ORIGINAL ARTICLE
Cross Infection Control Practices in Dental Clinics: A Patient Perspective

NAEEM ASIM[1], NASHIDA AHMED[2], MUHAMMAD HASSAN KHOSO[3*], REEMA ASLAM[4], ZAKA UN NISA[5*]
[1]Hepatitis Prevention Control Program, Punjab Health Department, Pakistan
[2]School of Public Health, Nanjing Medical University, Nanjing 211166, China
[3]Dr. Ishrat-Ul-Ebad Khan Institute of Oral Health Sciences (DIKIOHS), Dow University of Health Sciences, Karachi 74200, Pakistan
[4]Infection Control Department, Indus Hospital & Health Network, Karachi 75190, Pakistan
[5]Faculty of Medicine, Quaid-i-Azam University, Islamabad 45320, Pakistan
Corresponding author: Dr. Muhammad Hassan Khoso & Dr. Zaka Un Nisa, Email: hassan.khoso@duhs.edu.pk, zaka.unnisa@gamil.com, C: +92-21-99232660

ABSTRACT
Objective: To assess the knowledge, attitudes and practices of cross-infection control measures at dental clinics in Islamabad, Pakistan.
Study Design: A cross-sectional study was designated to assess the knowledge, attitudes, and practices of cross-infection control measures.
Place and Duration: The study was carried out in dental clinics in Islamabad for six months.
Methodology: A pretested questionnaire comprised of thirty questions was administered to respondents. The sample size comprises patients who visited the dental hospitals of Islamabad and Rawalpindi. The data were analyzed using SPSS statistical software.
Results: Most of the respondents (69.8%) showed poor knowledge. However, among respondents 85.6%presented a positive attitude towards infection control measures. Concerning self-reported practices, approximately 16% and 17% of patients ask the dentist to wear gloves and a face mask. Only 12% ask the dentist whether instruments are sterilized or not. A significant difference was seen between the education of patients and knowledge towards cross-infection control measures. Among respondents with a high level of education, 87.7% showed good knowledge, whereas the medium (58.6%) and low level of education (9.8%) showed good knowledge towards infection control measures, respectively.
Conclusion: In conclusion, our results showed poor knowledge and practice regarding cross-infection control measures; however, most respondents demonstrated a positive attitude.
Keywords: Infection control, Dental patient, Emerging disease, Risk, Knowledge, Attitude.

INTRODUCTION
Recently the emergence of infectious diseases around the world has drawn the attention of health care professionals and policymakers to develop policies on controlling cross infection in health care settings. Infection transmission in dental hospitals is one of the critical issues these days, as due to the nature of its procedure, dental care settings carries a high risk of cross infections[1,2]. Cross infection is defined as the infection transmission between staff and patients in a clinical setup. The transmission can be from direct person to person contact and through contaminated objects. Infectious agents can also be transmitted through blood, saliva droplet and contaminated dental instruments[3]. Infection can be transmitted via inhalation and inoculation in dental clinics, patients suffering from the infectious disease are a source of infection and infection can be transmitted by direct contact of tissues, with secretions or through instruments that are not sterilized. Studies are conducted in several countries like North America, Europe and Jordan to determine infection control practice at dental clinics [4, 5].

Many infection control procedures and precautions are effective in preventing cross contamination and many organizations like the Center for Disease Control and Prevention (CDC) and other health care agencies strongly support this. Universal precautions should be applied to all patients by accepting that all patients at dental clinics are infectious[6]. Due to the increased risk of Hepatitis B and HIV/AIDs, preventing cross risk infection has become an integral part of dental practice. In order to reduce the risk of infection transmission in a dental setup, several recommendations have been issued by health care agencies such as the use of protective measures (gloves, facemask, sterilized equipment) and vaccination against HBV[7].

Use of protective measures such as a facemask, gloves, spectacles, sterilized instruments and gowns are important to protect both patients and dental professionals but compliance to the cross infection control measures are not fully reached[8, 9]. Previous studies also confirmed that infectious diseases are more common among those patients who have little knowledge regarding the preventive measures of diseases[10].Several studies have been conducted around the world[6, 11-14] where dentist compliance with infection control measures was examined, but very few studies are conducted in dental practice in which patients attitude towards cross infection is seen. It is very important to identify the attitude and practice of patients towards cross infection control methods in dentistry as patients can play a very important role in controlling cross infection in dental clinics by ensuring that dentists are strictly following cross infection guidelines during treatment.

