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ORIGINAL ARTICLE

Knowledge and attitudes towards HIV/AIDS among dental students of Jazan University, Kingdom Saudi Arabia

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KEYWORDS

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Abstract *Objectives:* To evaluate the knowledge and attitudes of dental students at Jazan University, Saudi Arabia; compare the differences in HIV/AIDS related knowledge and attitudes between the genders and years of study.

Methods: This cross-sectional survey was conducted among dental students of Jazan University (N = 208; Response rate = 88.1%).

Results: Most of the students (93%) knew "HIV/AIDS patients can infect dental workers" and 14% were unaware of the fact that HIV/AIDS patients can be diagnosed with oral manifestations. Less than half the subjects (47.6%) were confident on their ability to safely treat HIV/AIDS patients and only 28.8% of the study population believed that their knowledge about infection control is enough to treat HIV/AIDS patients. Males and 4th year students had significantly greater HIV/AIDS related knowledge and attitudes than their comparative counterparts.

Conclusions: HIV/AIDS related knowledge and attitudes in dental students of Jazan University are comparable to other studies from Saudi but are poor when compared to other countries.

1. Introduction

Recent data suggests that approximately 38.8 million people are living with HIV worldwide and an estimated 1.2 million deaths have been attributed to HIV in 2015 (GBD, 2015). The first case of HIV infection in Saudi Arabia was reported in 1984 (Al-Mazrou et al., 2005) and the cases have been rising steadily until 2006 followed by which the increasing rates have stabilised (Mazroa, 2012). The cumulative number of cases by 2009 in Saudi Arabia was 15,213 as reported by the Ministry

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of Health, Saudi Arabia (Alsamghan, 2012). Although the prevalence of HIV in Saudi Arabia and other nations of the Eastern Mediterranean region is considered to be among the lowest rates globally (0.02%), (Alhuraiji et al., 2014) the actual prevalence can be more than that because of the reporting in the Middle East being slow due to social, cultural, taboo and religious factors (Mazroa, 2012). A study using the premarital screening data from January to May 2008 found that the prevalence of HIV infection is 0.03% (Alswaidi and O'Brien, 2010). Premarital screening for HIV has been made mandatory since 2008 as a pre requisite for getting a marriage certificate in Saudi Arabia (Alrajhi, 2009). Epidemiological data on the prevalence of HIV infection in Saudi mostly comes from small prevalence surveys and mandatory screening, there are no population wide studies (Shibl et al., 2012). Also, HIV prevalence data in most at-risk groups are still not available from Saudi Arabia and other countries in the Middle East (Bozicevic et al., 2013).

The possibility of exposure to blood borne pathogens like Hepatitis B (HBV), Hepatitis C (HCV) and HIV put health care workers at high risk (Beltrami, 2000; Cristina, 2009; Singhal et al., 2009). Similarly, patients are at risk of transmission from health care workers but this risk is considered to be extremely low according to the available literature (Beltrami, 2000). In particular, dental care professionals are also exposed to a wide range of infectious pathogens like HIV, HBV, Herpes B virus, HBC virus and many others while performing dental procedures (Leggat et al., 2007). However, the risk of contracting HIV through needle stick or cut exposure is extremely low (0.3%) as 99.7% of the exposures to HIV contaminated blood do not cause infection (Gupta and Tak, 2011). Therefore, the occupational risk of acquiring HIV/AIDS among dental care providers is low but they are at ten folds greater risk than other individuals for becoming carriers of HBV (Seacat and Inglehart, 2003).

The bachelors programme in Dentistry at Jazan University is a six year course which is structured as 12 semesters. Students are introduced to dental clinics in 4th year and are taught about viral infections including HIV/AIDS during the third year of dentistry in general and oral pathology. It's only in the 4th year, students are taught about the management of HIV/AIDS patients in dental practice under the subject "oral medicine and diagnostic sciences". Dental professionals including dental students should realize that they are ethically liable to treat their patients' with HIV/AIDS. However, they should have adequate knowledge of HIV related transmission and positive attitudes in order to deliver their responsibility of treating patients with HIV/AIDS. It is important to assess the knowledge and attitudes of dental students which helps in understanding their preparedness for treating HIV/AIDS patients and if any modifications have to be incorporated into the dental curriculum to instil positive attitudes in dental students. Thus, the current study evaluated the knowledge and attitudes of dental students at Jazan University, Saudi Arabia. In addition, we compared the differences in HIV/AIDS related knowledge and attitudes between the genders and years of study.

