

Knowledge's and Practices of Cross Infection Control Protocols among Dental Health Care Professionals in Public Sector University of Karachi, Pakistan

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ABSTRACT

Objectives: 1. To assess the knowledge and practices of cross-infection control protocols among dental health care professionals (DHCP).

2. To compare the scores among different groups: junior and senior, male and female DHCPs, as well as between doctors and non-doctors.

Study design and setting: A cross-sectional study was conducted involving 112 DHCPs from a public sector university in Karachi, Pakistan.

Methodology: Participants were provided with self-administered questionnaires, consisting of closed-ended and multiple-choice questions, designed to evaluate their knowledge and practices concerning cross-infection control. The data was analyzed using SPSS version 26, with a significance level set at $p=0.05$ for comparison of scores.

Results: Data of 112 participants was analyzed. The male to female ratio was 3:5 with mean age of 25 years. 97.3% of the population believed aerosols as main cause of communicable diseases reported to be vaccinated for hepatitis B. The knowledge was good, and practices were adequate to ensure cross-infection control, but we found difference between the diploma holders and graduate/postgraduates and between graduate and postgraduates at p -value 0.05.

Conclusions: The results indicate showed the knowledge and practices to be adequate. Increased awareness and stringent adherence to PPE usage may have been influenced by a change in mindset following the recent pandemic. Though seminars and workshops should be arranged to provide them with updates. Also, vaccination against communicable diseases should be made mandatory for professional practice.

Keywords: Awareness, Comparative Study, Cross-Infection Control, Dental Health Care Professionals,

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INTRODUCTION:

Infectious diseases remain a significant threat to Pakistan's healthcare system, a situation exacerbated by the widespread hepatitis and HIV epidemic in the country.¹ It is estimated that approximately 12 million people in Pakistan are afflicted with Hepatitis B or C, with an annual increase of about 150,000 individuals.² In clinical environments, a myriad of microorganisms, including mycobacterium tuberculosis, streptococci, staphylococci, HBV, HCV, HIV, HSV, mumps, rubella, and other viral and bacterial agents, can be transmitted between patients and healthcare personnel. This transmission results in cross-infection via infected aerosols, blood, saliva, droplets, and contact with equipment contaminated with secretions.^{3,4} Dental procedures are particularly associated with the risk of blood-borne diseases, as blood exposure can readily occur in dental clinical settings, thereby endangering dentists and their assistants.^{5,6} The most common route of cross-infection in oral procedures is through intact skin or mucosa, resulting from sharp instruments or direct inoculation into wounds and abrasions on the skin.

Preventing cross-contamination is achievable by adhering to the universal precautions prescribed by the Centers for

Disease Control and Prevention (CDC) and the Occupational Safety and Health Administration (OSHA).⁷ Additionally, healthcare facilities must establish and implement an exposure control plan (ECP), encompassing biohazard waste disposal.⁸ It is imperative to prevent cross-infection in dental offices and schools during dental procedures, necessitating strict adherence to preventive and safety guidelines by all para-dental auxiliaries, especially when interacting with patients.⁹

Consequently, it is vital for Dental Health Care Professionals (DHCPs) to adhere to comprehensive safety measures, including wearing personal protective equipment (PPE) such as gowns, gloves, masks, and eyewear. DHCPs must also utilize high-speed suction systems when operating high and low-speed rotary tools. Gloves and gowns should be worn upon entering and exiting the patient's room, followed by immediate hand hygiene.⁷

Proactive prevention and the implementation of necessary measures are fundamental to mitigating the risks of cross-contamination and cross-infection. Therefore, this study aims to compare the awareness and practice of cross-infection control protocols among DHCPs at a public sector university in Karachi, Pakistan. Specifically, the study assessed the awareness and practice of cross-infection control protocols among DHCPs and compares these aspects among junior and senior, male and female DHCPs, as well as between doctors and dental hygienist and assistants. A lack of awareness and practice regarding infection control protocols can lead to an increased risk of transmission of infections. Previous studies have shown a lack of awareness and practice among DHCPs in various parts of the world.^{5,6,8} However, there is limited data available on the awareness and practice of cross-infection control protocols among DHCPs in Pakistan, particularly in Karachi.¹⁰⁻¹² This study aims to fill this gap by providing valuable insights into the current status of awareness and practice of cross-infection control protocols among DHCPs in a public sector university in Karachi, Pakistan. Ultimately, the findings of this study will help in identifying areas that need improvement and in developing targeted interventions to enhance the awareness and practice of cross-infection control protocols among DHCPs in Pakistan.

