Knowledge and performance of dental students with regard to infection control guidelines in Dental School of Mazandaran University of Medical Sciences in 2015

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ABSTRACT

Dentists are at risk of infectious diseases and dental offices can serve as a source of infection transmission if the infection control guidelines are not properly implemented. Adherence to infection control principles can help prevent disease transmission. This study sought to assess the level of knowledge and performance of dental students with regard to infection control principles in dental clinics of School of Dentistry, Mazandaran University of Medical Sciences. This study was conducted on 87 dental students. Data were collected using a 9-question questionnaire and a 16-item checklist. The data were analyzed using SPSS version 21 and descriptive statistics by calculation of mean and standard deviation (SD), t-test, Chi square test, Kruskal Wallis test and the Spearman's correlation coefficient. Level of significance was set at P=0.05.Of subjects, 100% were wearing sterile gloves and changed them for each patient, collected and disposed wastes after examination or treatment of each patient, capped the needle after anesthetic injection and changed the dental suction tip; 94% were wearing a mask and changed it for each patient; 89% were wearing clean white coats. The level of knowledge of students was found to be moderate. Also, the performance of students with regard to infection control principles was found to be very good probably due to the rules and regulations set by the dental school departments.

Key words: Knowledge, Infection control, Dentists, Student
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INTRODUCTION

Health care services are associated with the potential risk of infection transmission if infection control principles are not properly implemented [1].Dental health services are a branch of health care [2]. Various diseases such as infectious diseases threatens dentists such of this diseases are neck pains [3], waist pains [4] and infectious diseases [5].Dental services are no exception to this rule. Infectious diseases caused by bacteria, viruses or fungi are a threat to the health of dentists and office staff and can result in infection transmission via cross-contamination [6,7].

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Hepatitis B virus [7] and human immunodeficiency virus (HIV), which causes acquired immunodeficiency syndrome (AIDS) [8] are among the most hazardous infectious agents.

Based on the statistics published in 2006, approximately 360 million and 12 million patients worldwide suffer from hepatitis B and syphilis, respectively. They serve as a source of infection and can transmit the disease to healthy individuals [9]. More attention is now paid to HIV infection, emerged in 1980s [8-15]. In 2006, there were 60 million HIV patients worldwide [9]. These diseases are transmitted through blood, tissue residues, infected aerosols or sharp cutting instruments [16]. Dentists and dental staff are at high risk of infection transmission since they work with sharp cutting instruments [17,18]. Studies have shown that risk of hepatitis B infection in dentists is 57 times the risk of AIDS (19) and three times the risk of general population [20].

Despite extensive instructions provided for dentists and dental staff with regard to the importance of adherence to infection control principles, the quality of infection control has reported to be poor even in developed countries [21-24].

Veronesil et al, in their study in Italy evaluated the knowledge and attitude of dentists towards infection control and concluded that their study population had good level of knowledge about the risks associated with dental practice and infection control protocols [25]. Duffy et al. reported that 89% of dentists in Romania believed that gloves were effective to prevent infection transmission; however, only 24% of them changed their gloves for each patient [26]. Montagna et al. stated that dental personnel did not well adhere to infection control protocols and concluded that their study subjects did not take the risks of infection transmission (especially via inhalation) very seriously [27]. McCarthy et al. found that dentists working in the suburbs of metropolitans were not well prepared for treatment of patients with high risk of infection transmission [28]. Several studies have been conducted in Canada, Jordan, India, China and Iran among dentists, laboratory technicians and students and all of them showed poor knowledge of dentists about principles of infection control [29-36].

Haghanifar and Heidari evaluated the knowledge of dentists about principles of disinfection and sterilization in Sari city using a questionnaire and reported the mean score of knowledge acquired by male and female dentists to be 8.11 and 3.12 out of 20, respectively. Also, the mean knowledge score of dentists with work experience less than 5 years was higher than that of more experienced dentists [37].

