

Original Research Article

Knowledge, Attitude and Practice Regarding Infection Control Procedures among Dentists of Karachi

ABSTRACT

Aim: Infection control is crucial in any clinical setting. It is vital that all dentists must follow the infection control protocols in their clinics to prevent cross-infection. In a dental clinic, even simple dental procedures including extractions, scaling and root planning, dental crown preparations and root canal treatment, have a high risk of exposure to blood, which may cause transmission blood-borne diseases. Dentist's compliance with these guidelines and recommendations have been recently studied in different parts of the world. Hence this study was performed to evaluate the knowledge, attitude, and practice regarding infection control measures among private dental practitioners in Karachi, Pakistan.

Study design: Cross-sectional study

Place and Duration of Study: This study was conducted for a period of four months in Karachi, Pakistan.

Material and Methods: Present cross-sectional study was performed by interviewing 234 dentists via a questionnaire based upon various questions regarding infection control. Sample were collected using convenience sampling, from private dental clinics in Karachi, Pakistan.

Setting: Questionnaire were sent to 400 general dentist in Karachi, out of which 234 replied.

Results: Mostly (69%) dentists who took part in the study were males. Regarding infection control, most of the individuals had a comprehensive understanding of infection control techniques. Isolation was considered to play a vital role in cross-infection prevention by 97.3% of the dentists. 93.2% used autoclave for sterilization and majority had thorough knowledge of the process involved. Regarding preventive measures, 66.7% of the dentists were vaccinated against major infectious agents in our society and 92.2% took protective measures required to prevent cross-infection.

Conclusion: Knowledge, attitudes and practices regarding infection control of dentists in private clinic of Karachi, Pakistan are satisfactory.

Comment [vm1]: Kindly mention the particular guidelines mentioned in the abstract. Or do the authors mean to just suggest infection control protocols.

Comment [vm2]: Kindly add a note on whether ethical approval was obtained?

Keywords: Dental Practice, Cross Infection, Infection Control, Patient Isolation, Infectious Disease Transmission, Professional-to-Patient

INTRODUCTION

Cross-infection is defined as "the transfer of harmful microorganisms, usually bacteria and viruses". Cross-infection can occur between persons, equipment, surfaces or within a person's body through multiple routes. Common micro-organisms in our part of the region, that can be transmitted within a dental setting includes Human Immunodeficiency viruses (HIV), Herpes Simplex virus (HSV), Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Mycobacterium Tuberculosis (1, 2). Micro-organisms can enter the body via direct contact with blood and/or saliva of an infected patient, e.g. when performing oral examination without the use of gloves. Contaminated needles, non-sterilized instruments or contaminated surfaces may result in indirect transmission of microorganisms. blood, saliva or air borne droplets are common source of cross-infection if protective measures including use of gloves, masks, eye wears or protective clothing are not used (3, 4).

In a dental clinic, even simple dental procedures including extractions, scaling and root planing, dental crown preparations and root canal treatment, have a high risk of exposure to blood, which may cause transmission blood-borne diseases (5).

It is a high possibility in our society that individuals coming to the dental clinic for treatment could be in the prodromal phase or may be a carrier of certain infectious diseases, without any sign and symptoms. In addition, some infectious diseases have prolonged incubation periods or post-infection "window period" during which antibodies can't be detected, hence, dentist needs to treat every patient coming to the clinic as potentially infected. (6, 7)

It is necessary for the dental health care practitioners (DHCPs) to use protective measures as it puts them at a high risk of direct disease transmission within a dental clinic setting (3, 8, 9).

By practicing infection control guidelines and working safely, accidental contacts to infectious agents can be avoided in a dental setting. However, even after following infection control guidelines and working safely, there are some non-preventable exposures, hence immunization and proper post-exposure management becomes the important line of protection (10, 11).

According to the Centers for Disease Control and Prevention (CDC) extensive guidelines regarding dental settings, it is essential for DHCPs to use all protective measures such as wearing gloves, face-mask, eye-wears, protective clothing, as well as use of adequate high speed suction while using high and low speed rotary instruments (12).

