ORIGINAL ARTICLE

Factors Affecting Awareness of Infection Control Measures among Dental Practitioners of Karachi

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OBJECTIVES: To determine the factors affecting awareness of infection control measures among dental practitioners working in universities and teaching hospitals of Karachi.
METHODOLOGY: A cross-sectional study was conducted from May 2017 to January 2018 among 190 conveniently sampled practitioners from four dental clinics of tertiary care hospitals of Karachi. The study population consisted of dental practitioners that included graduates and post graduates of either gender with an experience of two years and above while practitioners refusing to give written informed consent were excluded from the study. The questionnaires were distributed and collected on same day by the principal investigator. All the collected data were analyzed on Statistical Package for Social Sciences version 20.
RESULTS: A majority of dental practitioners (>90%) were aware that contact with blood may transmit pathogenic microorganisms; goal of infection control is to eliminate the transfer of microorganisms; steam autoclave sterilizes by using steam under pressure; disinfection of dental chair, clinic, and dental office; wearing gloves, face masks and having protective eye wear on while checking patients; changing gloves, extraction instrument, saliva ejectors and burs in operative dentistry after checking each patient is necessary for a dental practitioner. Moreover, the awareness scores of dental practitioners were found to be significantly different across categories of experience (p=0.008).
CONCLUSION: A majority of dental practitioners was aware about most measures of infection control. Further confirmation of study results by studies with larger sample sizes is recommended.
KEYWORDS: Risk Factors, Awareness, Infection Control, Dentists
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INTRODUCTION

Infection may be defined as an invasion and multiplication of microorganism, such as bacteria, viruses, fungi, parasites, etc. collectively called pathogens, in body tissues.[1] Infection control aims to prevent the exposure from such infections and its transfer from one person to another.[2] Infection and its control is a major problem for healthcare delivery systems worldwide.[3] In healthcare settings, the risk of infection to patients is greatly increased, and appropriate infection control techniques can help prevent the spread of many hospital acquired infections.[4] These techniques include, but are not limited to, wearing gloves, facemasks, eye protection with lateral shields and other protective clothing; sterilization of instruments and materials used in dental procedures and proper monitoring of the sterilizer.[5]

As dentistry is mainly a surgical field that involves saliva, blood and potentially infectious material exposure, dental health personnel are at increased risk of exposure to cross-infection.[6-8] Cross-infection is the transmission of infectious agents between patients and staff within a clinical environment. Therefore, dental practitioners need a very

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strong infection control effort to avoid cross-contamination and occupational exposures to saliva and blood borne diseases.[9,10]

Adequate infection control is an important issue in health care settings, particularly dentistry; it is therefore critical that necessary steps are taken for protection against cross infection in a dental setup[11,12], where transfer of infections from one person to another or from object to the person can take place through both direct and indirect transmission.[13] Direct transmission of pathogens can occur during examining of the oral cavity with bare hands and when contact is made with blood/serum of infected patients while indirect transmission can occur through contact with the contaminated needle, dental units, surfaces, or improperly sterilized instruments.[14]

In order to stop this transmission, and to reduce the risk of accidental injuries by dental instruments, dentists should take necessary measures during patient treatment.[11,15,16] According to Center for Disease Control and Prevention's guidelines on infection control updated in 2019, if infection control methods are consistently applied, they result in prevention of environmentally related infections in high risk populations.[17] Although adequate emphasis has been placed on the importance of adherence to these protocols, literature shows that few dentists actually adhere to the standardized infection control procedures in their daily practice.[18]

Though the awareness of dental students regarding infection control measures has been studied previously, recent literature about dental practitioners' awareness and the factors affecting is particularly limited, especially in our local setting. Tahir MW et al., found dental students to be adequately aware about infection control measures[19], though Qamar MK et al., reported the awareness of dental students regarding infection control measures to be unsatisfactory.[20] With regard to dental practitioners, Mohiuddin S and Dawani N reported a need to improve the awareness of dental professionals to minimize cross infection in dental set up.[21]

It was hypothesized by the authors that certain dental practitioner related factors, such as their age, gender, qualification and experience may affect their awareness of infection control measures. In the given context, this study was carried out to determine the factors affecting awareness of infection control measures among dental practitioners working in universities and teaching hospitals of Karachi.