The prevalence of infectious diseases can be decreased by strict adherence to infection control measures. Wearing gloves, mask and white coat when working and taking them off when leaving the procedure room, use of sterile syringe and hand pieces and disposable instruments and washing hands before and after changing the gloves are among the main principles of infection control, which can help prevent cross-contamination in dental setting [38].

Considering the importance of this topic and the superiority of prevention to control, which has been set as a priority in the health care system general policies, this study sought to assess the level of knowledge and performance of dental students with regard to infection control principles in School of Dentistry of Mazandaran University of Medical Sciences to provide information for targeted health strategy planning.

MATERIALS AND METHODS

This practical, analytical, cross-sectional study was conducted on 110 third, fourth, fifth and sixth year dental students in School of Dentistry of Mazandaran University of Medical Sciences. Maximum sample size was calculated to be 87 using Kerjesiand Morgan's table for determining sample size. Subjects were randomly selected. A questionnaire was used to assess the knowledge and a checklist was used to evaluate the performance of students with regard to infection control guidelines. One of the authors presented to the university clinics and filled out the checklist by observation with no intervention. The questionnaires were then administered among dental students and collected soon after they were filled out to prevent students from discussing the answers with each other. The field project took one month. The checklist was filled out prior to the administration of the questionnaires since the reverse order could cause bias and direct patients towards paying more attention to infection control measures.

The questionnaire included two sections: A demographic section including sex and academic entry year of dental students and a second section, which included 3 performance and 6 knowledge questions. The questionnaire was researcher-designed. Correct answer to each question was allocated a score of 1 and a wrong answer was allocated

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zero scores. Thus, the total score was in the range of zero to 9. Students who answered correctly to less than 50% of questions were categorized as having poor knowledge, those giving a correct answer to 50-75% of the questions were categorized as moderate and those giving a correct response to over 75% of the questions were categorized as having good level of knowledge. To assess the validity (content validity) of the questionnaire, an 11-question questionnaire was administered among the infection control instructors of the university. They evaluated the questions and reported that one of the questions did not have adequate validity and was therefore excluded. Eventually, validity of a 9-question questionnaire was confirmed. To assess reliability, the designed questionnaire was administered among 10 dental students (equal number of males and females who were not among our study population) and they were requested to fill it out in two sessions with a two-week interval and the agreement between their responses in the two sessions was evaluated. The Cronbach's alpha coefficient of reliability was calculated to be 83%.

The checklist used in this study was also designed by the authors and covered 16 principles of infection control including wearing a clean white coat, wearing sterile gloves, wearing a new pair of gloves for each patient, wearing protective eyeglasses and gown whenever required, changing the gown for each patient, collecting and disposing the waste after treatment, washing hands before and after work (for each patient), capping the needle before and after anesthetic injection, changing the dental suction tip for each patient and not pulling the mask under the chin.

The collected data were analyzed using SPSS version 21. The correlation of level of knowledge with practice of infection control guidelines was assessed. The data were analyzed using descriptive statistics and mean and SD values were calculated. The t-test, Chi square test, Kruskal-Wallis test and Spearman's correlation coefficient were used for statistical analysis of data as well. Level of significance was set at $P=0.05$.

RESULTS

This study was conducted on 87 third to sixth year dental students in Mazandaran School of Dentistry. Of participants, 57% were females and 43% were males; 4 (4.6%) dental students were foreign graduates attending a complementary course of dental education, 7 (8%) were sixth year, 19 (21.8%) were fifth year, 26 (29.9%) were fourth year and 31 (35.6%) were third year dental students.

Averagely, 65% of females and 55% of males correctly responded to knowledge questions and 67% of females and 66% of males gave correct answers to practice questions. Thus, overall, females had a higher mean knowledge score than males (66% versus 60%).