Dentist's compliance with these guidelines and recommendations have been recently studied in different parts of the world. (13, 14) These studies indicate that there are gaps in some dentist's knowledge regarding modes of transmission of infectious diseases so the objective of this study was to evaluate the knowledge, attitude, and practice regarding infection control procedures among dentists of Karachi, Pakistan, therefore, we could then identify the areas where improvements can be made in a dental setting.

MATERIAL AND METHODS

Present cross-sectional study was carried out to collect data from private dental practitioners in Karachi, Pakistan. Using convenience sampling technique, we sent the questioner to 400 private dental practitioners, out of which 234 responded (58.4 % response rate). Study duration was from October 2018 to December 2018.

After acquiring data regarding the demographics of all study participants, they were then assessed on knowledge, attitude & practice for preventing infection control by filling up a questionnaire based on fourteen different questions. Descriptive statistics were applied. SPSS version 20.0 was used for data analyses.

RESULTS

Out of 234 dentists who took part in this study, 162 (69%) were males and 72 (31%) were females.

Knowledge

Majority had correct knowledge regarding the optimal temperature and minimum time required for the sterilization process using an autoclave. 218 (93.2%) agreed to the fact that ineffective sterilization may result in cross-infection between patients. When acquired regarding highest rate of disease transmission via saliva, 120 (51.3%) choose hepatitis B, 84 (35.9%) said tuberculosis and 18 (7.7%) choose acquired immune deficiency syndrome (AIDS). When asked about what action should be taken immediately in case of contact with the blood of a HIV patient, 86 (36.8%) said that blood tests were the first thing to do whereas 56 (23.9%) didn't knew regarding what course of action should be taken.

Awareness

Isolation was considered a key factor in controlling infections while treating the patients by most of the dentists 228 (97%). Majority of participants 214 (91.5%) were also aware that beside instrument sterilization, it is also important to disinfect the dental chair and clinic.

Practice

152 (65%) of the participants reported that they washed their hands before examining patients, whereas 82 (35%) said that they didn't washed their hands. When asked about washing hands after examining the patients, 216 (92%) responded positively. Those who washed their hands were further asked regarding what aid they used, 110 (47%) reported of using anti-septic solutions, 108 (46.2%) used liquid soap, 4

Comment [vm3]: In paper form or online??

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(1.7%) used soap bar and 12 (5.1%) washed with water only. Regarding the vaccination status, most of the participants 152 (66.7%) were vaccinated against all the listed diseases like Hepatitis B, Tuberculosis and Tetanus & BCG. Autoclaving the instruments is considered a key factor in controlling infection by 218 (93.2%) candidates. 216 (92.2%) used both gloves and mask to avoid cross-contamination in their practice, use of eyewear and protective clothing was seen in just two participants.

Comment [vm5]: A component on vaccination of dental assistants would be beneficial to this study.

DISCUSSION

Due to increased spread of HIV, Hepatitis and other infections among the patients and DHCP, awareness regarding control of cross-infection has developed among dental practitioners. (15, 16). Better results were observed in this study regarding attitude of dentists towards sterilization and control of cross-infection. The most efficient and effective way of minimizing the risk of exposure for DHCPs is immunization. Our study shows that most of the dental practitioners were vaccinated against Hepatitis B. Quedeimat et al, Azodo et al, Peeran et al and Shitoot et al also confirmed these findings. (17-20).

It is recommended to wear gloves when coming in contact with the patient to prevent the contamination of hands, which also helps in reducing the spread of microorganisms from the hands of dentists and/or dental assistants to the patients during dental procedures and surgeries. Our study reported that majority (96.5 %) of the participants are changing gloves after every patient, which was in agreement with the studies by Quedeimat *et al* and Kanjirath *et al*. (17, 21) In our study protective measures included gloves and mask were adopted by majority (93%) of individuals. Our study also shows that majority of dental practitioners were washing their hand before and after dental procedures, which was in contrast with the Quedeimat et al and Stevenson's where less than half of the DHCPs were washing their hands after dental procedures. Spread of organisms and operator's risk increases by using gloves inappropriately (e.g., not changing gloves after a patient).

