ORIGINAL ARTICLE POJ 2019:11(1) 33-38

An audit of infection control in a tertiary care dental hospital

Kinza Ayub[a], Owais Khalid Durrani[b], Madiha Shakeel[c], Khadeejah Qureshi[d]

Abstract

Introduction: Infection transmission among dental staff and patients leads to increased incidence viral diseases like hepatitis and AIDS. Use of infection control methods in dental work can reduce possibility of spread of infectious agents. Even after pursuing the universal precautions, shortcomings remain in cross-infection regulation in any dental workplace. The basic goal of the following research was to ascertain cross infection control practices of house officers, demonstrators and post graduate trainees at Islamic International Dental Hospital Islamabad, Pakistan.

Material and Methods: A proforma based on guidelines by center of disease control was used to audit the practices of cross infection regulation in the hospital. Total sample included 71 house officers and 40 post graduate trainees and demonstrators. The data was recorded over the period of two months by three investigators.

Results: SPSS version 17.0 was used to analyze data. The p-value for Levene's test to check for equality of variance was P=0.102. P-value < or equal to 0.05 was considered decisive. Hence equal variances among the groups were assumed. Mean scores of group A & B were measured with independent t test. Significant difference was established between mean scores of House officers, 13.3$\pm$ 2.5 and the mean score of the post graduate trainees and demonstrators, 12.30+ 2.041 (P = 0.031). The 95 % CI is $\pm$0.9 to $\pm$1.9.

Conclusions: It was found that generally most practitioners had knowledge regarding the infection prevention practices but they were not compliant in following protocols because of lack of time, equipment and patient flow. Personal protective tools and equipment should be used during routine clinical work. Despite the infectious status of patient, standard universal safety measures should be adopted for every patient

Keywords: Communicable agents; infectious; disease control

Introduction

The transfer of infective and communicable agents among patients, staff and inside a clinical atmosphere is called as cross infection[1] In recent years the concerns regarding infection control have increased because several cases have reported spread various viral diseases from patients to doctor and vice versa.[2,3]

One of the problems encountered by doctors and clinical personnel is that most of infection carriers of diseases cannot be recognized easily because infested patients are ignorant of their condition. Occupational percutaneous wounds and damages and eye exposures by dental equipment during dental procedures have greatly enhanced risk of transmission of diseases which is why every patient should be considered infectious and standard precautions should be under taken.[4,5] It has been reported that infection control practices have a pivotal role in preventing and controlling microbial pollution and cross infection.[6] Moreover it is supported by many organizations e.g. Centers for Disease Control and Prevention and other health organizations.[7]

Infection control recommendations are not extensively recognized and used in developing countries.[1] Most hospitals have no infection control programs because of inadequate awareness and lack of properly qualified staff. Few studies on infection

[a,c,d] House Officer, Department of Orthodontics, Riphah International University
[b] Corresponding Author: BDS; FCPS; Professor, Department of Orthodontics, Riphah International University. Email: owais.durrani@riphah.edu.pk

control practices in a dental hospital in Islamabad have been carried out so far.

The goal of our research was to observe and document infection control practices and knowledge among house officers, demonstrators and postgraduate trainees working at Islamic International Dental Hospital Islamabad.

Material and Methods

Ethical approval from Riphah University's ethical committee was taken prior to the commencement of this study (Ref no. IIDC/IRC/2016/09/001). The sample consisted of house officers, demonstrators and postgraduate trainees. The total sample included 71 house officers and 40 post graduate trainees and demonstrators.

A Performa based on guidelines by center of disease control was filled by three standardized investigators observing the house officers, demonstrators and post graduate trainees without their knowledge while they would be treating a patient. The investigators noted down all the infection control practices practiced and not practiced by the house officers and trainees in Performa. Three investigators recorded the data over the period of two months.

Results

SPSS version 17.0 was used to analyze data. Descriptive data were ascertained (Table I and Figure 1 to 6). Levene's test for equality of variance was applied to check homogeneity of the groups. Independent t-test was used to check the statistical variance between means of Group A & B. The P-value equal to or less than 0.05 was considered significant for both Levene's and independent t test.

