

Occupational exposures and hepatitis B vaccination statuses in dental students in Central Saudi Arabia

Maha Al-Sarheed, MSc, PhD.

ABSTRACT

Objective: To assess the nature of occupational exposures occurring to students and to assess the rate of reporting of incidents.

Methods: A self-administrated questionnaire was circulated to third, fourth and final year undergraduate dental students in Dental College of King Saud University, Riyadh, Kingdom of Saudi Arabia from April 2004 to May 2004. The questionnaire was consisted of 4 domains: personal details, hepatitis B vaccination, occupational exposures and reporting of the exposure incident.

Results: Significantly more incidents occurred among final year students than third year students. Through the students there was no correlation between ages, gender, and dominate hand; however, more exposures occurred in

female students. A significant decrease in exposures ($p < 0.05$) occurred when an assistant was employed. Some students with one or more exposures during their training were percutaneous injuries predominated. Seventy-seven (28.9%) students stated that they have not been vaccinated against hepatitis B virus and that was notice among male students.

Conclusion: Dental teaching colleges are faced with the unique challenge of protecting the student and populations against blood-borne infections. Efforts must go beyond teaching of universal precaution, which should include safer products and clinical procedures that can reduce the risks associated with occupational exposures.

Saudi Med J 2004; Vol. 25 (12): 1943-1946

Although adherence to universal pre-cautions and routine use of appropriate barriers provides protection against most micro-organism. Health care workers are still at risk for infections due to accidental exposures. In the dental environment compared to other health care settings, sharps injuries are more likely due to small operating field, frequent patient movement and the variety of sharp dental instruments used in everyday practice.¹ Numerous studies have shown that the incidence of hepatitis B after needlestick injuries from hepatitis B surface antigen (HBsAg) patients is approximately 20% compared with an estimated of

0.4% following similar exposure to the acquired immune deficiency syndrome (AIDS) virus.² Many infected patients are unaware of their status due to long incubation periods and post-infection widow period during which antibodies cannot be detected.³

As future dentists, dental students must be made aware of these risks and trained in the procedures needed for effective prevention and the actions to be taken in the event of an occupational exposure to the patient body fluids. The risks of exposure for dental students may be greater than the qualified practitioner. Their manual skills are underdeveloped, and their clinical experience is

From the Department of Preventive Science, Division of Pediatric Dentistry, King Saud University, Riyadh, Kingdom of Saudi Arabia.

Received 12th June 2004. Accepted for publication in final form 8th August 2004.

Address correspondence and reprint request to: Dr. Maha Al-Sarheed, Consultant Pedodontist, Department of Preventive Science, Division of Pediatric Dentistry, King Saud University, PO Box 3921, Riyadh 11481, Kingdom of Saudi Arabia. Tel. +966 (1) 4784524 Ext. 108. Fax. +966 (1) 4647937. E-mail: alsarheedm@yahoo.com

limited. They frequently work without an assistant and continually practicing a variety of task which is new to them.⁴

The aim of this study is to assess the nature of the occupational exposures occurring to dental students and the rate of reporting such as injuries.

Methods. Students in the third, fourth and fifth-year (final year) undergraduate dental course of King Saud University Dental College, Riyadh, Kingdom of Saudi Arabia from April 2004 to May 2004 were asked to complete a questionnaire. This questionnaire had been piloted from one previously used in dental school in the United Kingdom.⁴ The questionnaire was distributed towards the end of the academic year to each group. These students were used because they had their majority of their clinical courses in these years. The questionnaire comprised 27 questions divided into 4-part of enquiry: 1) Personal details: age, gender, year of dental course and dominant hand. 2) Vaccination status regarding HBV. 3) Occupational exposures: number and nature of incidents. Possible associated factors (time and place of incident, procedure, presence of assistant, use of protective equipment) upon their last incident. 4) Reporting.

Permission was obtained from the College Dental Research Center (CDRC) to circulate the questionnaires. The respondent's anonymity was assured. The data were coded and entered onto the Statistical Package for Social Sciences program for statistical analysis. Quantitative analyses were confined to simple cross-tabulations of occupational exposures and potential associated factors with Chi-square analysis and appropriate follow-up comparisons where necessary.

Results. Of the 266 questionnaires distributed the response rate was 90.9% (241). Students in third year (Y3) were 88 (36.5%), in fourth year (Y4) were 93 (38.6%) and 60 (25.9%) in the 5th year (Y5). The sample consisted of 123 (51%) males and 118 (49%) females. Of the total numbers of reported exposures since starting the dental course was 164 (68%): 53 (60.2%) for Y3, 65 (69.9%) for Y4 and 46 (76.7%) for Y5 (**Table 1**). There was a statistically significant association between Y3 and Y5 in reporting number of exposures ($p < 0.05$). The reported numbers of occupational exposures occurring in 6 months prior to the survey were 26 (29.6%) for Y3, 39 (42.0%) for Y4 and 28 (46.7%) for Y5. There was a greater percentage in Y4 students (23.7%) reporting 2 exposures than in Y3 (14.8%) and in Y5 students (20%) but that was not statistically significant among 3 groups within the previous 6 months (**Table 1**). There was a statistically significant difference of Y3 students with no exposures

(70.5%) in the last 6 months compared to Y5 (53.3%) students ($p < 0.05$). The total numbers of reported exposure since starting the dental course for each age group were: 65 (66.5%) aged 18-22 years, 91 (70%) aged 23-24 years and 7 (58.3%) aged 25-28 years. The numbers of students experiencing 2 or more exposure were 54 (55.1%) aged 18-22 years, 74 (56.9%) aged 23-24 years and 7 (58.3%) aged 25-28 years.