In dental clinics, staff members and patients could acquire several infectious agents by airborne transmission (22). Particular dental procedures, like ultrasonic scaling and cavity preparations produces higher levels of airborne oral microorganisms (23, 24). According to American Dental Association (ADA) infection control guidelines dental health care professionals should wear masks and eyeglasses with lateral protective shields during the procedures at all times. (12, 25). The results of the present study revealed that 92.2 % wore gloves and masks before every patient.

Comment [vm6]: A component in the questionnaire regarding the use of face shields could have been incorporated.

It is a known fact that autoclaving the instruments is most efficient method of sterilization as it kills all the bacteria, viruses and their spores, disinfection alone is not adequate for sterilizing dental instruments (26). In our study 93.2% of dental practitioners sterilize the instruments using an autoclave, correct time was estimated by 70.1% and accurate temperature and pressure was known to 88.9%, which shows knowledge and practice is satisfactory among the dentists. In other studies, dental instrument were autoclaved by more than 90% of dentists but a study conducted in Turkey showed that hand pieces and instruments were autoclaved by only 18% dentists at the end of the day (27-29).

Most of the procedures performed at a dental clinic or hospital such as dental implant placement and oral surgeries relies upon a team of dentist, dental hygienist and dental assistants, hence, it is also necessary to take into account the knowledge and practice regarding sterilization and safety protocols of these dental auxiliaries. Proper training of these dental auxiliaries should be performed to eliminate any risk of cross-infection in a clinical setting as they are mostly responsible for carrying-out sterilization procedures.

Comment [vm7]: The knowledge among dental auxiliaries have not been incorporated in this study.

Though there are sufficient sterilization protocols being followed in the private dental clinics, however, with the increase in number of dental quacks as compared to qualified practitioners in Pakistan, these untrained individuals are playing havoc with the lives of people as they have no or little concept of infection control and sterilization. Hence, a large number of population is at risk as they go to them for treatment because of low cost. We urge the dental community and the respective government departments to take action against these dental quacks. There is a need to put a ban on these dental quacks, as they are a major source of spread of transmissible diseases in our community.

CONCLUSION

In all, the infection control knowledge, attitudes and practices of dentists in private clinic of Karachi, Pakistan are satisfactory.

CONSENT

As per standard, participant's written consent form has been collected and preserved by the authors. Consent form was filled by each participant.

Table 1: Knowledge, attitudes and practice of infection control measures among dentists.

Questions	Answers	Number of participants (%)
1. Before examining patients, do you wash your hands?	Yes	152 (65%)
	No	82 (35%)
2. After examining patients, do you wash your hands?	Yes	216 (92%)
	No	18 (8%)
3. What do you use for washing hands?	Water only	12 (5.1%)
	Soap bar	4 (1.7%)
	Liquid soap	108 (46.2%)
	Anti-septic Solution	110 (47%)
4. Which of the listed diseases have you been vaccinated against?	Hepatitis B only	40 (17.1%)
	Tuberculosis only	2 (0.9%)
	Tetanus & BCG	8 (3.4%)
	None of the above	28 (11.9%)
	All of the above	156 (66.7%)
5. What protective measures do you take while working upon patients in your clinic?	Face Mask only	6 (2.6%)
	Gloves only	6 (2.6%)
	Eyewear only	4 (1.7%)
	Protective clothing only	2 (0.9%)
	Facemask and gloves	216 (92.2%)
6. What do you do after using gloves on a patient?	Discard them	226(96.5%)
	Wash and reuse	6 (2.6%)
	Disinfect and reuse	2 (0.9%)
7. How do you sterilize the instruments in your clinic?	Autoclave	218 (93.2%)
	Washing/ Boiling	2 (0.9%)
	Washing and disinfecting	14 (5.9%)
8. Minimum time required for autoclaving is?	5 min	10 (4.3%)
	10 min	60 (25.6%)
	15 min	164 (70.1%)
9. Optimal temperature required for autoclaving is?	100° C at 15 lbs	12 (5.1%)
	121° C at 15 lbs	208 (88.9%)
	150° C at 15 lbs	14 (6%)
10. Can ineffective sterilization result in cross-infection?	Yes	218 (93.2%)
	No	6 (2.6%)
	Don't know	10 (4.2%)
11. Which disease has the highest rate of transmission via saliva?	Hepatitis B	120 (51.3%)
	AIDS	18 (7.7%)
	Tuberculosis	84 (35.9%)
	Don't know	12 (5.1%)
12. What action should be taken immediately in case of contact with the blood of a HIV patient?	Anti-HIV Igs	56 (23.9%)
	Anti-HIV drugs	36 (15.4%)
	Blood tests	86 (36.8%)
	Don't know	56 (23.9%)
13. Is isolation necessary to prevent cross-	Yes	228 (97.3%)

