spread of the virus among dentists, dental assistants, and patients in the dental operatory.

The number of female participants was more in our study compared to males, this could be due to the greater number of female dentists graduating and practicing these days. Nearly 50% of the dentists had their experience of <5 years and were into private setups owing to the increasing number of outgoing graduates in the recent past with decreased institutional job opportunities. Majority of the clinics were located in urban areas implying better scope of practice than in rural areas.

The dental practitioners were following majority of the infection control procedures except for few aspects where the infection control practices were not followed as per the guidelines. A large proportion of the dentists were not maintaining an adequate time gap between the two consecutive patients.

During dental treatments, saliva may become aerosolized, and microorganisms in such aerosols from the oral cavity contribute to the spread of infectious diseases.[9] Chen *et al*. proved that running air purifiers in suitable locations can remove aerosols in dental clinics significantly, resulting in the reduction of dental health-care worker (DHCW) exposure to aerosols ranging from 80% to 95%. Further, it was shown that for dental treatments generating a large number of aerosols, air purifiers with high-efficiency particulate air (HEPA) may be more effective and protective for DHCWs than air purifiers with fine filters, thus necessitating the use of highly effective filters to filter out fine particles.

In our study where clinics were fitted with air conditioners, more than half of them had installed air filters, of which HEPA filters were the most popular, which is the most one.[10] Even though HEPA filters are the most recommended ones, about one-third of the practitioners used various other filters due to the factors such as inadequate knowledge and cost involved. The choice of disinfectant recommended by Scarano *et al*.l in

his review was sodium hypochlorite and H_2O_2 and majority of the dentists in our study followed the same.[11]

Now that India is stepping up in digitalization, technological advancement was utilized in the health sector during the COVID-19 crisis in the form of telemedicine and teledentistry. Maintaining distance is crucial during COVID-19, for which practicing telemedicine acts like an essential tool in health-care assistance, which was effectively utilized by many of the practitioners. This approach to practice would substantially reduce the spread of infection which would have been caused due to visits for elective dental treatment.[12,13]

A little less than half of the participants washed their hands for the recommended duration of time (20–30 s) as directed by the CDC.[7] Around one-third of the dentists followed lesser than recommended duration, which might lead to ineffective cleansing of their hands.

Samaranayake *et al*. in their study have indicated that rubber dam along with strong saliva ejectors minimizes aerosol generation, reducing the atmospheric microbial contamination,[14] whereas in our study, most of the dentists did not use rubber dams for aerosol-generating procedures, which is a matter of concern pertaining to infection control in their operatory.

The practice of donning and doffing of PPE is crucial during the pandemic, around 50% of the dentists in our study followed the recommended procedures advised by the CDC.[7] However, the rest are still not following the correct order of wearing and removal of PPE which is critical in stopping the spread of this infection.

Of the dentists surveyed, two-third were disinfecting the dental water lines. Among them, sodium hypochlorite was vastly used, which has proven to be an effective disinfectant.[15]

In addition, some of the dentists also used hypochlorous acid which has also shown promising results as dental waterlines disinfectant.[16]

Disposal of PPE kits is vital for preventing cross-contamination after finishing the dental procedure, one has to make sure that the PPE kits are disposed in designated color-coded bins so that effective biohazard waste management is followed. More than half of the practitioners were practicing a proper method of disposal of PPE kits.

In our study, the number of female dentists practicing postprocedural rinse was comparatively higher than male dentists. This could be due to the extra cautious behavior observed in females.

Taking consent for treatment during COVID-19 was practiced more frequently by dentists located in urban areas than in rural areas. This could be due to higher level of education and increased awareness among the urban population.

Aerosol-generating procedures were more commonly practiced by urban dentists, probably due to increased preventive and restorative procedures practiced in urban areas which could be attributed to increased awareness regarding the preventive approach toward the disease among the urban population.

Although there was a significant difference in the timing of washing the hands between urban and rural practitioners, overall, we observed the correct method of handwashing in terms of duration being followed by the rural practitioners.

Most of the long-term practitioners had their clinics air conditioned because of the obvious reason of capital. Most of the younger dentists had HEPA filters fitted to their air-conditioned clinics because they are more updated with the latest technological advancements available in the field.

Widyarman *et al*. showed in their study that it is important that dentists keep abreast of the updated knowledge on the current health issues. Dentists' knowledge of infection control, especially during times like, would be highly useful in controlling the infection spread which could be achieved through continuous dental educational programs.[17] In addition, Yüzbasioglu *et al*. have suggested short-time courses along with continuing dental education programs about cross-infection and infection control procedures to improve the knowledge of dentists.[18]

Conclusion

The study results indicated that though majority of the dentists are following most of the infection control protocols related to COVID-19, there are some areas that need to be addressed for better infection control, which ultimately leads to the delivery of safer dental care. To pave way for safer and healthier dental treatment, practitioners should be encouraged to update their knowledge that can be applied in their practice by attending continuing dental education programs, short-term courses, and lectures regarding infection control.

Limitations of the study

As it is a questionnaire-based study, the responses have to be cautiously interpreted as the participant's honesty in responding to the questionnaire is dubious.

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Conflicts of interest

There are no conflicts of interest.

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