2. Materials and methods

2.1. Subjects

The target population for the present cross-sectional questionnaire survey were second to fourth year dental students at College of Dentistry, Jazan University. All the students present on the days of the survey were requested to participate. No attempt was done to contact those students who were absent on those days and there were no follow-ups done. The participation of the students was voluntary and no incentive was provided to the respondents. Written informed consent was obtained from each participating student and the study protocol was approved by Institutional Research Ethics Committee.

2.2. Data collection

A self-administered, pre-coded, and closed ended questionnaire was used for the present study which was conducted in August 2012. The first part of the questionnaire was used to collect information on gender and year of study while the later part consisted of closed ended questions related to the knowledge and attitudes towards HIV/AIDS. The questionnaire was distributed to dental students at the end of their lectures and were explained the reason for conducting the study.

2.3. Survey instrument

The questionnaire consisted of two parts. The first part collected information on gender and year of study. The second part consisted of 27 questions regarding the knowledge and attitudes of dental students towards HIV/AIDS which were adopted from previous surveys that was conducted among Iranian and US dental students (Seacat and Inglehart, 2003; Sadeghi and Hakimi, 2009). The first twelve closed ended questions were related to knowledge of HIV infection, transmission patterns, and opinions about adequacy of their own knowledge. The answer for knowledge questions was either "agree" or "disagree." A score of 2 was given for correct answer and a zero for the wrong. Hence, a student's total score ranged from 0 to 24. In the later part of the questionnaire, thirteen questions addressed attitudes towards HIV/AIDS patients, attitudes in treating HIV/AIDS positive patients and ability in treating HIV/AIDS patients. The answer to each question about attitudes was rated on a five-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree). For positive attitudes, a score of 5 was given to the response 'strongly agree' and a score of 1 was given to "strongly disagree" while a score of 5 was given to the response 'strongly disagree' and a score of 1 was given to "strongly agree" for the negative attitudes. Thus the total score for attitudes ranged from 13 to 65. The questionnaire was found to be valid in the previous studies (Seacat and Inglehart, 2003; Sadeghi and Hakimi, 2009). However, it was pilot tested for content validity on a convenience sample of 20 dental students. Few questions were deleted as they seemed unsuitable. One knowledge related statement "The specificity of the HIV tests is 100%" and one section on specific oral manifestations related to HIV has been deleted from the original questionnaire as the student population in the present study were in beginning years of dental curriculum and were unsure about these questions. In addition, two more knowledge related statements "Dental workers can act as intermediary for transmission of HIV" and "Now AIDS is the most important health problem in the world" were deleted as they were reported to be similar to other knowledge related questions and inappropriate by most of the interviewed subjects. Four items on HIV/AIDS related attitudes were also

deleted. Slight modifications in wordings were done for few statements.

2.4. Statistical analysis

SPSS (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp) was used for statistical analysis. Descriptive variables like frequencies and means were used to describe the knowledge and attitudes towards HIV/AIDS patients. Unpaired '*t*' test and One way ANOVA were used to compare the significance of difference in mean knowledge and attitude scores between the genders and years of study respectively.

3. Results

Questionnaires were distributed to 236 dental students, of which a total of 208 subjects accepted to participate with a response rate of 88.1%. More than half the subjects were males (55.1%) and students belonging to the third year of dental education contributed to 35% of the total study population. Table 1 shows that males had significantly greater HIV related knowledge and attitudes than females. When HIV related knowledge and attitudes was compared between the students in various years of study (Table 1), both knowledge and attitudes differed significantly between the years of study with students belonging to 4th year reporting greater knowledge and positive attitudes than students in 3rd or 2nd years.

Table 2 demonstrates that most of the students (93%) knew "HIV patients can infect dental workers" and 14% were unaware of the fact that AIDS patients can be diagnosed with oral manifestations. It was noted that 80% and 88% of the participants agreed with the statements "Needle stick injury during dental treatment can transmit HIV" and "Medical staff are more prone for cross-infection" respectively. Less than half of the participants knew about the diagnostic tests of HIV. More than half of the students believed that saliva is a vehicle for AIDS transmission (57%). More than half the participants believed that all sterilisation methods can kill HIV and the sterilisation methods used for HBV are effective on HIV.