METHODOLOGY

Ethical approval letter was obtained (No. FHM 42-2017). After taking ethical approval from Baqai Institute of Health Sciences, a cross-sectional study was conducted from May 2017 to January 2018 among 190 conveniently sampled practitioners from four dental clinics of tertiary care hospitals of Karachi namely Baqai Medical University, Hamdard College of Medicine and Dentistry, Karachi Medical and Dental College and Jinnah Sindh Medical University. The study population consisted of dental practitioners that included graduates and post graduates of either gender with an experience of two years and above while practitioners refusing to give written informed consent were excluded from the study.

A pre-designed closed-ended questionnaire was given to all participants who consented to participate in this study. The questionnaire was developed in English. The questions were adopted from different sources after literature search and review and were modified according to the study population. It was first checked for face validity by asking the participants how relevant the questionnaire appeared to the study objective; and then for reliability by calculating Cronbach's alpha that was found to be 0.709, indicating an acceptable level of internal consistency.

The questionnaire was divided into two sections. The first section consisted of five questions on demographic characteristics of dental practitioners i.e. age, gender, qualification, faculty, and experience while the second section of the questionnaire consisted of fourteen questions to assess the awareness of dentists regarding the infection control measures. The questionnaire was circulated and collected by the principle investigator on the same day. At the completion of the data collection, all the responses of the participants were coded by giving the value of 1 to a correct response and a value of 0 to an incorrect response. By summing up the scores of each participant, their total awareness scores out of maximum 14 were calculated.

Sample size estimation: Keeping the percentage frequency of the study outcome at 40.8%[13] with 95% confidence level and 7% precision, the required sample size was calculated to be 190 participants using the following formula: $n=z^2(p)(1-p)/c^2$.

DATA ANALYSIS

The data were entered analyzed on SPSS version 20. Descriptive analysis was performed by generating frequencies and percentages for categorical variables and means and standard deviations for continuous variables. After checking normality, inferential analysis was performed using Mann Whitney U test and Kruskal Wallis test for comparison of awareness scores across categories of demographic variables whereas the significance level was set at 0.05.

RESULTS

Out of total of 190 participants enrolled in the study, 104 (54.7%) were aged 30 years or above, 118 (62.1%) were females, 153 (80.5%) were graduates, 185 (97.4%) were clinical faculty members whereas 112 (58.9%) had 2 to 5 years' experience (table 1).

Table 1: Demographic Characteristics of Dental Practitioners

Variable (n=190)	Frequency (%)
Age (Years)	
Less than 30	86 (45.3)
30 or Above	104 (54.7)
Gender	
Male	72 (37.9)
Female	118 (62.1)
Qualification	
Graduate	153 (80.5)
Post-Graduate	37 (19.5)
Faculty	
Clinical	185 (97.4)
Non-Clinical	5 (2.6)
Experience (Years)	
2 to 5	112 (58.9)
6 to 10	37 (19.5)
11 or More	41 (21.6)

The study results further showed that 185 (97.4%) respondents were aware that contact with blood may transmit pathogenic microorganisms from one person to another, 118 (98.9%) respondents were aware that the goal of infection control is to eliminate the transfer of microorganisms, 185 (97.4%) respondents were aware that steam autoclave sterilizes by using steam under pressure, 137 (72.1%) respondents were aware that minimum 15 minutes are required for sterilization in autoclave, 185 (97.4%) respondents were aware that apart from instruments, disinfection of dental chair and clinic is necessary, 183 (96.3%) respondents were aware that wearing gloves is necessary for a dental practitioner, 182 (95.8%) respondents were aware that changing gloves after checking each patient is necessary, 182 (95.8%) respondents were aware that wearing face masks while checking patients is necessary, 153 (80.5%) respondents were aware that changing face masks between patients is necessary, 171 (90.0%) respondents were aware that having protective eye wear on while checking patients is necessary, 170 (89.5%) respondents were aware that changing hand pieces between patients is necessary, 181 (95.3%) respondents were aware that changing extraction instrument after every patient is necessary, 178 (93.7%) respondents were aware that changing saliva ejectors after each patient is necessary whereas 177 (93.2%) respondents were aware that changing burs in operative dentistry after every patient is necessary (table 2).