In Pakistan, infectious diseases are consideredas one of the major health problems and is a cause of morbidity and mortality[15]. The dental practice has been identified as a major risk factor for the transmission of Hepatitis B and C[16]. For the protection of the dentist and patient, adequate precautions must be adopted in dental clinics. Therefore, this study was carried out with the aim to determine the patient knowledge, attitude and practice (KAP) towards cross infection control measures at dental clinics located in the northeastern part (Islamabad and Rawalpindi) of Pakistan.

METHODS
Study design: A cross sectional study was conducted among patients visiting the dental hospital in twin city of Pakistan: Rawal Dental Hospital; Shifa Dental Clinic; Margalla Dental Hospital, Islamabad Dental Hospital and Islamic International Dental Hospital from March to August 2018 for the time period of 6 months.
Sampling strategy: Nonprobability convenience sampling was used. The sample size was calculated using the Open Epi and it came out to be 384. The sample size of this study incluided the entire population of patients who visited the dental hospitals of Islamabad and Rawalpindi. To ensure that, objectives of study are met the following patients were excluded from the study sample: Patients with mental illness or other serious illness and children younger than 17 years of age. All the patients who were willing to participate were included in this study. Patients with mental illness or other serious illness and children younger than 17 years of age were excluded. This survey included 384 adult patients of both genders.
Questionnaire: The different questionnaires used in the previous studies related to Knowledge, Attitude and Practice (KAP) of patientstowards cross-infection control measures were examined

and the questionnaire was drafted as a multiple choice question[17].The questionnaire was developed in both English and Urdu language. The questionnaire validity was determined by pretesting it with 20 patients at five different dental clinics (5 from each clinic). After pilot testing slight modifications were done in the questionnaire and after that questionnaire was distributed to the respondents. The questionnaire comprised 4 parts. The firstpart included demographic information of respondents. The second part comprised10 questions to assess the respondent knowledge towards cross infection control methods. The third part consisted of 10attitude related questions. The lastpart contained 4 practice-related questions to determine the practice of patients towards cross infection control measures.

Validity and Reliability of Questionnaire: For the present study, two experts in research have reviewed the questionnaire and questions were checked for clarity, consistencies and relevance. Moreover, a pilot study was conducted by pretesting it with 20 patients at five different dental clinics (5 from each clinic) to assess the face and content validity of questionnaire and whether the data collection methods were feasible or not. After pilot testing slight modifications were done in the questionnaire and after that questionnaire was distributed to the respondents. Data obtained from the pilot study are not included in the reported results.

Ethical approval: Before conducting the survey, ethical approval was taken from the Institutional Review Board (IRB) at Quaid-e-Azam University. Written consent was taken from each patient who showed their willingness to participate in this study.

Data Collection: Survey to different dental clinics was carried out and patients were contacted in the waiting area. Before filling the questionnaire, each patient was explained about the study and after their approval; they were interviewed on an individual basis using the pretested questionnaire.

Statistical Methods: Data were analyzed using SPSS version 21 using a special coding system. Descriptive and inferential statistics were done. Frequency and percentages were calculated for qualitative variables while arithmetic means were calculated for the quantitative variables. Chi-square test was used to find the associations between the categorical variables. P-values <0.05 were considered statistically significant.

RESULTS

A total of 384 questionnaires were distributed, out of which 341 were filled with a response rate of 88%.The mean age was 33.6 ±14.3 years. Most of the respondents (53.9%) had a medium level of education whereas (31.2%) had a high education level. Majority of the respondents were nonprofessional (75.1%). Out of 341 respondents who were interviewed, 78% had previous experience of receiving dental treatment (Table 1).

Description of respondents' knowledge towards cross infection and its control measures: There were 10 questions regarding knowledge of respondents towards cross infection and its control measures (Table 2). Among respondents, 29.9% knew the definition of cross infection and 59.8% were aware of the spread of infection at dental clinics. Among respondents (39.9%, 47.8% and 61.3%) said that infection can spread from saliva, blood and unsterilized instruments, respectively. Among respondents, (24.9%) stated that the dentist can acquire infection from patients, whereas (47.8%) stated that patients can get an infection from the dentist. Almost (45.0%) of respondents knew that HIV and HBV can spread during dental treatment. Among respondents, only (25.3%) stated that protective gloves, facemask and sterilized equipment will protect both patient and dentist. Only (29.9%) knew that autoclave is the best method to sterilize dental instrument as shown in Fig. 1.