As presented in Table 3, it was surprising to note that only a quarter of the study population (28.9%) disagreed with the statement "Treatment of HIV/AIDS patients' means wasting national resources" but 74% subjects believed that community health can be improved by supporting HIV patients. Not all the subjects (71%) considered dental patients as potentially infectious for HIV. Approximately, a fifth (19%) of the participants believed that HIV patients should be treated in a separate ward and 15% students agreed to the statement "If I know that my friend has HIV infection, I end the friendship". More than one-third of the subjects (43%) agreed that they are morally responsible and are willing to treat (45%) patients with HIV/AIDS. Less than half the subjects (47.6%) were confident on their ability to safely treat HIV patients and only 28.8% of the study population believed that their knowledge about infection control is enough to treat HIV patients. One third of the study population (32%) reported that they would not do CPR on patients if required.

4. Discussion

The present study intended to evaluate the knowledge and attitudes towards HIV/AIDS among dental students. The questionnaire used in this survey has been adopted from a previous survey (Sadeghi and Hakimi, 2009) that was conducted among dental students of Iran which has been widely used in many previous surveys (Alsamghan, 2012; Seacat and Inglehart, 2003; Sadeghi and Hakimi, 2009; Hu et al., 2004; Aggarwal and Panat, 2013). The statement "Dentists with HIV/AIDS should not be allowed to treat patients" has been deleted from the questionnaire as there is still no consensus if HIV infected health care workers should be allowed to treat patients. For instance, the recent Society for Healthcare Epidemiology of America (SHEA) guidelines recommend that those providers with HIV burden of more than 5×10^2 GE/ml should not be allowed to perform category III activities (those associated with risk of transmission from provider to patient) which include general surgical procedures (Henderson, 2010). Although CDC recommends voluntary HIV screening of all patients between 13 and 64 years of age, the question "A blood test should be taken for diagnosis of HIV infection in all dental patients" has also been deleted as it is limited by the clause that patient is free to decline testing (Vernillo and Caplan, 2007). Two more statements on "I

Table 1 Dental students' knowledge and attitudes in relation to gender and year of study.

	n (%)	Knowledge		P value	Attitudes		P value
		Mean	SD		Mean	SD	
Gender[a]							
Males	116 (55.8)	15.87	2.89	0.003	42.09	6.23	0.05
Females	92 (44.2)	13.63	4.33		40.57	5.01	
Year of study[b]							
2nd year	70 (33.6)	14.00	4.14	0.05	40.37	3.16	0.001
3rd year	73 (35.1)	14.56	3.60		40.80	6.48	
4th year	65 (31.3)	16.4	3.08		43.07	6.77	
Total	208	14.87	3.76		41.41	5.76	

[a] Unpaired '*t*' test.
[b] One way ANOVA.

Table 2 Responses of dental students of Jazan University to HIV related knowledge statements.

Knowledge statement	Agree	Disagree
HIV/AIDS patients can infect dental workers	194(93.3)[a]	14(6.7)
HIV/AIDS patients can be diagnosed with oral manifestations	179(86.1)[a]	29(13.9)
Needle stick injury during dental treatment can transmit HIV	183(88.0)[a]	25(12.0)
Hepatitis B is more communicable than HIV/AIDS	157(75.5)[a]	51(24.5)
Medical staff are more prone for cross-infection	167(80.3)[a]	41(19.7)
The negative HIV tests surely indicate that the persons are free of viruses	89(42.8)	119(57.2)[a]
Western blot is a definite test for HIV/AIDS diagnosis	97(46.6)[a]	111(53.4)
ELISA is a screening test for HIV infection	92(44.2)[a]	116(55.8)
Saliva can be a vehicle for the transmission of AIDS	118(56.7)	90(43.3)[a]
Infection control methods for Hepatitis B provide adequate protection against the transmission of HIV	121(58.2)[a]	87(41.8)
There is a lot of HIV in the saliva of HIV/AIDS patients	117(56.3)	91(43.8)[a]
All sterilisation methods have cidal effects against HIV	83(39.9)	125(60.1)[a]

[a] Correct response to the statement.

Table 3 HIV/AIDS related attitudes of dental students of Jazan University.

