

Assessment Of Cross Infection Preventive Measures At A Dental Hospital In Lucknow City - A Cross Sectional Study

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Abstract

Introduction: Cross-infection can be defined as the transmission of infectious agents between patients and staff within a clinical environment. In a dental setup, transmission occurs through air, blood, saliva droplets, or improper sterilization of instruments. Despite various standardized protocols in infection control, dental undergraduate students fail to obey the same. Hence, the present study was conducted with an aim to assess cross infection preventive measures among undergraduate students of a dental college in Lucknow city. **Materials and methods:** A cross-sectional, closed ended questionnaire was prepared and distributed among interns, final-year and 3rd-year students in a dental college. The questionnaire comprised of 18 awareness based questions that includes knowledge, attitude and practices regarding cross infection preventive measures among undergraduate dental students. The Chi-square test was used to compare the results. **Results:** Out of 342 dental students, 38.9% students always preferred to change mouth masks between patients. 79% 3rd year, 43% final year and 53.8% intern students used to practice regular sterilization of instruments before sending it to laboratories. **Conclusion:** Awareness regarding infection control measures among undergraduate dental students was not deemed sufficient. Dental colleges should set up an infection control program before the commencement of clinical studies in the third year which should be periodically revised for improved understanding and long term effect establishment.

Key words: Cross Infection, Undergraduate dental students, Biomedical waste.

Introduction

Cross-infection can be defined as the transmission of infectious agents between patients and staff within a clinical environment.¹ Human oral cavity is vulnerable for transmission, inoculation, and development of agents that can be harmful to others. Therefore, transmission of various existing and emerging new infections can easily occur in dental clinics through various courses which include direct contact with blood, oral fluids, other secretions, indirect contact with contaminated instruments, operatory instruments, and contact with airborne contaminants present in either droplet splatter.²

As far as Dental Health Care Personnel (DHP) are concerned, they are potentially at more risk of infections caused by a wide range of causative organisms namely mycobacterium tuberculosis, hepatitis B & C virus, streptococci-staphylococci, herpes simplex virus type 1 (HSV 1), human immunodeficiency virus (HIV), influenza.³ According to the guiding principles of Centers for Disease Control and Prevention (CDC), it is mandatory to wear face mask and gloves after completion of dental procedures on a patient. Furthermore, CDC guidelines also recommend wearing

protective eye cover, properly disinfectant clothes before reuse. Moreover, after performing chair- side dental treatments, hands must be thoroughly washed with anti septic solution. ⁴

A considerable emphasis has been placed on standardized infection control measures, but unfortunately, only a few dentists seem to implement these procedures in their clinical practice.⁵ The other unfortunate thing is that in dental schools, future dentists have not adequately adhered to these protocols and hence, cross-contamination is more probable in them than the more experienced members of the dental team.⁶ Therefore, the purpose of the present study was to investigate awareness regarding cross infection preventive measures among undergraduate dental students of dental hospital in Lucknow city, Uttar Pradesh.

Materials & Methods

A cross sectional, questionnaire based study comprising an 18 point close ended self- administered questionnaire was prepared with the help of experts in the field and was conducted to assess cross infection preventive measures at a dental hospital in Lucknow city. Before the commencement of the study, ethical clearance was obtained from the Institutional Committee of Career Post Graduate Institute of Dental Sciences and Hospital, Lucknow.

On the basis of sample size calculation, the minimum representative sample size required for the study was 313. All the undergraduate dental students from 3rd year, final year and internship were included in the study sample. The sample comprised of 188 intern, 85 final years and 83 third year students forming a final sample of 356. Furthermore, the participant's anonymity was preserved. The results were then prepared using the information from the questionnaire. The questionnaire was divided into two sections; Section 1: It includes the personal information like (age, gender, year of study). Section 2: It comprised of 18 awareness based questions that includes knowledge, attitude and practices regarding infection control measures among undergraduate dental students.