The P-value for Levene's test for equality of variance was P=0.102. Hence equal variances among the groups were assumed. Mean scores of two groups were compared with independent t test. significant difference (P=0.31) between the mean scores of House officers (13.3+ 2.5) and that of post graduate trainees and demonstrators (12.30+ 2.041) (P = 0.031) was found.

Table I: Mean scores of house officers and Post graduate trainees and demonstrators

	Rank	N	Mean	Std. Deviation	Std. Error Mean
TS	Ho	71	13.32	2.529	.300
	PGs and demos	40	12.30	2.041	.323

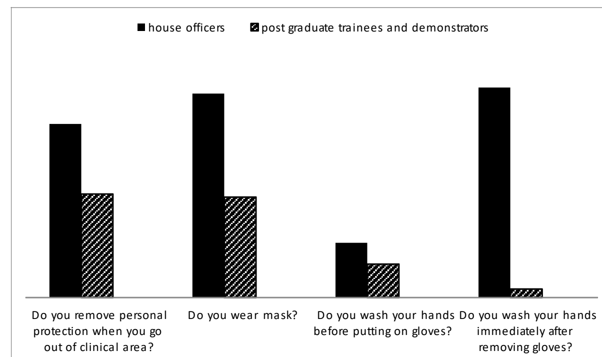

Figure 1: Percentage of house officers and post graduate trainees who remove Personal protection equipment before going out of clinical area, wear mask, wash their hands before putting on and after removing gloves

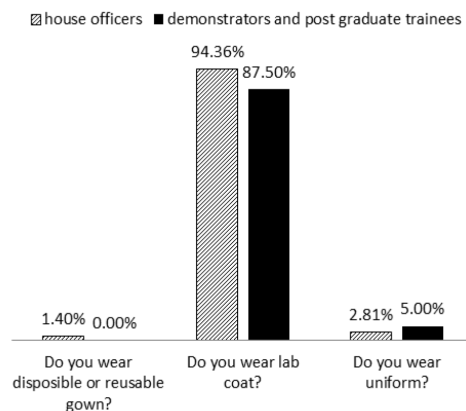

Figure 2: Percentage of house officers and post-graduate trainees who wear gown, lab coat or uniform

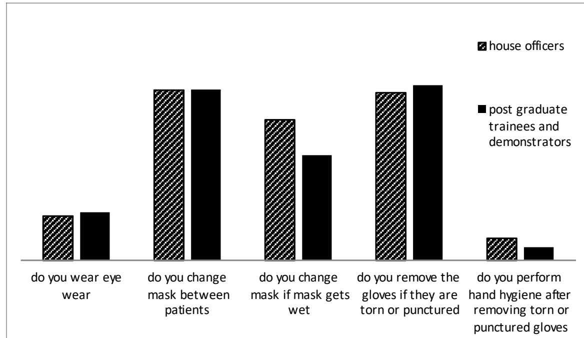

Figure 3: Percentage of house officers and post graduate trainees who wear eye wear, change masks between patients or when it gets wet, remove gloves when are torn and perform hand hygiene after removing torn gloves.

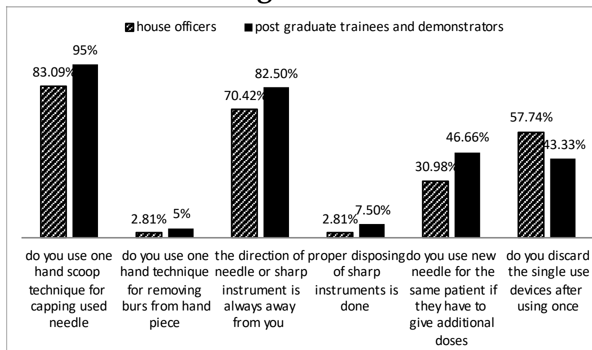

Figure 4: Percentage of house officers and post-graduate trainees who use one hand scoop technique for needles and burs, keep direction of needle away from one's self, dispose the sharp instruments properly, change the needle for additional doses for one patient, discard the single use devices after using once.

