Infection control practices among undergraduate students from a private dental school in India

Práticas de controle de infecção entre estudantes de Odontologia de uma instituição privada na Índia

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Abstract

Purpose: To investigate compliance with recommended infection control procedures among junior and senior dental students from a private dental school in India.

Methods: The study sample comprised 142 (76 males and 66 females) junior and senior dental students from a private dental institution located in Udaipur city, India. A self applied, closed ended questionnaire (response as 'yes' or 'no') was used to collect data. The questionnaire consisted of 15 items related to medical history taking, vaccination status, barrier techniques, and infection control practices.

Results: Only one tenth of the subjects (9.9%) reported adherence to all infection control procedures. Barely one tenth of the population surveyed used plastic wrappings for sterilized instruments, and approximately three fourths of the subjects were vaccinated against Hepatitis B. Changing of face masks and handpieces between patients was reported by 21.7% and 24.6% of senior students, respectively, in contrast to 1.4% and 8.3% of the junior students.

Conclusion: The undergraduate students at this private dental institution in India exhibited poor infection control practices. These findings show the need to change organizational and administrative procedures to enable dental students to follow a strict infection control protocol.

Key words: Infection control; practice; Hepatitis B; dental students

Resumo

Objetivo: Investigar a adoção de procedimentos de controle de infecção por estudantes de Odontologia de uma faculdade privada na Índia.

Metodologia: A amostra constituiu-se de 142 (76 homens e 66 mulheres) alunos de Odontologia do terceiro ano e do último ano de uma faculdade privada na cidade de Udaipur, Índia. Um questionário autoaplicado com respostas fechadas (respostas "sim" ou "não") foi utilizado para coletar os dados. O questionário consistiu de 15 perguntas relacionadas à obtenção da história médica, estado de vacinação, técnicas para barreiras e práticas de controle de infecção.

Resultados: Apenas um décimo dos sujeitos (9,9%) aderiu a todos os procedimentos de controle de infecção. Quase 10% relataram uso de envoltórios plásticos para instrumentos esterilizados e aproximadamente três quartos dos sujeitos foram vacinados contra hepatite B. Troca de máscaras e de peças de mão esterilizadas entre pacientes foi relatada por 21,7% e 24,6% de estudantes do último ano da faculdade, respectivamente, em contraste com 1,4% e 8.3% dos alunos do terceiro ano.

Conclusão: Os alunos de Odontologia desta faculdade privada na Índia exibiram deficiência de práticas de controle de infecção. Estes resultados mostram a necessidade de mudar os procedimentos organizacionais e administrativos para possibilitar que os estudantes de Odontologia sigam um protocolo rigoroso de controle de infecção.

Palavras-chave: Controle de infecção; prática; hepatite B; estudantes de Odontologia

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Introduction

In Dentistry, there is a major effort to re-evaluate the methods adopted to maintain sterilization in the clinical environment. The upsurge of new diseases such as AIDS and the recrudescence of diseases such as tuberculosis, hepatitis B, C, and D, and other maladies have made it essential that strict sterilization be accomplished and maintained (1).

During dental procedures, dentists and their patients are at risk from a range of pathogenic microorganisms including cytomegalovirus, hepatitis- B/C virus (HBV and HCV), Herpes simplex virus types 1 and 2, human immunodeficiency virus (HIV), Mycobacterium tuberculosis, streptococci, transmissible spongiform encephalopathies (including variant CJD), Methicillin-resistant Staphylococcus aureus (MRSA), and severe acute respiratory syndrome (SARS) virus (2-6). There is an increase in occurrence of antimicrobial-resistant bacteria within hospital environment, which subsequently represent a growing healthcare problem (7).

Most exposures are accidental and can be avoided by adopting safety work practices and following infection control guidelines. However, because some exposures are not preventable, immunization and appropriate post exposure management become key defense procedures. As healthcare students have increasing patient contact during their education and clinical training, they are at high risk for exposure to pathogens. It is the responsibility of academic institutions to facilitate appropriate preclinical immunization and provide infection control training to protect patients and students, and to educate the future healthcare professionals in safety work practices. Studies monitoring occupational injuries and infection control practices among students and healthcare workers are necessary to assess the efficacy of infection control training and help to develop educational interventions to improve adherence to guidelines and reduce injuries.