Overall knowledge of patients: There were 10 knowledge related questions. Score 1 and 0 were assigned to each right and wrong answer. The mean knowledge score was found for each respondent and it was found that (30.2%) have good knowledge, whereas (69.8%) showed poor knowledge as shown in Fig.2.

Attitude of respondents towards infection control measures: Most of the respondents in this study show a positive attitude towards infection control measures at dental clinics. Almost all the respondents (93.8%) agreed that a dentist should routinely wear gloves. (92.7%) and (67.7%) stated that a dentist should wear facemask and safety spectacles respectively. Among respondents (92.7%) and (89.1%) believe that the dentist should replace gloves and facemask after treating each patient, respectively. Majority of the respondents (97.1%) stated dentists should use the sterile/ disinfected equipment. Among respondents, (78.6%) stated that the dentist should disinfect clinical contact surface before treating every patient (**Error! Reference source not found.**).

Overallattitude of patients: There was10 attitude related questions. Scoring was done by giving a score '1' to a positive attitude and '2' for a negative attitude. On the basis of individual mean score overall (85.6%), respondents show a positive attitude towards infection control measures at dental clinics as shown in Fig.3

Self reported practice by patients in dental hospitals: Results showed that between 16.1%and 16.7% of patients ask the dentists to wear gloves and face mask. Among respondents,(12%) ask dentist whether instruments are sterilized or not and only (8.2%) ask whether clinical contact surface is clean with disinfectant or not (Table 4).

Overall self-reported practice of patients: There was 4 practice related questions. Scoring was done by giving a score '1' to a good practice and '2' for a poor practice. On the basis of individual mean score only (13.2%), respondents show a good practice towards infection control measures at dental clinics as shown in Fig 4

Patients' knowledge attitude and practice according to the level of education: Chi-square test was used to find the association of knowledge with a level of education. As shown in Fig. 5significant difference was seen between the level of education and knowledge of patients towards infection control measures (p=0.000). Among respondents with a high level of education, (87.7%) showed good knowledge, among respondents with the medium and low level of education,(58.6%) and (9.8%) showed good knowledge towards infection control measures, respectively. No significant difference was seen between the level of education and the attitude of the respondent (p=0.91).
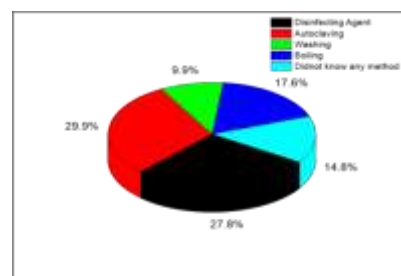

Fig. 1. Patients' knowledge regarding the best method to sterilize instruments.
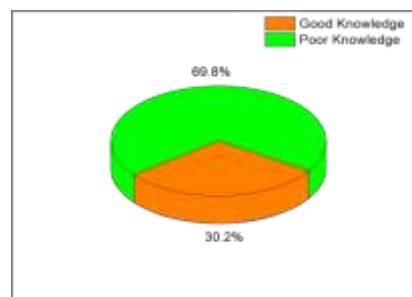

Figure 2: Overall Knowledge of patients towards cross infection control at dental hospitals.
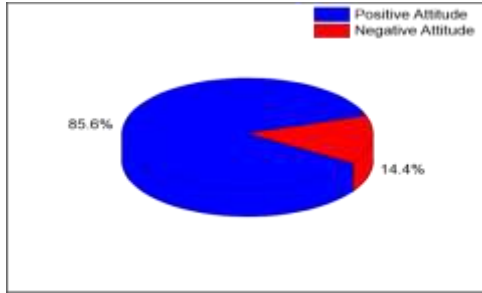
Figure 3: Overall Attitude of respondents towards infection control measures
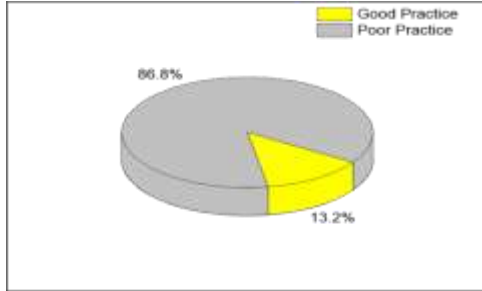

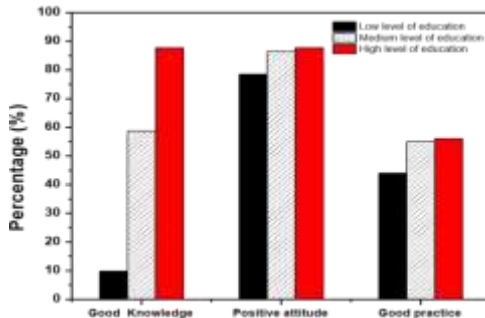Figure 4: Overall self-reported practice of patients in dental hospitals.