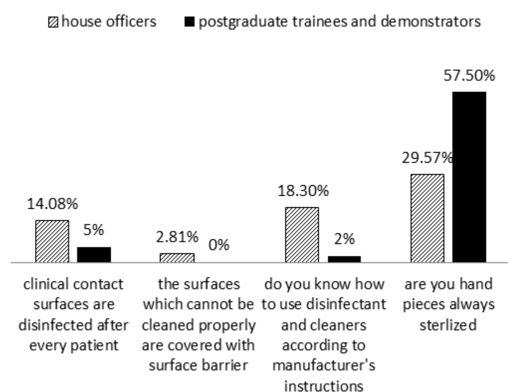

Figure 5: Percentage of house officers and Post graduate trainees who disinfect clinical contact surfaces after every patient, cover the clinical contact surfaces with surface barriers, use the disinfectant according to manufacturer's instructions and always sue sterilized hand pieces.

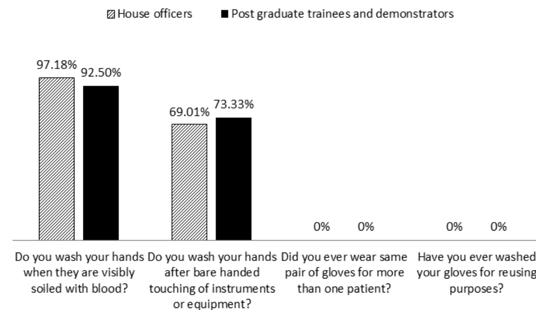

Figure 6: Percentage of house officers, post graduate trainees and demonstrators who wash their hands when they are visibly soiled with blood or after bare handed touching of instruments or equipment who wear same pair of gloves for more than one patients or wash their gloves for reusing purposes

Discussion

Infection control and prevention constitutes a significant part of training and practices for all health care professions.[8] Dental patients and practitioners are exposed to all sorts of pathogenic microorganisms.[9] For limiting the transmission of infectious pathogens sterilization and disinfection are crucial and necessary. All health care professionals should practice other infection prevention guidelines and practices along with sterilization and disinfection.[10]

In the current study, risky and perilous behavior was found among the dental practitioners observed. 74.64% house officers and 72.5 % post graduate trainees did not wash their hands before putting on gloves. In a previous study, Boyce et al. reported that non-compliance to washing hands of health care providers has association with spread of infections and multi-resistant organisms.[11]

Multiple studies have evidenced that wearing gloves is recommended while performing any

procedure but gloves can have small, unapparent defects which can go unnoticed and hands can get contaminated during the procedure. These conditions would increase the possibility of cross infection from patient to dental health care professional which is why hands should be immediately washed after removing gloves. Furthermore, bacteria need moist environment to multiply, condition beneath the gloves are favorable for the rapid division of the bacteria which is why hands should be meticulously dried before putting on gloves.[10,12-14]

94.36 % house officers and 82.5 % post graduate trainees wore masks during any procedure but only 42.29 % house officers and 27.5 % post graduate trainees changed their mask after every patient. According to recommended infection-control practices for dentistry, rotary dental hand pieces, ultrasonic scalers, surgical equipment and triple syringes may create spray and splash (containing drops of water, saliva, body fluids, microbes and other fragments) which is why mask and other personal protective equipment should be renewd for every patient. Recommended infection-control practices for dentistry defines single use devices or disposable instruments and equipment should be discarded and should not be recycled for use on another patient.

42.25 % house officers and 67.5% post graduate trainees and demonstrators didn't discard single use devices. Non reusable instruments in dentistry cannot be properly scrubbed or disinfected and generally are not heat-tolerant for sterilization. Examples include suction tips, syringe needles, plastic orthodontic brackets, plastic brushes for applying bonding agent, prophylaxis polish cups and brushes. Other devices like polishing hand pieces and air-water syringe tips should be sterilized after using once. Non reusable instruments and objects (e.g. suction tips, cups, surgical gauze, napkins and disposable syringes) should be new at the time of procedure. The washing of some devices (e.g. bar broaches, burs, and endodontic files) is challenging because of their construction. Beside, cutting surfaces of metallic instruments like carbide and diamond burs or endodontic files are weakened during cleaning which can lead to possibility of breakage of these instruments during procedures.[16] Endodontic instruments and burs show fatigue and deterioration during regular practice because of which they should be considered as single-use devices.[15-17]