The objectives of this study were to investigate compliance with recommended infection control procedures reported by undergraduate dental students pursuing their career at a private dental institution in India. Furthermore, the present cross-sectional survey will serve as a preliminary assessment of the local needs for the development of interventions to improve infection control practices at this institution.

Methods

The study sample was drawn from the population of undergraduate dental students of Darshan Dental College and Hospital affiliated with the Rajasthan University of Health Sciences, India, during the academic year 2007-2008. The research protocol was approved by the Ethics Committee of the Darshan Dental College and Hospital, and informed consent was obtained from each participant.

All undergraduate students in their clinical years (third and fourth/final year, *e.g.*, junior and senior students, respectively) who were present on the days of the survey were included; no attempt was made to further invite the students absent during the survey days. The subjects who did not fill the questionnaires completely were excluded. From a total of 186 students (94 junior and 92 senior students), 72 junior students (38 males and 34 females) and 70 senior students (38 males and 32 females) participated in the investigation; thus, 142 students (76 males and 66 females) anonymously completed the study questionnaire in their classrooms before the routine lectures. The age of the subjects ranged from 19 to 22 years (mean age of 20.08±0.72 year-old).

A single investigator (SK) distributed the questionnaires, and the purpose of the study was communicated verbally. The student participation in the research was voluntary with no incentives declared. The instrument used in the present study was based on the self applied questionnaire used in a past survey (8), which contained 15 closed ended items related to infection control practices; participants were asked to answer each questionnaire item as "yes" or "no".

Data collected was analyzed using Statistical Package for Social Sciences (SPPS 15.0). Frequencies for each question were analyzed and Fisher exact analysis was used to assess the differences in infection control practices according to the student year of study and gender. A significance level of 0.05 was adopted for all tests.

Results

The overall response rate in the present study was 76.3%. Table 1 shows that the highest compliance rates to infection control guidelines were reported for wearing and changing gloves between patients (99.3%) followed by medical history taking (97.9%) and face mask wearing (96.5%). However, very few subjects reported changing face masks between patients. Barely one tenth of the population surveyed used plastic wrappings for sterilized instruments, and approximately three fourths of the subjects were vaccinated against Hepatitis B. More than one tenth of the sample reported that they did not change extraction instruments between patients and only 69.5% changed saliva ejectors. Rubber dam was used by 29.8% of the subjects, while no more than 68.8% subjects disposed sharp objects in a special container.

Table 1. Reported adherence to various infection control procedures among dental students.

Infection control practice	Yes	No
Asking about medical history	138 (97.9%)	3 (2.1%)
Vaccination for hepatitis B	106 (75.2%)	34 (24.8%)
Gloves wearing	140 (99.3%)	1 (0.7%)
Changing gloves after each patient	140 (99.3%)	1 (0.7%)
Face mask wearing	136 (96.5%)	5 (3.5%)
Face mask changing between patients	16 (11.3%)	125 (88.7%)
Changing extraction instruments	125 (88.7%)	16 (11.3%)
Changing hand pieces	23 (16.3%)	118 (83.7%)
Changing saliva ejectors	98 (69.5%)	43 (30.5%)
Changing burs	29 (20.6%)	112 (79.4%)
Use of autoclave for sterilization of hand pieces	29 (20.6%)	112 (79.4%)
Use of plastic wrappings for sterilized instruments	14 (9.9%)	127 (90.1%)
Disinfect impressions	38 (27.0%)	103 (73.0%)
Use of rubber dam	42 (29.8%)	99 (70.2%)
Use of special container for disposal of sharp objects	97 (68.8%)	44 (31.2%)

Table 2. Adherence to various infection control procedures among dental students according to year of study and gender.