In general, the third question (no limitation in infection control principles for different patients) gained the highest (n=84) and question one gained the lowest (n=33) frequency of correct answers. Table 1 shows the mean scores of knowledge and performance questions acquired by male and female students (based on their academic year).
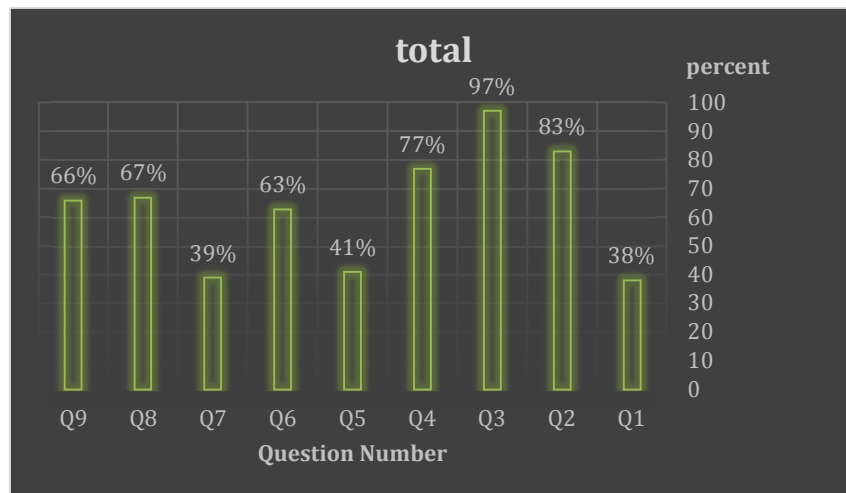

Figure 1. Total number of students that gave a correct answer to each question

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Table 1. The mean scores of knowledge and performance questions acquired by male and female students (based on their academic year)

Academic entry year	Sex		Number	Mean	Standard deviation
Complementary dental education students	Female	Total	2	5.5000	.70711
		Performance		2.0000	.00000
		Knowledge		3.5000	.70711
	Male	Total	2	5.5000	.70711
		Performance		2.5000	.70711
		Knowledge		3.0000	.00000
2009	Female	Total	3	6.6667	1.15470
		Performance		3.3333	.57735
		Knowledge		3.3333	.57735
	Male	Total	4	5.7500	1.50000
		Performance		3.0000	.81650
		Knowledge		2.7500	.95743
2010	Female	Total	11	5.6364	1.12006
		Performance		2.7273	.90453
		Knowledge		2.9091	.70065
	Male	Total	8	5.0000	.92582
		Performance		2.1250	.83452
		Knowledge		2.8750	.64087
2011	Female	Total	15	6.4667	1.50555
		Performance		3.0000	.92582
		Knowledge		3.4667	.91548
	Male	Total	11	5.8182	1.53741
		Performance		3.4545	.82020
		Knowledge		2.3636	.92442
2012	Female	Total	19	5.6316	1.46099
		Performance		2.3684	.83070
		Knowledge		3.2632	1.04574
	Male	Total	12	5.0833	1.44338
		Performance		2.1667	.71774
		Knowledge		2.9167	1.31137

In terms of level of knowledge, subjects were divided into three groups of poor (less than 50% correct answers), moderate (50-75% correct answers) and good (over 75% correct answers). In general, 18% (7 females and 10 males) had poor, 74% (38 females and 25 males) had moderate and 8% (5 females and 2 males) had good level of knowledge about infection control.

In our study, 100% of subjects were wearing sterile gloves, changed their gloves for each patient, collected and disposed wastes after patient treatment or dental examination, capped the needle before and after anesthetic injection and changed the dental suction tip for each patient. Of all, 94% were wearing a protective mask and changed it for each patient; 31% did not pull the mask under their chin; 89% were wearing clean white coats. Of the remaining who were not wearing a clean white coat, 9% were working in the radiology and endodontics departments and 2% were working in the department of prosthodontics.

With regard to wearing a protective gown, of 10 dental students in periodontics department, none were wearing a gown; 19 dental students were in the oral and maxillofacial surgery department who were wearing a gown and reported changing it for each patient. A total of 74% were wearing protective eyeglasses; 10% (8 students from the class of 2011 and one student of complementary education course) washed their hands before starting the treatment while 90% washed their hands after the treatment; 93% used sterile instruments for each patient.