Fig. 5. Patients' knowledge, attitude and practice related to their level of education.

Table 1.Demographic characteristics of respondents.

Demographic variables	Categories	Response n (%)
Age	Mean age 33.6 ± 14.3 years	
Gender	Male	207(60.7)
	Female	134(39.3)
Type of education	Low (matric or less)	51(14.9)
	Medium (intermediate /simple graduate)	184(53.9)
	High(university degree)	106(31.2)
Type of occupation	Professional	85(24.9)
	Non professional	256(75.1)
Patient history of dental treatment	First experience	75(22.0)
	Previous history of dental visit	266(78.0)

Table 2.Patients' knowledge about cross infection in dental clinics.

	Questions regarding cross infection knowledge	Respondents response n (%)
1	Define cross infection?	102(29.9)
	Transmission of infectious agents between patients and staff in a clinical practice	96(28.2)
	Transmission of infection from patient to healthcare staff	143(41.9)
	Transmission of infection from health care staff to patient	
2	Are you aware that infection can be spread in dental clinics?	
	Yes	204(59.8)
	No	137(40.2)
3	Are you aware that infection can spread from saliva(spit) during the dental procedure?	
	a) Yes	136(39.9)
	b) No	205(60.1)
4	Infection can spread from blood during dental treatment?	
	a) Yes	163(47.8)
	b)No	178(52.2)
	Infection can spread from the unsterilised instrument	209(61.3)

	Yes	132(38.7)
	No	
5	The dentist can acquire infection from patients?	
	a) Yes	85(24.9)
	b)No	256(75.1)
6	Patients can acquire infection from dentist?	
	Yes	163(47.8)
	No	178(52.2)
7	HBV and AIDs can spread during dental treatment?	153(44.9)
	Yes	188(55.1)
	No	
8	What are protective measures which can prevent transmission of infection in dental clinics	
	Gloves	90(26.4)
	Spectacles	18(5.3)
	Facemask	75(21.9)
	Sterilized instrument	110(32.3)
	All of the above	48(14.1)
10	Wearing gloves/ facemask and spectacles will protect	
	Patients	68(19.9)
	Dentist	187(54.8)
	Both patients and dentist	86(25.3)

Table 3.Patients' attitude regarding cross infection in dental clinics.

	Questions regarding attitude	Yes	No
1	The dentist should routinely wear gloves	320 (93.8)	21 (6.2)
2	The dentist should routinely wear a face mask	316 (92.7)	25 (7.3)
3	Do you think that a dentist should routinely wear a safety spectacles	231 (67.7)	110 (32.3)
4	Do you feel that your dentist should use new gloves for each patient	316 (92.7)	25 (7.3)
5	Do you feel that your dentist should change face mask after every patient	304 (89.1)	37 (10.9)
6	Do you think that dentists should be vaccinated against HBV	258 (75.7)	83 (24.3)
7	Gloves should be replaced by dentist after receiving phone calls	287 (84.2)	54 (15.8)
8	Do you feel that the dentist should use sterile/disinfected instruments	331 (97.1)	10 (2.9)
9	Do you feel that dentist should disinfect Clinical contact surface before treating the patient	268 (78.6)	73 (21.4)
10	Are you concerned about contracting infection when visiting a dentist	253 (74.2)	(25.8)

Table 4. Patients' self-reported practice at dental clinics.

	Questions regarding self reported practice	Yes n (%)	No n (%)
1	Ask dentist that the instrument he/she using is sterilized	41(12)	300(88)
2	Ask the dentist to wear protective gloves if he/she not wearing	55(16.1)	286(83.9)
3	Ask the dentists to use face mask if he/she not wearing	57(16.7)	284(83.3)
4	Ask dentist that clinical surface is clean with disinfectant or not	28(8.2)	313(91.8)

DISCUSSION

This is a first study that is conducted in the northeastern part of the country to assess the KAP of patients towards cross infection in dental hospitals. It is very important in dental hospitals to set preventive measures to prevent disease transmission as infection guidelines and required protective measures can prevent the spread of infection in dental hospitals. Most of the patients in this study showed poor knowledge regarding cross infection in dental hospitals. In contrast, a study conducted by Azodo et al.showed that 45% of patients had adequate knowledge regarding cross infection in dental clinics[18].