METHODOLOGY:

This research was approved by an institutional review board of Jinnah Sindh Medical University (Reference # JSMU/IRB/2022/602). A Cross-sectional study was conducted to assess the awareness and practice of cross-infection control protocols among dental health care professionals (DHCPs) in the public sector University of Karachi, Pakistan. The study was conducted from 1st June to October 2022. All dentists, professors, associate professors, assistant professors, lecturers, demonstrators, postgraduate trainees, fellows, house officers, hygienists, therapists, prosthetists, technicians, and dental assistants were included in the study.

A non-random convenience sampling technique was employed to recruit participants. For sample size, select statistics online calculator was used. Considering that 93.5% of participants followed appropriate infection control measures during dental procedures as reported by Shenoy et al., keeping the confidence level of 95%, a margin of error of 5%, a minimum sample size of 94 was calculated.¹³ Data was gathered from 112 DHCPs affiliated with JSMU. Informed consent was obtained from each participant before recruitment.

A self-administered structured questionnaire was designed and used to collect data from the DHCPs. The questionnaire consisted of closed-ended questions regarding practitioners' vaccination status, patient history-taking habits, and hygiene habits during practice, sterilization, and irrigation type preferences. It consisted of multiple-choice questions and the participants were asked to choose the best option.(annexure 1)

Undergraduate medical and dental students, foreign dentists, those with no clinical experience either teaching or non-teaching, and those who did not provide consent were excluded from the study. No personal details, including complete names, residential addresses, or phone numbers, were recorded or gathered. The principal researcher and the co-researcher had unrestricted access to the data at all moments. This guaranteed the integrity of their anonymity and confidentiality for the entire duration of the study.

All the data was entered and analyzed into the Social Package of Statistical Sciences SPSS version 26. Percentages and frequencies are calculated to assess the awareness and practice of that knowledge amongst Dental Health Care Practitioners (DHCPs). Additionally, a comparison was done between the male and female, senior and junior DHCP, and doctors and other dental health care providers using ANOVA and post hoc analysis was used to find out difference in answers for the knowledge and practical use of cross-infection protocols. For all comparative analyses, the level of significance is at $p=0.05$. This helps assess the impact of formal education on the practical use of cross-infection measures.

RESULTS:

A total of 112 dental health care professionals participated in the study with a mean age of 25 years, and a male-female ratio of 3:5. The overall mean experience of working in hospital-based setting was of 6 years. Out of our 112 participants, $n=73$ (65%) DHCPs reported having been vaccinated against HBV. 61.6% of the sample size reported personally checking for vaccination reports of patients while the rest didn't check for any vaccination reports. When asked about the type of diseases that can be transmitted during a dental checkup, 97.3% of the population pointed out airborne diseases as the culprit. when inquired how many times the dental units were cleaned in this public

hospital, n= 90(80.4%) of the population reported only once daily, 5.4% reported thrice daily, and 14. 3% of the population reported the units to be cleaned after every patient. The participant’s responses to the following cross-infection control precautions are mentioned in table 1. While Table 2 shows that only 61.6%(n=69) of the team checking for reports of patients treated for communicable diseases or with comorbid that may affect treatment. When asked about the their own vaccination they reported highest for Hepatitis B(n=45,40.2%) and only 4.5%(n=5) said they were not

Table 1. Responses to cross-infection control precautions

Practices	Every time	Sometimes	Never
Use gloves during treatment	94.6% (106)	4.5%(5)	0.9%(1)
Use mask during treatment	93.8% (105)	6.3% (7)	-
Use sterilized instruments	98.2% (110)	1.8%(2)	-
Use white coat during	75% (84)	20.5% (23)	4.5%(5)