A pilot study was conducted on 36 undergraduate dental students (12 students each from 3rd year, final year and internship) using a preformed proforma. It was done to check the validity of questionnaire and operational feasibility of the study. Cronbach's alpha was 0.76 and test-retest analysis showed a good reliability of study questionnaire. Undergraduate dental students who participated in pilot study were not included in the final study sample.

The inclusion criteria for the study were as follows:

1. Under graduate dental students (3rd year, final year and intern) present on the day of examination.
2. Under graduate dental students who gave consent and willing to participate in the study.

The returned and completed questionnaires were coded and entered into the computer using the Statistical Package for the Social Science (SPSS) software 23rd version. Data was presented in proportion and percentage for categorical data and mean standard deviation (S.D) for discrete. The Chi-square test was used to compare the results. The level of significance was set at $P \leq 0.05$. The responses obtained were tabulated and expressed as frequency distributions and then computed in percentages.

Results

A total of 356 dental students were selected for the study. Owing to incomplete information from 14 undergraduate students, only 342 students were considered in the final study sample. In the present study, internship students were maximum in proportion (53.2%), followed by 3rd year 81(23.7%) and final year 79 (23.1%).

Table 1 shows distribution of students according to infection control awareness items. The results showed majority of the students (98.5%) preferred to take medical history before the start of any dental procedures. The results revealed that out of 342 students, 239 students (69.9%) used to practice proper bio medical waste (BMW) disposal methods. Additionally, it was also observed that more than half of dental students (65.5%) had good knowledge regarding color coding for hospital waste management in India given by BMW management. Furthermore, it was also seen that almost all the students (90.9%) wished to attend workshops on infection control measures.

Table 1: Distribution of students according to Infection Control Awareness Items

Variable		No.	%
Do you take patient's medical history before starting any dental procedures?	Always	337	98.5%
	Sometime	3	0.9%
	Never	2	0.6%
The cotton gauge used during various treatment procedures can be disposed by	Open Area	26	7.6%
	Burnt	171	50.0%
	Dustbin	145	42.4%
Which gloves according to you are the most effective barrier against contaminants	Latex gloves	246	71.9%
	Nitrile gloves	66	19.3%
	Vinyl gloves	30	8.8%
Do you follow proper biomedical waste disposal methods (color coded dustbins)?	Yes	239	69.9%
	No	55	16.1%
	Sometimes	48	14.0%
Do you use special containers for disposal of sharp objects?	Always	198	57.9%
	Sometimes	100	29.2%
	Never	44	12.9%
How often do you change your masks between patients	Always	133	38.9%
	Sometimes	174	50.9%
	Never	35	10.2%
Do you wear protective eyewear while performing dental procedures?	Always	81	23.7%
	Never	82	24.0%
	Depending upon treatment	179	52.3%
How often do you wear face shield	Always	71	20.8%
	Never	82	24.0%

	Depending upon treatment	189	55.3%
Do you remove your watch, bracelet, rings and other hand accessories before treating patients	Yes	232	67.8%
	No	70	20.5%
	Sometimes	40	11.7%
Do you use sterilized drape	Yes	271	79.2%
	No	31	9.1%
	Sometimes	40	11.7%
Do you sterilize your instruments before and after being used with the patients?	Always	328	95.9%
	Never	2	0.6%
	Sometimes	12	3.5%
Do you know the methods used for recapping the needle	Scoop method	195	57.0%
	Hold with finger	83	24.3%
	Needle recapping device	64	18.7%
What do you do in case of contaminated needle stick injury	Wash hands with water	48	14.0%
	Wash hands with soap and water	72	21.1%
	Use an antiseptic solution	222	64.9%
Do you regularly disinfect items such as dental casts, denture prosthesis, wax rim before sending it to dental laboratory	Always	196	57.3%
	Sometimes	108	31.6%
	Never	38	11.1%
Do you know what is personal protective equipment or measures	Yes	314	91.8%
	No	28	8.2%
The color coding for hospital waste management in India given by BMW management	Yellow, Red, White, Black	224	65.5%
	Yellow, Blue, Green, Black	68	19.9%
	Red, White, Black, Green	50	14.6%
Have you attended any workshop on infection control measures in dental practice?	Yes	108	31.6%
	No	199	58.2%
	Did not remember	35	10.2%