Wearing gloves has been considered as one of the most important elements in the dental cross infection control[14]. Infection transmission from the hand of the dentist to patients is one of the major concerns. Hand hygiene is very important for the prevention of infection transmission in dental practice[13] as the hand of dentists can serve as a reservoir for various pathogens[13].A total of 93.8% of patients believed that a dentist should regularly wear protective gloves. Results are consistent with the study conducted in another part of the world; India (97.7%). Nigeria(88.8%)[19], Lagos Nigeria (98.6%) [20]. In this study, 92.7% of patients believed that for each patient dentist should wear new gloves. Similar results were found in other studies conducted in Saudi Arabia[3](95%) and Nigeria (81.3% [19]. When patients were asked about the protection which gloves provide, only 25.3% stated that it protects both patient and dentist

which is inconsistent with the study conducted in India where (92.7%) [21], Saudi Arabia 80% [3] and Nigeria 94.3% [18] stated that gloves provide protection to both patient and dentist. However, in the present study, among respondents, 92.7% stated that a dentist should wear a face mask routinely. The result is in accordance with the study conducted previously[3].

Sterilization of dental instruments is very important in preventing infection transmission from patient to patient. In this study, only 29.9% of patients knew that autoclave is the best method to sterilize equipment which is less than the percentage reported in studies conducted in another part of the world[17, 18]. This shows that patient visiting the dental clinics cannot determine the quality of the dental instruments and their health safety.

This study also reveals that those respondents who have a high level of education possess good knowledge, attitude as well as shows willingness to be involved in their own health care. Those who do not inflict an involvement in their own health care may be due to a lack of knowledge regarding infection risk and appropriate measures that are required to reduce it. This result is consistent with the results reported in the literature[21, 22], where a high proportion of patients are not involved in assessing the safety protocols because of the lack of awareness regarding the risk of infection.

Infection control in dental clinics is becoming a global issue. Worldwide almost 400 million people are a carrier of Hepatitis B virus and studies have shown that dental treatments are the main cause of infection transmission[23].Studies conducted in Pakistan also shows that the main cause of the transmission of Hepatitis C in Pakistan is dental procedures[24]. In Pakistan currently, 9 million population are a carrier of HBV[25]. Only 44.9% of the patients in this study knew that Hepatitis and HIV can spread from dental treatment which is in accordance with the study conducted in Sudan and Saudi Arabia where the patients had low knowledge regarding hepatitis and AIDs [17, 26].Standard preventive practices are important for preventing of dentally acquired cross infection and blood borne infection as patients have a right to be treated in an environment which is safe. Both patients and dental health professionals' needs to be well equipped with enhanced knowledge about cross infection in dental clinics through different educational programs. This can be done through university public places, TV programs and shopping malls. These educational programs will help in the elimination of cross infection in dental clinics through increasing awareness of patients about the required protective measures.

CONCLUSION

Collective results showed that patients visiting dental clinics have poor knowledge regarding cross infection control measures and the spread of Hepatitis and HIV. The patient also showed poor self-reported practices. However,the majority of the patients showed a positive attitude. There is a great need for the awareness programs which should involve both public and health care professionals to make people aware of the infection control measures in dental clinics. This study will help in providing information for planning an effective public awareness program on cross infection control measures in dental clinics of Pakistan. Further studies should be conducted in other cities of Pakistan which would allow generalizability as well as more solid results.

Abbreviations
CDC: Center for Disease Control and Prevention
KAP: Knowledge, Attitude and Practice
HIV: Human Immunodeficiency Viruses
HBV: Hepatitis B Virus
AIDs: Acquired Immunodeficiency Syndrome
IRB: Institutional Review Board