The results showed that the level of knowledge of dental students (from different classes) about infection control principles was the same; their practice in this respect was the same as well. In general, practice of dental students was superior to their knowledge and a weak correlation was found between the knowledge and practice of dental students; it seems that practice of dental students is influenced by some other factors.

DISCUSSION

In general, the mean knowledge score of females was equal to that of males. Dental students poorly responded to questions 1, 5 and 7; these questions asked about the use of alcohol as disinfectant, wearing gloves and washing

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hands. This result may be due to poor learning of students with regard to these topics. Dental students acceptably responded to questions 6, 8 and 9 and correctly responded to questions 2, 3 and 4. The results of the current study showed acceptably high adherence to infection control guidelines, which may be due to the strict rules and regulations set by the university departments in this regard. Only 31% of students did not pull their protective masks under their chin and the remaining did it when talking to their colleagues, nurses or instructors and did not change it afterwards; this was against the infection control principles.

A considerable percentage of dental students were wearing clean white coats in the clinics; however, the white coats of dental students working in the radiology and endodontics departments were not clean, which is somehow justifiable since they were working with film processing solutions.

Infection control guidelines were highly adhered to in the oral and maxillofacial surgery department. In this department, all dental students were wearing a gown. In the periodontics department, none of the dental students were wearing a gown because this department did not provide students with a gown. Most dental students (93%) used sterile instruments for each patient. Only 10% washed their hands prior to work. Considering the low frequency of this habit, some rules and regulations need to be set in this regard in university departments.

A high percentage of dental students washed their hands after completion of treatment while only a few did it before starting the treatment. This is probably due to the fact that dental students are well aware of the risk of transmission of disease from patient to dentist (since it has been well emphasized in the infection control course). Thus, they paid more attention to washing hands after treatment of patients compared to prior to treatment.

In a similar study conducted in Mashhad School of Dentistry, knowledge of dental students about infection control was reported to be generally low and it was proposed to improve the quality and quantity of infection control course to enhance the knowledge of students in this regard [30]. Sabouhi et al. rated the level of knowledge of dentists practicing in Isfahan about infection control to be moderate [39]. Montagna et al, in their study in Italy reported that 95.5% of dentists were wearing gloves, 90.1% were wearing masks and 91.2% were wearing eye glasses [40], which were different from our findings. This discrepancy in results may be due to the difference in the educational systems and curricula and cultural differences of the two communities. Al-Omari and Al-Dwairiin 2004 evaluated adherence to infection control principles in Jordan and reported that 100% of Jordanian dentists changed the dental suction tip for each patient [41].

Several studies have been conducted on dentists, laboratory technicians and dental students in Canada, Jordan, India, China and Iran indicating their poor knowledge about infection control principles [29-36].

Barleanu et al. highlighted the need to enhance the level of knowledge of dental students about infection control by forming strong clinical behavioral abilities and ideal implementation of infection control protocols [42].

Haghanifar and Heidari used a questionnaire to assess the knowledge of dentists in Sari city about disinfection and sterilization and reported that the mean score acquired by male and female dentists was 11.8 and 12.3 out of 20, respectively. Also, the mean score of knowledge of dentists with a working experience less than 5 years was higher than that of more experienced dentists [37].

CONCLUSION

This study showed that dental students had a moderate level of knowledge about infection control. Dental students had a very good performance with regard to infection control guidelines, which was probably due to the mandatory infection control rules and regulations set by the university departments. However, the performance with regard to items not emphasized by the university departments was not good (such as washing hands prior to treatment of patients). It is suggested that dental students be provided with a brochure regarding infection control principles in each department prior to the onset of their rotation. Also, infection control instructions can be listed on a poster as a reminder for students to enhance their knowledge and improve their practice in this regard.

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