Do you wish to attend workshops on infection control measures?	Yes	311	90.9%
	No	19	5.6%
	Don't know	12	3.5%

Table 2 depicts age wise association of undergraduate dental students with infection control awareness items. Statistical association was obtained between age and practice regarding disinfection of items by dental students before sending it to dental laboratory ($p= 0.001$). Moderate association was also found regarding practice to follow proper bio medical waste disposal methods ($p=0.020$), use of special sharp containers for sharp object disposal ($p= 0.014$).

Table 2: Association of Age with Infection Control Awareness Items.

Variable		Age				chi sq	p-value
		20 - 24 yr		25 - 29 yr			
		N	%	N	%		
Do you regularly disinfect items such as dental casts, denture prosthesis, wax rim before sending it to dental laboratory	Always	147	63.9%	49	43.8%	13.44	0.001
	Sometimes	59	25.7%	49	43.8%		
	Never	24	10.4%	14	12.5%		
Do you follow proper biomedical waste disposal methods (color coded dustbins)?	Yes	150	65.2%	89	79.5%	7.79	0.020
	No	41	17.8%	14	12.5%		
	Sometimes	39	17.0%	9	8.0%		
Do you use special containers for disposal of sharp objects?	Always	126	54.8%	72	64.3%	8.54	0.014
	Sometimes	66	28.7%	34	30.4%		
	Never	38	16.5%	6	5.4%		

Table 3 illustrates gender wise association of undergraduate dental students with infection control awareness items. Statistical association was obtained between gender and practices such as taking of medical history before starting any dental procedure ($p=0.005$), wearing of eyewear during dental treatment by undergraduate dental students ($p=0.018$).

Table – 3 : Association of gender with Infection Control Awareness Items

Variable		Gender				chi sq	p-value
		Male		Female			
		N	%	N	%		
Do you take patient's medical history before starting any dental procedures?	Always	107	95.5%	230	100.0%	10.42	0.005
	Sometimes	3	2.7%	0	0.0%		
	Never	2	1.8%	0	0.0%		
Do you wear protective eyewear while performing dental procedures?	Always	37	33.0%	44	19.1%	8.07	0.018
	Never	24	21.4%	58	25.2%		
	Depending upon treatment	51	45.5%	128	55.7%		

Table 4 shows association of year of study with infection control awareness items. The results revealed that practices of undergraduate dental students in dental clinic such as biomedical wastes disposal methods, disposal of sharp objects in special containers and disinfecting of items such as dental casts, denture prosthesis wax rim etc were found highly significant ($p<0.001$) with year of study of undergraduate dental students.

Table – 4 : Association of Year of Study with Infection Control Awareness Items

Variable		Year of Study						chi sq	p-value
		3rd year		Final year		Intern			
		N	%	N	%	N	%		
Do you follow proper biomedical waste disposal methods (color coded dustbins)?	Yes	62	76.5%	40	50.6%	137	75.3%	21.14	<0.001
	No	11	13.6%	24	30.4%	20	11%		
	Sometimes	8	9.9%	15	19%	25	13.7%		
Do you use special containers for	Always	54	66.7%	30	38.0%	114	62.6%	25.06	<0.001
	Sometimes	15	18.5%	30	38.0%	55	30.2%		

disposal of sharp objects	Never	12	14.8%	19	24.1%	13	7.1%		
Do you regularly disinfect items such as dental casts, denture prosthesis, wax rim etc before sending it to dental laboratory?	Always	64	79.0%	34	43.0%	98	53.8%	28.57	<0.001
	Sometimes	11	13.6%	29	36.7%	68	37.4%		
	Never	6	7.4%	16	20.3%	16	8.8%		