Item	Answer	N	Percentage
Check for reports of the patient	Yes	69	61.6%
	No	43	38.4%
Vaccinated against	Hepatitis B	45	40.2%
	Tuberculosis	10	8.9%
	Tetanus & BCG	24	21.4%
	None	5	4.6%
	All the above	28	25%

vaccinated. ANOVA was used to find out the differences between the approached and knowledge between the participants. None of the findings were significant. Though on post-hoc analysis with Scheff’s test the findings for Gloves worn during treatment, Mask worn during treatment, Coat during treatment, Sterile instrument, Hand wash after, Critical instrument, Semi critical instrument, Disease check, Report vaccination, Unit Cleaning frequently were found to be significant up to p-value of 0.05(Table 3).

DISCUSSION:

A patient trusts the healthcare personnel working on them to bring them out of pain and solve the dental problem they came with rather than give them an infection through irresponsible practice of cross-infection control measures. The Pakistan dental curriculum equips its students with all the important measures for cross-infection control to not only protect themselves but also their patients. This study shows that while a majority of dental healthcare practitioners do follow universal precautions, there is a lot of room for improvement. Using sterilized instruments every time is very basic- the practice should be strictly followed by all. washing hands before treatment needs more emphasis. Disinfecting the dental unit after every patient should not just be ideal but should be a standard. This study however has unveiled how PPE practices have changed from previous years.

Due to limitation of resources and facilities, developing countries lack the state-of-the-art equipment available to practice Dentistry. Most hospitals and clinical settings lack

Table 3: Difference in knowledge and practices of Dental Health Care Providers (Scheff’s analysis)

Dependent Variable	Dental Qualification		Mean Difference (I-J)	Std. Error	Sig.
	I	J			
Gloves worn during treatment	Diploma holder/Certified	Post graduation/doctorate	.44444*	.12688	.009
	Graduation	Post graduation/doctorate	.42294*	.08789	.000
Mask worn during treatment	Diploma holder/Certified	Post graduation/doctorate	.44444*	.10675	.001
	Graduation	Post graduation/doctorate	.42294*	.07395	.000
Coat worn during treatment	Diploma holder/Certified	Graduation	-.80645*	.19663	.001
Use of Sterile instruments	Diploma holder/Certified	Post graduation/doctorate	.22222*	.06048	.005
	Graduation	Post graduation/doctorate	.22222*	.04190	.000
Hand wash after treatment	Graduation	Post graduation/doctorate	.36918*	.11696	.023
Disinfectant used for Critical instrument	Diploma holder/Certified	Post graduation/doctorate	1.26984*	.27950	.000
	Graduation	Post graduation/doctorate	1.18996*	.19361	.000
Disinfectant used for Semi critical instrument	Graduation	Post graduation/doctorate	.69534*	.15781	.000
During history asking about Diseases	Diploma holder/Certified	Undergraduate	-.42857*	.08694	.000
		Graduation	-.42857*	.04938	.000
		Post graduation/doctorate	-.42857*	.06349	.000
Patient’s report for vaccination	Graduation	Post graduation/doctorate	.57706*	.16776	.010
Relevant person for cleaning Unit.	Diploma holder/Certified	Undergraduate	1.71429*	.43115	.002
		Graduation	1.43472*	.24488	.000
		Post graduation/doctorate	1.71429*	.31487	.000

infection control policies due to a lack of understanding of the risks or a lack of adequately trained staff. The Centre for Disease Control (CDC) published guidelines for infection control in dental settings in 2003.^{2,7} The major goal of OSHA guidelines is to create a safe working environment for dentists, DHCPs, and their patients, as well as to prevent the spread of dangerous infections and nosocomial illnesses. According to the CDC's guiding principles, face masks and gloves must be used during all dental treatments on every patient, and the masks and gloves must be changed after each procedure. Disinfection of clothes before reusing them has also been very talked about. Additionally, after performing chair-side dental treatments, hands must be thoroughly cleaned with an antiseptic solution which is a common technique for reducing the risk of illness and spreading it.⁷