Declarations

REFERENCES

1. Longtin, Y., et al. Patient participation: current knowledge and applicability to patient safety. in Mayo Clinic Proceedings. 2010. Elsevier.
2. Kohn, W., Centers for Disease Control and Prevention: Guidelines for infection control in dental health care settings-2003. J Am Dent Assoc, 2004. 135(1): p. 33-47.
3. Baseer, M.A., G. Rahman, and M.A. Yassin, Infection control practices in dental school: A patient perspective from Saudi Arabia. Dental research journal, 2013. 10(1): p. 25.
4. Al-Rabeah, A. and A.G. Moamed, Infection control in the private dental sector in Riyadh. Ann Saudi Med, 2002. 22(1-2): p. 13-7.
5. Al-Omari, M.A. and Z.N. Al-Dwairi, Compliance with infection control programs in private dental clinics in Jordan. J Dent Educ, 2005. 69(6): p. 693-8.
6. Yüzbasioglu, E., et al., A survey of cross-infection control procedures: knowledge and attitudes of Turkish dentists. Journal of applied oral science, 2009. 17(6): p. 565-569.
7. Durrani, O.K., et al., Prevalence of patients infected with HIV, Hepatitis B and C virus visiting the outpatient department of Islamic International Dental Hospital, Islamabad. Pakistan Orthodontic Journal, 2017. 9(1): p. 15-18.
8. Kearns, H., F. Burke, and S.W. Cheung, Cross-infection control in dental practice in the Republic of Ireland. International dental journal, 2001. 51(1): p. 17-22.
9. Nisa, Z.U., A. Zafar, and F. Sher, Assessment of knowledge, attitude and practice of adverse drug reaction reporting among healthcare professionals in secondary and tertiary hospitals in the capital of Pakistan. Saudi Pharmaceutical Journal, 2018. 26(4): p. 453-461.
10. ALAgil, N.A. and A. Bin Mubayrik, Dental patients' knowledge, awareness, and attitude regarding infection control procedures. AUSTRALASIAN MEDICAL JOURNAL, 2017. 10(9): p. 789-799.
11. Dagher, J., et al., Infection control measures in private dental clinics in Lebanon. International journal of dentistry, 2017. 2017.
12. Khalil, I.A., M.K. Sultan, and A. Tanveer, Knowledge, attitude, and practice of infection control among dental students in King Khalid University, Abha. journal of international oral health, 2018. 10(2).
13. Mutters, N.T., et al., Compliance with infection control practices in an university hospital dental clinic. GMS hygiene and infection control, 2014. 9(3).
14. Khanghahi, B.M., et al., Knowledge, attitude, practice, and status of infection control among Iranian dentists and dental students: a systematic review. Journal of dental research, dental clinics, dental prospects, 2013. 7(2): p. 55.
15. Minooee, A. and L.S. Rickman, Expanding the role of the infection control professional in the cost-effective use of antibiotics. American journal of infection control, 2000. 28(1): p. 57-65.
16. Krasteva, A. and V.E. Panov, Hepatitis B and C in dentistry. Journal of IMAB–Annual Proceeding Scientific Papers, 2008. 14(2): p. 38-40.
17. Ibrahim, N.K., et al., 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): p. 438-445.
18. Azodo, C., A. Umoh, and A. Ehizele, Nigerian patients' perception of infection control measures in dentistry. Int. J. Biomed. Hlth. Sci. Volume, 2010. 6(4).
19. Otuyemi, O., et al., Patients' attitudes to wearing of gloves by dentists in Nigeria. East African medical journal, 2001. 78(4): p. 220-222.
20. Sofola, O., O. Uti, and O. Onigbinde, Public perception of cross-infection control in dentistry in Nigeria. International dental journal, 2005. 55(6): p. 383-387.
21. Deogade, S.C., et al., Perceptions of dental outpatients toward cross-infection control measures in Jabalpur city. Journal of Indian Association of Public Health Dentistry, 2016. 14(3): p. 338.
22. Bârlean, L., et al., Patients'knowledge and attitudes towards infection control in the dental practice. Romanian Journal of Oral Rehabilitation, 2010. 2(4): p. 4.
23. Mahboobi, N., et al., Hepatitis B virus infection in dentistry: a forgotten topic. Journal of viral hepatitis, 2010. 17(5): p. 307-316.
24. Butt, A.K., et al., Dentistry as a possible route of hepatitis C transmission in Pakistan. International dental journal, 2003. 53(3): p. 141-144.
25. Ali, M., et al., Hepatitis B virus in Pakistan: a systematic review of prevalence, risk factors, awareness status and genotypes. Virology journal, 2011. 8(1): p. 102.
26. Nasir, E.F., et al., Utilization of dental health care services in context of the HIV epidemic-a cross-sectional study of dental patients in the Sudan. BMC Oral Health, 2009. 9(1): p. 30.