Comment [vm8]: A note on the use of eye wear among the dental practitioners being low can be discussed in this paper.

infection?	No	6 (2.7%)
14. Besides sterilizing instruments, disinfection of dental chair and clinic is essential?	Yes	214 (91.5%)
	No	14 (5.9%)
	Don't know	6 (2.6%)

REFERENCES

1. Talha KA, Muhammad A, Faouzia T, Muhammad O, Muhammad I, Khan SZ, et al. Emerging Viral Infections in Pakistan: Issues, Concerns, and Future Prospects. *Health Security*. 2017;15(3):268-81.
2. Sultan F, Khan A. Infectious diseases in Pakistan: a clear and present danger. *The Lancet*. 2013;381(9884):2138-40.
3. Harrel SK, Molinari J. Aerosols and splatter in dentistry: a brief review of the literature and infection control implications. *J Am Dent Assoc*. 2004;135(4):429-37.
4. Lai ACK, Poon CKM, Cheung ACT. Effectiveness of facemasks to reduce exposure hazards for airborne infections among general populations. *Journal of the Royal Society, Interface*. 2012;9(70):938-48.
5. Taiwo JO, Aderinokun GA. Assessing cross infection prevention measures at the Dental Clinic, University College Hospital, Ibadan. *African journal of medicine and medical sciences*. 2002;31(3):213-7.
6. Baseer MA, Rahman G, Yassin MA. Infection control practices in dental school: A patient perspective from Saudi Arabia. *Dent Res J (Isfahan)*. 2013;10(1):25-30.
7. Ibrahim NK, Alwafi HA, Sangoof SO, Turkistani AK, Alattas BM. Cross-infection and infection control in dentistry: Knowledge, attitude and practice of patients attended dental clinics in King Abdulaziz University Hospital, Jeddah, Saudi Arabia. *Journal of infection and public health*. 2017;10(4):438-45.
8. Cleveland JL, Gray SK, Harte JA, Robison VA, Moorman AC, Gooch BF. Transmission of blood-borne pathogens in US dental health care settings: 2016 update. *Journal of the American Dental Association (1939)*. 2016;147(9):729-38.
9. Laheij AMGA, Kistler JO, Belibasakis GN, Välimaa H, de Soet JJ, European Oral Microbiology W. Healthcare-associated viral and bacterial infections in dentistry. *Journal of oral microbiology*. 2012;4:10.3402/jom.v4i0.17659.
10. McCarthy GM, Britton JE. A Survey of Final-Year Dental, Medical and Nursing Students: Occupational Injuries and Infection Control. *Journal (Canadian Dental Association)*. 2000;66(10):561.
11. Woo TM. Postexposure Management of Vaccine-Preventable Diseases. *Journal of pediatric health care : official publication of National Association of Pediatric Nurse Associates & Practitioners*. 2016;30(2):173-82; quiz 83-4.
12. Cleveland JL, Foster M, Barker L, Gordon Brown G, Lenfestey N, Lux L, et al. Advancing infection control in dental care settings: Factors associated with dentists' implementation of guidelines from the Centers for Disease Control and Prevention. *The Journal of the American Dental Association*. 2012;143(10):1127-38.
13. Alharbi G, Shono N, Alballaa L, Aloufi A. Knowledge, attitude and compliance of infection control guidelines among dental faculty members and students in KSU. *BMC Oral Health*. 2019;19(1):7.
14. Arif S, Janjua O, Qureshi S. Knowledge, attitude and practice of dental students against infection control in allied hospital Faisalabad. *Pakistan Armed Forces Medical Journal*. 2019;69(1):130 - 5.
15. Sofola OO, Folayan MO, Denloye OO, Okeigbemen SA. Occupational exposure to bloodborne pathogens and management of exposure incidents in Nigerian dental schools. *J Dent Educ*. 2007;71(6):832-7.
16. CDC Guidance for Evaluating Health-Care Personnel for Hepatitis B Virus Protection and for Administering Postexposure Management. *MMWR*, December 20, 2013;62(RR10):1-19.
17. Qudeimat MA, Farrah RY, Owais AI. Infection control knowledge and practices among dentists and dental nurses at a Jordanian University Teaching Center. *American journal of infection control*. 2006;34(4):218-22.