	By Year of Study			By Gender		
	3rd year % (N)	4th year % (N)	*P*	Male % (N)	Female % (N)	*P*
Asking about medical history						
Yes	97% (70)	98.5% (68)	0.586	98.7% (75)	96.9% (63)	0.472
No	3% (02)	1.5% (1)		1.3% (1)	3.1% (2)	
Total	(72)	(69)		(76)	(65)	
Vaccination for hepatitis B						
Yes	72.2% (52)	78.2%(54)	0.408	78.9% (60)	70.8% (46)	0.264
No	27.8% (20)	21.8% (15)		21.1% (16)	29.2% (19)	
Total	(72)	(69)		(76)	(65)	
Gloves wearing						
Yes	100 % (72)	98.5% (68)	0.307	98.7% (75)	100% (65)	0.280
No	0% (0)	1.5% (1)		1.3% (1)	100% (0)	
Total	(72)	(69)		(76)	(65)	
Changing gloves after each patient						
Yes	100% (72)	98.5% (68)	0.307	98.7% (75)	100% (65)	0.280
No	0% (0)	1.5% (1)		1.3% (1)	100% (0)	
Total	(72)	(69)		(76)	(65)	
Face mask wearing						
Yes	98.6% (71)	94.2% (65)	0.157	97.4% (74)	95.4% (62)	0.527
No	1.4% (1)	5.8% (4)		2.6% (2)	4.6% (3)	
Total	(72)	(69)		(76)	(65)	
Face mask changing between patients						
Yes	1.4% (1)	21.7% (15)	0.000	15.8% (12)	6.1% (4)	0.073
No	98.6% (71)	78.3% (54)		84.2% (64)	93.9% (61)	
Total	(72)	(69)		(76)	(65)	
Changing extraction instruments						
Yes	97% (70)	79.7% (55)	0.001	84.2% (64)	6.1% (61)	0.073
No	3% (2)	20.3% (14)		15.8% (12)	93.9% (4)	
Total	(72)	(69)		(76)	(65)	
Changing hand pieces						
Yes	8.3% (6)	24.6% (17)	0.009	15.8% (12)	16.9% (11)	0.856
No	91.7% (66)	75.4% (52)		84.2% (64)	83.1% (54)	
Total	(72)	(69)		(76)	(65)	
Changing saliva ejectors						
Yes	81.9% (59)	56.5% (39)	0.001	68.4% (52)	70.8% (46)	0.764
No	18.1% (13)	43.5% (30)		31.6% (24)	29.2% (19)	
Total	(72)	(69)		(76)	(65)	
Changing burs						
Yes	20.8% (15)	20.3% (14)	0.937	22.4% (17)	18.5% (12)	0.569
No	79.2% (57)	79.7% (55)		77.6% (59)	81.5% (53)	
Total	(72)	(69)		(76)	(65)	
Use of autoclave for sterilization of hand pieces						
Yes	25% (18)	16% (11)	0.185	25% (19)	15.4% (10)	0.161
No	75% (54)	84% (58)		75% (57)	84.6% (55)	
Total	(72)	(69)		(76)	(65)	
Use of plastic wrappings for sterilized instruments						
Yes	8.3% (6)	11.6% (8)	0.519	14.5% (11)	4.6% (3)	0.050
No	91.7% (66)	88.4% (61)		85.5% (65)	95.4% (62)	
Total	(72)	(69)		(76)	(65)	
Disinfect impressions						
Yes	19.4% (14)	34.8% (24)	0.041	36.8% (28)	15.4% (10)	0.004
No	80.6% (58)	65.2% (45)		63.2% (48)	84.6% (55)	
Total	(72)	(69)		(76)	(65)	
Use of rubber dam						
Yes	30.6 % (22)	29%(20)	0.839	36.8% (28)	21.5% (14)	0.048
No	69.4 % (50)	71% (49)		63.2% (48)	78.5% (51)	
Total	(72)	(69)		(76)	(65)	
Use of special container for disposal of sharp objects						
Yes	75% (54)	62.3% (43)	0.105	72.4% (55)	64.6% (42)	0.324
No	25% (18)	37.7% (26)		27.6% (21)	35.4% (23)	
Total	(72)	(69)		(76)	(65)	

Subjects were considered compliant if they adhered to the complete list of infection control procedures described in the questionnaire (Table 1). Thus, only one tenth of the subjects (9.9%) adhered to all infection control practices.