Discussion

In dentistry, preventing cross infection has always been of utmost concern. It is regarded as the gold standard for dental institution's personnel and students as well as for patient safety. Dental health professional are at long risk of impairing the immune system because of deadly transmissible infections. This decline in the health by transmission of germs occurs due to lack of awareness and practice about various infection control measures. Hence, this study was conducted with an aim to assess cross infection prevention measures at a dental hospital in Lucknow city. A total of 342 undergraduate dental students were included in the study. The age of the participants ranged from 20 years to 29 years. Majority of the dental students were females (67.3%) followed by males (32.7%), which was similar to the study conducted by Halboub et al (2015)¹. Internship students were maximum in proportion (53.2%), followed by 3rd year (23.7%) and final year (23.1%) students.

In the coeval study, majority of the students (98.5%) preferred to take medical history before the commencement of any dental procedures which was similar to the study conducted by Hindawy GE et al (2021)⁷ where they reported 94.7% students aware of taking medical history before any dental procedures. Basic information on medical history while recording case history are considered crucial for treatment planning, drug administration and helps in dealing with complications and also aids in dealing with various drug allergies which make them concerned about the importance of taking medical history prior to commencement of any dental procedure.

For protection of personnel and patients in dental-care settings, medical gloves must be worn by Dental Health Care Workers (DHCWs) when there is potential for contacting blood, blood contaminated saliva, or mucous membranes. Gloves made with nitrile exhibit greater material stiffness. Compared to latex gloves, medical examination gloves consisting of nitrile and neoprene demonstrated a 10 times greater bacterial transit via a conventional puncture. In the current study, 71.9% believed that latex gloves were the most effective barrier against contaminants which was similar to the study conducted by Bobu LI et al (2021)⁸ where they reported 70% students preferred latex powdered gloves.

More than half of the participants, i.e. (57.9%), in the present study preferred to dispose sharp objects in special containers. Akin to this, Kamran MA et al (2022)⁹ reported that 53.1% dental students were aware of disposing of sharp objects in special containers (puncture resistant plastic bags). Also, 55.4% male and 59.1% female used special containers for sharp objects disposal. Contrasting results have been reported by Mandourh S et al (2017)¹⁰ where they reported 91.5% male and 83.3% female preferred safety box for disposal of sharp objects. This can be ascribed to the fact that students were aware of the importance of safety measures to reduce the risk of needle stick injuries which provide significant occupational risks for the spread of numerous blood borne infections, including hepatitis B virus, hepatitis C virus and AIDS among dental health care workers.

In the concurrent study, it was observed that practice of biomedical waste disposal methods were higher among 3rd year students (76.5%) followed by interns (75.3%) and final year (50.6%). The results obtained were highly significant ($p < 0.001$) between year of study and practice of bio medical waste disposal methods.

Similarly, when comparison was made between academic year and practices including use of special containers for sharp object disposal, switching out mask between patients, wearing of face shield, and disinfecting prosthetic items before sending them to dental laboratories; the results came out to be highly significant ($p < 0.001$). Additionally, moderately significant association were also obtained between year of study and practice to sterilize drape and attitude of dental students after contaminated needle stick injuries (i.e. $p = 0.046$ and $p = 0.045$ respectively).

Conclusion

In the current study, awareness regarding cross infection preventive measures among undergraduate dental students was not found satisfactory. There is need to conduct continuous based infection control lectures and training to improve level of knowledge regarding the subjects. Additionally, every dental institute/ hospital should set up infection control measures in accordance with the guidelines and vaccination should be made mandatory especially Hepatitis B for students prior to admission to these institutes. Cross infection preventive measures practiced by students in clinics should be evaluated periodically to accomplish the goal of infection free practice.

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Conflicts of interest

There are no conflicts of interest

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