As dentists and their assistants are at a higher risk of contracting the viruses, if infection control principles are not followed, they can contribute to the spread of infection and disease to dental patients. Infection control can be achieved by following conventional recommendations. Unfortunately, evidence suggests that DHCPs have little knowledge, unfavorable attitudes, and poor practices when it comes to infection control.¹⁴ Exposure to infections can be avoided by using universal precautions. Pre-operative self-vaccination and post-operative hygiene and disinfection play a key role in avoiding infections.⁵

We conducted a pilot study to find out the reliability and validity of the questionnaire on sample of 10 participants from all 4 categories (n=2 each) and found it to have good face validity and Cronbach's Alpha of 0.7. After that the final data collection was started. We included the results from the pilot study into the final data.

In current study, the out of the 112 sample, 65% (n=73) reported to being vaccinated against HBV and 97.3% of the respondents were aware of what infections could they contract from patients and vice versa. On comparing this to the available literature from Egypt, Saudi Arabia, India and Pakistan we found that either they had included dental assistants or dental students in the sample leaving the other dental health care providers.^{11,15-17} Only one study from India covered everyone from dental health care team.¹⁸ The questions from the mentioned were different from ours. But mostly covered the knowledge and practice part both. When they were asked if they know about infection control facilities available to them, 60% knew about them. Around 67.6% used protective equipment during treatment, when compared to our results we found that 90% use personal protective equipment including protective eye wear, mask, gloves and lab coat.

The mean knowledge score between the dental practitioners and the dental assistants in the Indian study was higher for dental assistants (Mean Score=5.79) in comparison to dentist (Mean Score=2.03).¹⁶ This difference in knowledge and

practices in our study was analyzed through Post-hoc (Schaff test). Mostly there was a significant difference specially between assistants/hygienist (certified/diploma holders) and postgraduates (faculty and postgraduate trainees) (Table 3) at p-value 0.05. Few of the practices showed difference in practices between graduate and postgraduate: gloves worn during treatment, mask worn during treatment, use of sterile instruments, hand wash after treatment, disinfectant used for Critical instrument, disinfectant used for semi critical instrument, patient's report for vaccination which are significant at p-value 0.05. Similarly, few of the practices showed significant differences at p-value 0.05 between undergraduate and diploma health care providers including during history asking about diseases and relevant person for cleaning Unit.

It is very important that the reports of the patient's reporting with history of undergoing treatment for communicable diseases or other disease that may alter the dental treatment, should be checked. This important detail was not covered in the above-mentioned study.¹⁶ While our results showed that 61.6% of the personnels checked for reports and secondly when they were asked for what diseases they were vaccinated, they reported that only 40% were vaccinated against hepatitis B which is low implying that adequateness of the knowledge and practices were as per the universal precautions for cross-infection control which may have can be the result of the covid 19 pandemic which increased the general awareness of PPE.^{19,20} Other important factors specially vaccination status of the health care provider is necessary for the safety of the practitioner but also of the patients.

CONCLUSION:

The overall knowledge and practices of staff and dentist working at Sindh Institute of Oral Health sciences are satisfactory and concrete measures are in place to decrease the chances of cross infection to patients, attendants, janitorial and dental staff as well as dentists. The findings show that there is difference between the Dental staff and Dentists knowledge and practices for cross-infection control. It is suggested to achieve cross-infection control, regular training through workshops or seminars and support of the faculty and staff both auxiliaries and janitorial is necessary to pre-prepare the staff to deal with future endemics/pandemics as faced during COVID-19 time recently. This will support cross-infection control.

Authors Contribution:

Hina Shah: Conceptualized the study, acquisition, collection, statistical analysis & interpretation data manuscript writing
Sadaf Talha: Contributed to the study design, reviewed and approved the manuscript
Syed Mohsin Ahmed Rizvi: Contributed in data collection and edited the manuscript
Marium Irshad: Contributed in data collection
Aruba Fatima: Contributed in data collection
Nazish Nisar: Contributed in data collection

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