Fisher exact tests showed that there were only four infection control procedures that differed significantly between the years of study. Changing face masks and hand pieces between patients was reported by 21.7% and 24.6% of the senior students, respectively, in comparison with 1.4% and 8.3% of the junior subjects. However, more junior students reported that they used to change extraction instruments and saliva ejectors than the senior students.

When the effect of gender was assessed, male students significantly reported more use of rubber dam, disinfection of impressions, and plastic wrappings for sterilized instruments. Though more males reported changing face mask and extraction instruments between patients, the gender difference was close to statistical significance.

Discussion

The most susceptible people to infectious diseases in the work environment are healthcare professionals. The dental professional is repeatedly exposed to many microorganisms present in blood and saliva. As a consequence, the incidence of certain infectious diseases is higher among dental professionals than observed for the general population. Infection in the dental practice may result from direct contact with blood, oral fluids, and other secretions or from indirect contact with contaminated instruments, operatory equipment, and environmental surfaces. It may even occur due to contact with airborne contaminants, droplets, splatter, and aerosols. Thus, dental professionals are at a greater risk of acquiring and spreading infections, which requires the implementation of infection control guidelines.

Dental students are the future dental professionals, who will provide oral healthcare for the population. They tend to practice the infection control procedures they acquired during training at the dental school. Thus, the present study investigated the compliance with recommended infection control procedures by dental students pursuing their career at Darshan Dental College and Hospital, which is located in Udaipur city, India. This survey also aimed to help the development of educational interventions to improve infection control practices at this institution.

The students at the present dental institution attend lectures on infection control during the second year of their undergraduate course. Practice guidelines are received in the third and fourth years during clinical training. Moreover, a standard infection control protocol is adopted at the institution, and the clinical faculty should pay attention to the student adherence to the recommended infection control practices.

The results of this survey were somewhat alarming as only one tenth of the students was fully compliant with the recommended infection control guidelines. However, for many of the infection control practices, such as medical history taking, use of barriers and clothing, and hepatitis B vaccination, the dental students of the present study were more compliant than the private dentists in Jordan (7), which reported 13.6% of compliance to infection control guidelines.

The highest level of compliance was found for wearing gloves (99.3%) and face masks (96.5%), which is similar to the frequency of 100% for gloves usage among dental faculty and dental nurses in Jordan (9). However, only 78% and 59% of the dental practitioners in Haryana, India, reported that they used gloves and face masks, respectively (10). Furthermore, the use of face masks and hand gloves and the autoclaving of hand pieces were more frequent in present study population than among Saudi Arabia dentists, who reported that 92% used a new pair of gloves for each patient, 85.32% wore face masks, and 27.14% sterilized hand pieces in autoclave after each patient (1).

Medical history was regularly taken by most subjects, which is in accordance with a past study (11). Approximately three quarters of the dental students were vaccinated against Hepatitis B; this vaccination rate is similar to that reported among dentists in Saudi Arabia (63.5%) (12), but lower than the rates in Scotland (88%) (13) and in Canada (92.3%) (14).

Although all the dental students were expected to replace sterilized extraction instruments, saliva ejectors, and hand pieces between patients to prevent cross contamination, very few subjects reported the routine practice of these procedures. In Jordan, 96% of the dentists reported that they changed burs and extraction instruments.

Despite the fact that no significant gender differences were found for most of the infection control procedures, more male subjects reported compliance to standard protocols than females, which differs from previous studies in other settings (15-17). Likewise, year of study also failed to show any influence on infection control practices, but junior students were more acquiescent than their senior counterparts. This might be due to the greater load of clinical work for the senior students, which demands them to treat the maximum number of patients to complete the required quota to be eligible for graduation.

Some limitations of the present study should be acknowledged. This survey was conducted in a single institution and thus the results cannot be generalized to all dental students in India. However, these findings would be useful for planning additional educational interventions and improving the infection control protocol at this institution.

Conclusions

In conclusion, the dental undergraduate students at this private dental institution in India reported poor infection control practices, which require changes in organizational and administrative factors to enable students to follow a strict infection control protocol. Moreover, as the senior students reported low compliance to infection control guidelines, the dental curriculum and grade system should be revised to evaluate overall quality of care and not only quantity of patients treated per student.

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