Attitude statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Treatment of HIV/AIDS patients means wasting national resources[a]	25(12.0)	73(35.1)	50(24.0)	31(17.8)	23(11.1)
All dental patients should be considered potentially infectious	70(37.7)	69(33.2)	48(23.1)	13(6.3)	8(3.9)
If I know that my friend has HIV infection, I end the friendship[a]	6(2.9)	27(13.0)	42(20.2)	54(26.0)	79(38.0)
Supporting HIV/AIDS patients improves community health	42(20.2)	112(53.8)	31(14.9)	22(10.6)	1(0.5)
HIV/AIDS patients should be treated at a separate ward[a]	15(17.2)	24(11.5)	59(28.4)	67(32.2)	43(20.7)
I am morally responsible to treat HIV/AIDS patients	22(10.6)	67(33.2)	35(16.8)	69(33.2)	15(7.2)
HIV/AIDS patients can live with others in the same place	42 (20.2)	43(20.7)	42(20.2)	60(28.8)	21(10.1)
I am not obliged to treat HIV/AIDS patients[a]	10 (4.8)	34(16.3)	55(26.4)	80(38.5)	29(13.9)
HIV/AIDS patients can lead a normal life	33 (15.9)	51(24.5)	49(23.6)	66(31.7)	9(4.3)
I can safely treat HIV/AIDS patients	37 (17.8)	62(29.8)	56(26.9)	28(13.5)	25(12.0)
I will treat HIV/AIDS patients	28 (13.5)	66(31.7)	56(26.9)	41(19.7)	17(8.2)
My knowledge about infection control is enough to treat HIV/AIDS patients	30 (14.4)	30(14.4)	57(27.4)	71(34.1)	20(9.6)
I will perform CPR if HIV/AIDS patients need it	30 (14.4)	59(28.4)	53(25.5)	39(18.8)	27(13.0)

[a] Statements that were reversely scored (i.e., strongly agree – 1. . ..strongly disagree – 5).

worry about being infected with HIV by my patients" and "It is my right to know if my patients are infected by HIV" were also deleted whose responses cannot be definitively categorised as positive or negative attitudes. There were two questions in the questionnaire regarding the knowledge about risk of transmission of HIV through aerosols and CPR. The risk of transmission through aerosols is very unlikely as it requires the presence of infected HIV in the aerosols and the deposition of sufficient number of HIV organisms on mucous membranes of the susceptible host (Beltrami et al., 2000). Also, the level of risk for transmission of HIV through CPR is very low and calculated as about one per million resuscitations in the highest risk group (Bierens and Berden, 1996). A position statement from Heart and Stroke Foundation of Canada suggests "the value of CPR outweighs the small, theoretical risk of disease transmission" (Disease transmission and cardiopulmonary resuscitation, 1990). Although there is no evidence of any cases, the risk of transmission of HIV through CPR and aerosols is theoretically possible and therefore, the data related to these questions is not presented.

It was encouraging to observe that majority of the students agreed to general statements like "HIV/AIDS patients can infect dental workers", "AIDS can be diagnosed with oral manifestations" and "Needle stick injury during dental treatment can transmit HIV". The proportion of students agreeing to these statements in our study is comparable to a survey on dental students in another University of Saudi Arabia (Alsamghan, 2012). However, recent studies from India (Aggarwal and Panat, 2013; Fotedar, 2013) and Iran (Sadeghi and Hakimi, 2009) have reported greater percentages of dental students agreeing to these statements.

Moreover, less than half of the participants knew about the diagnostic tests and sterilisation methods for HIV. These differences can be attributed to the difference in dental curriculum in different contexts. For example, topics related to HIV like dental management of HIV patients, prevention of cross infection and examination of patients for oral viral manifestations are dealt in the second semester of 4th year at college of dentistry of Jazan University. Although our study population comprised 4th year students, they were in first semester of 4th year. Apart from the limited exposure of 2nd to 4th year dental students to HIV related information in their curriculum, a previous study from Saudi have suggested that the role of health education materials in spreading the knowledge related to HIV/AIDS is also scarce (Al-Mazrou et al., 2005).

More than half of the students believed that saliva is a vehicle for AIDS transmission (57%). This could be attributed to the difference of opinion and information in literature on the

transmissibility of HIV via salivary route. Transmission of HIV from saliva is considered to be a rare event as the saliva in infected patients usually contains only non-infectious constituents of HIV (Baron et al., 1999).