70.42% house officers and 42.5% post graduate trainees and demonstrators said that their hand pieces are not sterilized after every patient. Gooch et al explained that hand pieces, tip of triple syringe and scaling tips that make contact with oral mucosa and remain connected to the dental unit waterline, should be considered as semi critical dental devices. Crawford, Mills and Lewis reported the possibility for pulling in and drawing back oral secretions into inner sections of hand pieces and saliva ejectors using dye expulsion. This indicates that retained patient's debris of the previous patient can be expelled intra-orally during following practices. Lewis and Boe et al reported the likelihood for preservation of sustainable virus inside both high and low speed hand pieces using laboratory models. The cleaning of hand pieces is imperfect due to their construction and limited physical access. Hence according to suggested infection-control methods, by Centers for Disease Control and Prevention, after every procedure water, air or combination of both should be expelled from 20-30 seconds from all dental equipment that remain joined to dental water-air system and contact patient's oral cavity.[15] Lewis and Boe et al reported that this technique helps in physical flushing out of patient's secretions that could have been reserved in air and waterlines.[18,19]

85.91 % house officers and 95 % post graduate trainees and demonstrators said that they do not clean clinical contact surfaces with

disinfectant after every patient. According to the Guidelines for Infection Control, the equipment that is permanently connected to dental unit waterlines can cause infection with retained oral fluids during following procedures. Components of dental chair that come in contact with patient (e.g. suction, handles of chair) should be covered with impermeable clinch. Before seating the next patient instant cleaning and disinfection with disinfectant should be done.[9]

Single-dose ampoules can cause contamination if they are pierced repetitively. The remaining substances of a single-dose ampoule should be thrown away and should not be joined with other medications for reuse purposes.[20] One use medication must not be used again or given to another patient even if the needle is new.[21]

Dental professional are at constant danger of getting infection from patients. Dentists, patients and dental staff are constantly susceptible to microorganisms residing inside oral cavity and it's vicinities which can be staphylococci, cytomegalovirus, herpes type 1 and 2, HBV, HCV and HIV. Direct (patient's saliva or blood) and indirect contact (wounds caused by sharp contaminated equipment during or after procedure) can cause transmission of microorganism to dental health care professional.[22]

Yüzbasioglu Et al carried out a detailed review of private dental setups in Samsun, Turkey to find and evaluate knowledge of dental practitioner's procedures used for the cross infection prevention. He reported that 95.60% of the participants believed that same precautions must be used for all patients because many patients are infectious and they don't know about it. But when it came to usage of barrier techniques, like placement of rubber da and mouth rinses before the procedure, these techniques were not commonly used.[1]

In another study Monarca et al found that only 56% of dental practitioners use polyethylene film for wrapping and covering the critical area.[23] which is similar to our study as only 14.08% house officers and 5 % post graduate trainees used barrier on clinical contact surfaces.

This research design was preferred due to restricted period and financial resources. The study was conducted in in only one institute of Islamabad. Another research with multi-sectoral teamwork should be done. Sample size and distribution of male and female participants should be calculated according to population of that area thus awareness and practice variation in male and females can also be assessed.

Conclusions

In the current study infection control practices and knowledge of house officers, demonstrators and postgraduate trainees working in Islamic International dental hospital Islamabad were assessed. It was found that generally most practitioners have knowledge regarding the infection prevention practices but they are not compliant in following protocols because of lack of time, equipment and patient flow. Seminars and workshops to ensure continuing medical education should be carried out after every six to twelve months

References

1. Yuzbasioglu E, Sarac D, Canbaz S, Sarac YS, Cengiz S. A survey of cross-infection control procedures: knowledge and attitudes of Turkish dentists. Journal of applied oral science : revista FOB 2009 Nov-Dec;17(6):565-9
2. Merchant VA. Herpesviruses and other microorganisms of concern in dentistry. Dental clinics of North America 1991 Apr;35(2):283-98
3. Update: transmission of HIV infection during invasive dental procedures. CMAJ: Canadian Medical Association Journal. 1992;146(4):519-21
4. Al-Maweri SA, Tarakji B, Shugaa-Addin B, Al-Shamiri HM, Alaizari NA, AlMasri O. Infection control: Knowledge and compliance among Saudi undergraduate dental students. GMS Hygiene and Infection Control. 2015 07/01;10:Doc10
5. Freire DN, Pordeus IA, Paixao HH. Observing the behavior of senior dental students in relation to