18. Azodo C, Ehizele A, Uche I, Erhabor P. Hepatitis-B vaccination status among dental surgeons in benin city, Nigeria. *Annals of medical and health sciences research*. 2012;2(1):24-8.
19. Peeran S, Peeran S, Al Mugarbi M, Abdalla K, Murugan M, Alsaid F. Hepatitis B: Knowledge and attitude of graduating dentists from faculty of dentistry, Sebha University, Libya. *Dentistry and Medical Research*. 2017;5(1):3-8.
20. Shitoot A, Motwani M, Chamele D, Shitoot A, Chamele J, Ghosh A. Hepatitis B awareness and attitudes among dental professionals in Central India. *Journal of Indian Academy of Oral Medicine and Radiology*. 2016;28(3):270-3.
21. Kanjirath PP, Copley AE, Chapman JC, Peters MC, Inglehart MR. Effectiveness of Gloves and Infection Control in Dentistry: Student and Provider Perspectives. *Journal of Dental Education*. 2009;73(5):571-80.
22. Rautemaa R, Nordberg A, Wuolijoki-Saaristo K, Meurman JH. Bacterial aerosols in dental practice – a potential hospital infection problem? *Journal of Hospital Infection*. 2006;64(1):76-81.
23. Leggat PA, Kedjarune U. Bacterial aerosols in the dental clinic: a review. *International Dental Journal*. 2001;51(1):39-44.
24. Chen C, Zhao B, Cui W, Dong L, An N, Ouyang X. The effectiveness of an air cleaner in controlling droplet/aerosol particle dispersion emitted from a patient's mouth in the indoor environment of dental clinics. *Journal of The Royal Society Interface*. 2010;7(48):1105-18.
25. Kohn WG, Harte JA, Malvitz DM, Collins AS, Cleveland JL, Eklund KJ. Guidelines for infection control in dental health care settings--2003. *J Am Dent Assoc*. 2004;135(1):33-47.
26. Myers JE, Myers R, Wheat ME, Yin MT. Dental students and bloodborne pathogens: occupational exposures, knowledge, and attitudes. *J Dent Educ*. 2012;76(4):479-86.
27. Singh A, Purohit BM, Bhambal A, Saxena S, Singh A, Gupta A. Knowledge, attitudes, and practice regarding infection control measures among dental students in Central India. *J Dent Educ*. 2011;75(3):421-7.
28. Askarian M, Assadian O. Infection control practices among dental professionals in Shiraz Dentistry School, Iran. *Archives of Iranian medicine*. 2009;12(1):48-51.
29. Abreu MHNGd, Lopes-Terra MC, Braz LF, Rímulo AL, Paiva SM, Pordeus IA. Attitudes and behavior of dental students concerning infection control rules: a study with a 10-year interval. *Brazilian Dental Journal*. 2009;20:221-5.