Although the present guidelines in most of the countries state that all the dentists are morally responsible to treat HIV patients (Crossley, 2004; McCarthy et al., 1999), dental patients are to be considered as potentially infectious (ADA guidelines for infection control, 2012) and that HIV patients are not to be treated in separate wards (Barr, 1994), not all the participants agreed with these statements. One in five students in our study thought that HIV/AIDS patients should be treated in a separate ward while approximately four-fifths of the dental and oral hygiene students in South Africa felt that HIV/AIDS patients should be treated at any dental facility with same respect and dignity as other patients (Erasmus et al., 2005). The proportion of our study subjects who expressed their willingness to treat HIV patients (45%) is comparable to 41.3% that has been observed among dental students of King Khalid University of Saudi Arabia (Alsamghan, 2012). However, studies from other regions of the world reported greater proportions of dental students willing to treat HIV patients (Seacat and Inglehart, 2003; Fotedar, 2013; Kuthy, 2005). Negative attitudes towards HIV patients in this study population is in accordance with previous studies among health care workers where very few subjects reported of 'being in friendship with a friend who has AIDS (Al-Ghanim, 2005) and 'accepting individuals with AIDS at work' (Al-Mazrou et al., 2005).

Male students reported significantly better attitudes towards HIV/AIDS patients than female students; this is in contrast with a study that was conducted in US (Seacat and Inglehart, 2003) which is culturally different from Saudi Arabia. However, gender differences with males presenting better HIV related knowledge has been observed in a past study on Saudi health care workers (Al-Ghanim, 2005). The results indicated that students' knowledge and attitudes on HIV/AIDS increased as the year of study progressed. Correlation between the year of study and knowledge was observed in previous studies (Sadeghi and Hakimi, 2009; Aggarwal and Panat, 2013; Erasmus et al., 2005). The reason for this might be due to the fact that the students in the later years have greater exposure to information on HIV/AIDS through the courses they attend as part of their curriculum. Positive correlation between HIV related knowledge and attitudes has also been previously reported in the literature (Sadeghi and Hakimi, 2009). One of the limitations of this study is that the results might not be representative to all the dental students of Saudi Arabia as the sampling frame was limited to only one dental college.

5. Conclusions

In general, HIV/AIDS related knowledge and attitudes in dental students of Jazan University are comparable to other studies from Saudi but are poor when compared to other countries. More males and 4th year dental students reported better HIV related knowledge as well as attitudes when compared to females and students in the 2nd or 3rd years. The curriculum at Jazan University has been constantly evolving since the inception of the college of dentistry in 2009. Further, response rate of greater than 80% demonstrates that most of the students are interested in knowing about HIV/AIDS. There is a need to incorporate information related to management of HIV/AIDS in dental practice during the initial years of the curriculum itself to make them competent enough to manage these patients when they start attending clinics in 4th year.

Conflict of interest

The authors declare that there is no conflict of interest.

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References

ADA guidelines for infection control, 2012. Australian Dental Association St. Leonards, NSW, Australia.

Aggarwal, A., Panat, S.R., 2013. Knowledge, attitude, and behavior in managing patients with HIV/AIDS among a group of Indian dental students. J. Dent. Educ. 77 (9), 1209–1217.

Al-Ghanim, S.A., 2005. Exploring public knowledge and attitudes towards HIV/AIDS in Saudi Arabia. A survey of primary health care users. Saudi Med. J. 26, 812–818.

Alhuraiji, A., Alaraj, A., Alghamdi, S., Alrbiaan, A., Alrajhi, A.A., 2014. Viral hepatitis B and C in HIV-infected patients in Saudi Arabia. Ann. Saudi Med. 34 (3), 207–210.

Al-Mazrou, Y.Y., Abouzeid, M.S., Al-Jeffri, M.H., 2005. Impact of health education on knowledge and attitudes of Saudi paramedical students toward HIV/AIDS. Saudi Med. J. 26 (11), 1788–1795.

Alrajhi, A.A., 2009. Premarital HIV screening in Saudi Arabia, is antenatal next? J. Infect. Publ. Health 2 (1), 4–6.

Alsamghan, A.S., 2012. Knowledge and attitude of male dental students toward HIV/AIDS in King Khalid University, Saudi Arabia. Int. J. Publ. Health Epidemiol. 1 (1), 1–8.

Alswaidi, F.M., O'Brien, S.J., 2010. Is there a need to include HIV, HBV and HCV viruses in the Saudi premarital screening program on the basis of their prevalence and transmission risk factors? J. Epidemiol. Commun. Health 64 (11), 989–997.

Baron, S., Poast, J., Cloyd, M.W., 1999. Why is HIV rarely transmitted by oral secretions? Saliva can disrupt orally shed, infected leukocytes. Arch. Intern. Med. 159 (3), 303–310.