The comparison of awareness scores across demographic characteristics of dental practitioners showed that the awareness scores were significantly different according to

Table 2: Awareness of Infection Control Measures among Dental Practitioners

Variables (n=190)	Frequency (%)
Contact with blood may transmit pathogenic microorganisms from one person to another?	
Yes	185 (97.4)
No	5 (2.6)
The goal of infection control is to eliminate the transfer of microorganisms?	
Yes	118 (98.9)
No	2 (1.1)
Steam autoclave sterilizes by using steam under pressure?	
Yes	185 (97.4)
No	5 (2.6)
What is the minimum time required for sterilization in autoclave?	
5 Minute	12 (6.3)
10 Minute	41 (21.6)
15 Minute	137 (72.1)
Apart from instruments, disinfection of dental chair and clinic is necessary?	
Yes	185 (97.4)
No	5 (2.6)
Is wearing gloves necessary for a dental practitioner?	
Yes	183 (96.3)
No	7 (3.7)
Is changing gloves after checking each patient necessary?	
Yes	182 (95.8)
No	8 (4.2)
Is wearing face masks while checking patients necessary?	
Yes	182 (95.8)
No	8 (4.2)
Is changing face masks between patients necessary?	
Yes	153 (80.5)
No	37 (19.5)
Is having protective eye wear on while checking patients necessary?	
Yes	171 (90.0)
No	19 (10.0)
Is changing hand pieces between patients necessary?	
Yes	170 (89.5)
No	20 (10.5)
Is changing extraction instrument after every patient necessary?	
Yes	181 (95.3)
No	9 (4.7)
Is changing saliva ejectors after each patient necessary?	
Yes	178 (93.7)
No	12 (6.3)
Is changing burs in operative dentistry after every patient necessary?	
Yes	177 (93.2)
No	13 (6.8)

Table 3: Comparison of Awareness Scores across Demographic Characteristics

Variables (n=190)	Awareness Score Mean±S.D.	p
Age (Years)		
Less than 30	13.08±1.03	0.801
30 or Above	12.81±2.00	
Gender		
Male	12.74±1.94	0.417
Female	13.05±1.41	
Qualification		
Graduate	12.99±1.40	0.949
Post-Graduate	12.68±2.39	
Faculty		
Clinical	12.91±1.65	0.258
Non-Clinical	13.60±0.54	
Experience (Years)		
2 to 5	13.12±0.93	0.008
6 to 10	11.76±3.01	
11 or More	13.49±0.63	

their experience (p=0.008) where practitioners with more than 10 years' experience had higher awareness scores than practitioners with 2 to 5 years' or 6 to 10 years' experience (table 3).

DISCUSSION

Being part of the healthcare system, it is important that the dental practitioners don't ignore the potential risk of transmission of infection which not only affects them and their patients but also doctor assistants and laboratory technicians associated with them. This study was therefore an effort to identify key awareness gaps among dental practitioners in this regard in the local setting.