infection control practices. Journal of dental education 2000 May;64(5):352-6
6. Freeman SS, Lara GL, Courts MR, Wanzer LJ, Bibb SC. An evidence-based process for evaluating infection control policies. AORN journal. 2009 Mar;89(3):489-90, 93-507
7. Al-Rabeah A, Moamed AG. Infection control in the private dental sector in Riyadh. Annals of Saudi medicine 2002 Jan-Mar;22(1-2):13-7
8. Al-Omari MA, Al-Dwairi ZN. Compliance with infection control programs in private dental clinics in Jordan. Journal of dental education 2005 Jun;69(6):693-8
9. Kohn WG, Collins AS, Cleveland JL, Harte JA, Eklund KJ, Malvitz DM. Guidelines for infection control in dental health-care settings--2003. MMWR Recommendations and reports : Morbidity and mortality weekly report Recommendations and reports. 2003 Dec 19;52(RR-17):1-61
10. Olsen RJ, Lynch P, Coyle MB, Cummings J, Bokete T, Stamm WE. Examination gloves as barriers to hand contamination in clinical practice. Jama 1993 Jul 21;270(3):350-3 11. Boyce JM, Pittet D. Guideline for Hand Hygiene in Health-Care Settings. Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. Society for Healthcare Epidemiology of America/Association for Professionals in Infection Control/Infectious Diseases Society of America. MMWR Recommendations and reports : Morbidity and mortality weekly report Recommendations and reports. 2002 Oct 25;51(RR-16):1-45
12. Larson EL. APIC guideline for handwashing and hand antisepsis in health care settings. American journal of infection control 1995 Aug;23(4):251-69
13. DeGroot-Kosolcharoen J, Jones JM. Permeability of latex and vinyl gloves to water and blood. American journal of infection control 1989 Aug;17(4):196-201
14. Burke FJ, Baggett FJ, Lomax AM. Assessment of the risk of glove puncture during oral surgery procedures. Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics 1996 Jul;82(1):18-21
15. Rapisarda E, Bonaccorso A, Tripi TR, Condorelli GG. Effect of sterilization on the cutting efficiency of rotary nickel-titanium endodontic files. Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics 1999 Sep;88(3):343-7
16. Silvaggio J, Hicks ML. Effect of heat sterilization on the torsional properties of rotary nickel-titanium endodontic files. Journal of endodontics 1997 Dec;23(12):731-4
17. Bonetti Filho I, Miranda Esberard R, de Toledo Leonardo R, del Rio CE. Microscopic evaluation of three endodontic files pre- and post-instrumentation. Journal of endodontics 1998 Jul;24(7):461-4.
18. Lewis DL, Arens M, Appleton SS, Nakashima K, Ryu J, Boe RK, et al. Cross-contamination potential with dental equipment. Lancet (London, England). 1992 Nov 21;340(8830):1252-4
19. Lewis DL, Boe RK. Cross-infection risks associated with current procedures for using high-speed dental handpieces. J Clin Microbiol 1992 Feb;30(2):401-6
20. Green KA, Mustachi B, Schoer K, Moro D, Blend R, McGeer A. Gadolinium-based MR contrast media: potential for growth of microbial contaminants when single vials are used for multiple patients. American Journal of Roentgenology 1995 1995/09/01;165(3):669-71
21. Infection Control in Anaesthesia. Anaesthesia. 2008;63(9):1027-36
22. Bolyard EA, Tablan OC, Williams WW, Pearson ML, Shapiro CN, Deitchmann SD. Guideline for infection control in healthcare personnel, 1998. Hospital Infection Control Practices Advisory Committee. Infection control and hospital epidemiology 1998 Jun;19(6):407-63
23. Monarca S, Grottolo M, Renzi D, Paganelli C, Sapelli P, Zerbini I, et al. Evaluation of environmental bacterial contamination and procedures to control cross infection in a sample of Italian dental surgeries. Occupational and Environmental Medicine 2000;57(11):721-6

.