Barr, C.E., 1994. Practical considerations in the treatment of the HIV-infected patient. Dent. Clin. North Am. 38, 403–423.

Beltrami, E.M. et al, 2000. Risk and management of blood-borne infections in health care workers. Clin. Microbiol. Rev. 13 (3), 385–407.

Beltrami, E.M., Williams, I.T., Shapiro, C.N., Chamberland, M.E., 2000. Risk and management of blood-borne infections in health care workers. Clin. Microbiol. Rev. 13 (3), 385–407.

Bierens, J.J., Berden, H.J., 1996. Basic-CPR and AIDS: are volunteer life-savers prepared for a storm? Resuscitation 32 (3), 185–191.

Bozicevic, I., G. Riedner, Calleja, J.M., 2013. HIV surveillance in MENA: recent developments and results. Sex Transm. Infect. 89 (Suppl. 3), iii11–iii16.

Cristina, M.L. et al, 2009. Investigation of organizational and hygiene features in dentistry: a pilot study. J. Prev. Med. Hyg. 50 (3), 175–180.

Crossley, M.L., 2004. An investigation of dentists' knowledge, attitudes and practices towards HIV+ and patients with other blood-borne viruses in South Cheshire, UK. Br. Dent. J. 196(12), 749–754, quiz 780.

Disease transmission and cardiopulmonary resuscitation, 1990. Emergency Cardiac Care Committee, Heart and Stroke Foundation of Canada. CMAJ 143 (10), 1007–1008.

Erasmus, S., Luiters, S., Brijlal, P., 2005. Oral Hygiene and dental student's knowledge, attitude and behaviour in managing HIV/AIDS patients. Int. J. Dent. Hyg. 3, 213–217.

Fotedar, S. et al, 2013. Knowledge and attitudes about HIV/AIDS of students in H.P. Government Dental College and Hospital, Shimla, India. J. Dent. Educ. 77 (9), 1218–1224.

GBD, 2015. HIV Collaborators. Estimates of global, regional, and national incidence, prevalence, and mortality of HIV, 1980–2015: the Global Burden of Disease Study 2015. Lancet HIV, 2016 3(8), e361–e387.

Gupta, N., Tak, J., 2011. Needlesticks injuries in dentistry. Kathmandu Univ. Med. J. (KUMJ) 9 (35), 208–212.

Henderson, D.K. et al, 2010. SHEA guideline for management of healthcare workers who are infected with hepatitis B virus, hepatitis C virus, and/or human immunodeficiency virus. Infect. Control Hosp. Epidemiol. 31 (3), 203–232.

Hu, S.W., Lai, H.R., Liao, P.H., 2004. Comparing dental students' knowledge of and attitudes toward hepatitis B virus-, hepatitis C virus-, and HIV-infected patients in Taiwan. AIDS Patient Care STDS 18 (10), 587–593.

Kuthy, R.A. et al, 2005. Students' comfort level in treating vulnerable populations and future willingness to treat: results prior to extramural participation. J. Dent. Educ. 69, 1307–1314.

Leggat, P.A., Kedjarune, U., Smith, D.R., 2007. Occupational health problems in modern dentistry: a review. Ind. Health 45 (5), 611–621.

Mazroa, M.A. et al, 2012. HIV case notification rates in the Kingdom of Saudi Arabia over the past decade (2000–2009). PLoS One 7 (9), e45919.

McCarthy, G.M., Koval, J.J., MacDonald, J.K., 1999. Factors associated with refusal to treat HIVinfected patients: the results of a national survey of dentists in Canada. Am. J. Publ. Health 89, 541–545.

Sadeghi, M., Hakimi, H., 2009. Iranian dental students' knowledge of and attitudes towards HIV/AIDS patients. J. Dent. Educ. 73 (6), 740–745.

Seacat, J.P., Inglehart, M.R., 2003. Education about treating patients with HIV infections/AIDS: the student perspective. J. Dent. Educ. 67 (6), 630–640.

Shibl, A., Senok, A., Memish, Z., 2012. Infectious diseases in the Arabian Peninsula and Egypt. Clin. Microbiol. Infect. 18 (11), 1068–1080.

Singhal, V., Bora, D., Singh, S., 2009. Hepatitis B in health care workers: Indian scenario. J. Lab. Physicians 1 (2), 41–48.

Vernillo, A.T., Caplan, A.L., 2007. Routine HIV testing in dental practice: can we cross the Rubicon? J. Dent. Educ. 71 (12), 1534–1539.