In this study 97.4% of the respondents had awareness regarding transmission of organisms through blood. Similar result was reported in a study by Askarian M et al. in 2009 where 96.7% of the respondents had this awareness.[11] Moreover, 98% of the respondents correctly knew the goal of infection control is to eliminate the transfer of microorganism. Similarly, 95.6% of the respondents were reported to have such awareness in a study by Naik S et al. in 2014.[22]

In our study 97.4% of the dental practitioners had awareness regarding steam autoclave sterilization while 72.1% were aware regarding the minimum time required for sterilization in an autoclave. Similar results were reported in a study by Bargale S et al. in 2016.[23] Moreover, 97.4% of the respondents were aware about the necessity of disinfecting dental chair, clinic, and dental office other than the sterilization of instruments. Likewise, 93.8% of the respondents were found to have similar awareness in a study by Shetty D et al. in 2011.[24]

In current study 96.3% respondents were aware that wearing gloves while checking patients is necessary for a dental practitioner. Moreover, 95.8% respondents were aware that changing gloves after checking each patient is necessary for a dental practitioner. Dagher J et al. in 2017 reported 92.4% and 97.5% of the dentists to have compliance with these requirements respectively.[25]

In current study 95.8% of the participants replied that it is necessary for a dental practitioner to wear a mask for checking each patient. Similarly, 94.7% of the respondents were found to have similar awareness in a study by Askarian M et al. in 2009.[11] Mohiuddin S and Dawani N in 2015 also reported 74.2% of the respondents to be compliant with this necessity.[21] Furthermore, 80.5% of the dental practitioners were aware that a face mask must be changed between patients. This was among the measures about which the respondents had least awareness in the study.

In our study 90% of the participants were aware about the necessity of protective eye wear. Likewise, a study by Askarian M et al. in 2009 found 97.4% of the respondents to have similar awareness.[11] Moreover, in our study 89.5% of the participants knew about the necessity of changing hand pieces between patients. Likewise, a majority of respondents were reported to have similar awareness in a study by Mohiuddin S and Dawani N in 2015.[21] Similarly, Mandourh MS et al. in 2017 found 95.4% of the dentists to be aware of the importance of using a new hand piece for every patient.[26]

Furthermore, 95.3% of the participants in our study were aware that it is necessary to change extraction instruments after every patient. In line with these results, Mohiuddin S and Dawani N in 2015 reported 97.5% of the dental practitioners interviewed to be aware of the importance of changing extraction instruments after every patient.[21] In our study 93.7% of the dental practitioners were aware that changing saliva ejectors after each patient is necessary. Moreover, 93.2% of the participants were aware that changing burs in operative dentistry after every patient is necessary. Similar results were reported by Mohiuddin S and Dawani N in 2015 where 96.7% and 75.8% of the respondents were found to have this awareness respectively.[21]

It is acknowledged that the study had several limitations. Certain aspects of infection control measures could not be covered in the study questionnaire in order to keep it brief due to time limitation, such as disinfection of the blood spillage/contamination and impression material, use of disinfectants prior to sterilization of instruments and of different sinks for scrubbing and rinsing the instruments, types of autoclaves, checking their validity and storage of sterilized instruments after autoclaving, transferring dental instruments from dirty to clean zone, sterilization of x-ray sensors, film holders and collimeters, maintenance of dental unit water line and disposal of needles and other sharps after surgical procedures etc. Furthermore, use of non-probability sampling technique and a moderate sample size may limit the generalizability of the study findings.

CONCLUSION

A vast majority of dental practitioners was aware about transmission of pathogenic microorganisms through contact with blood, goal of infection control, sterilization through steam autoclaves, importance of disinfecting dental chair and office, wearing and changing gloves, wearing and changing face masks, having protective eye wear on while checking patients and changing hand pieces, extraction instrument, saliva ejectors and burs after each patient. Moreover, dental practitioners with more experience had higher awareness scores than those with less experience.

RECOMMENDATIONS

Though a majority of dental practitioners were aware about many aspects of infection control, given the limitations of the study findings, further confirmation of these results is recommended by studies with more rigorous designs. Moreover, in any case, the importance of continuing dental educational programs to provide awareness of and familiarity with infection control measures to dental practitioners can never be over stated.

DISCLAIMER

None

CONFLICT OF INTEREST

None

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