It shows that both gender were well represented in each year. The number of female students experiencing one or more exposures within the previous 6 months were 57 (48.3%) compared to 36 (29.3%) males. There were a statistically differences between gender and numbers of exposures in the last 6 months ($p < 0.05$). There were more left-handed students (39%) who reported no exposures since starting the course compared to right-handed students (31%); however, that was not statistically significant.

All female students completed their vaccination except 14 (11%) of them had begun their vaccination seriously. Many male students did not have their vaccination (24 [40.7%] in Y3, 25 [50%] in Y4 and 14 [46.7%] in Y5). All students groups gathered together, there were more exposures occurred at morning session (46.3%) compared to afternoon session (36.6%) and that was not statistically significant. One hundred and thirty-three (81.1%) incidents of exposure occurred when students were not assisted compared to 14 (8.5%) with assistant and it was statistically significant ($p < 0.05$). Approximately 88.4% of students were wearing gloves when their last exposure occurred, 81% were wearing masks and 18.3% were wearing protective glasses.

List of various procedure described by students during their last exposures were (**Table 2**): 1) Local anesthesia including administration of local anesthesia and re-sheathing the needle. 2) Cavity preparation include loading burs, removing burs, removing rubber dam and instrumentation for root canal therapy. 3) Unite cleaning, include cleaning of instruments. 4) Scaling and periodontal treatment.

In all 3 groups, a greater percentage of exposure occurred during cavity preparation (14.9%) and cleaning unite (12.4%), and it was statistically significant differences between Y5 students and both Y3 and Y4 students ($p < 0.05$). In all 3 groups, the majority of last exposure incidents is puncture 52 (21.5%), cut by needle or sharp object with 13.6% occurred for Y3, 15% for Y4 and 43% for Y4. Spatter of aerosol onto mucous membranes was the second most frequent with 8% for Y3, 13% for Y4 and 8.3% for Y5. The numbers of students who had an exposure and did not report to clinical instructors were 52.3% for Y3, 69% for Y4 and 75% for Y5. Blood was drawn for testing from 59% of Y3, 72% of Y4 and 85% of Y5 who reported the incident.

Table 1 - Number of occupational exposures by year of the course.

N of exposures	Third year n (%)	Fourth year n (%)	Fifth year n (%)
Reported exposures			
None	35 (39.8)	28 (30.1)	14 (23.3)
Once or more	53 (60.2)	65 (69.9)	46 (76.7)
Reported exposures within the last 6 months			
None	62 (70.5)	54 (58.1)	32 (53.3)
Once	13 (14.8)	17 (18.3)	16 (26.7)
More than once	13 (14.8)	22 (23.7)	12 (20)

Table 2 - Clinical procedures being performed when last occupational exposures were occurred.

Procedure	Third year n (%)	Fourth year n (%)	Fifth year n (%)
Local anesthesia	6 (6.8)	8 (8.6)	10 (16.7)
Cavity preparation	10 (11.4)	12 (12.9)	14 (23.3)
Cleaning unite	11 (12.5)	5 (5.4)	14 (23.3)
Periodontal treatment	8 (9.1)	11 (11.8)	6 (10)

DISCUSSION. The potential of cross-infection with blood-borne viruses in dental clinic environment is well documented. For instance, hepatitis B virus (HBV) has been recognized hazard for several years and number of result of occupational exposure.^{5,6} A large number of students (67.8%) reported that they had experienced one or more exposures and that appears to be consistent with other study where 40% of exposure occurred in their sample.⁴ From the reported exposure, percutaneous injury was most common type. Percutaneous injuries are considered the most probable portal of entry for microorganisms during accidental occupational exposures.⁷ The estimated risk of HBV infection from percutaneous exposure range from 5-45%.⁸

In the present study, almost 28.9% of students had no hepatitis B vaccination. The prevalence of hepatitis B antigen carriers in Saudi Arabia is estimated to be 8.3% for the entire population.⁹ This means that students are at a high risk of exposure to hepatitis B. Therefore, an urge screening for HBV and a full course of hepatitis B immunization should be initiated soon. One factors was assessed, which is the presence of an assistant during clinical session, and it was shown to be associated with an increase of exposure incident. More exposure occurred when students were working alone than when assisted (81.1%). This findings support previous study⁴ where most exposure occurred when students were unassisted (83%). Students are frequently obliged to work on their own and it is therefore, more likely that any incident will occur while there is no assistant.⁶ There is, however, a considerable practical problem in the provision of adequate numbers of dental assistants for every student. Students frequently manage to work alone and overcoming this problem, but they need to be aware of the increasing risks of experience accidental occupational

exposures when they are working without assistant. The procedure associated with the greatest incidence of occupational exposures appears during cavity preparation, and cleaning dental unites. In reviewing reports from various dental schools, the rate of injuries from cavity preparation is consistent: 17% and 26%.^{10,11} Meanwhile, in the present study the rate injury from burs was 14.9%. Instances involving the bur on a handpiece not in use included grazing one's forehead on the bur while bending over, backing into the bur, injuries sustained while attempting to remove an item from the bracket table and scratching one's hand on the bur. To prevent these types of injuries, the correct placement of the hand piece in the bracket table needs to instruct.

Risk of HIV and HBV transmission via mucous membrane were smaller because of wearing protective glasses during their occupational exposures, 29.3% of their last occupational exposures were due to aerosol or spatter of fluids onto mucous membranes. Students need to be aware of the guidelines for infection control in dental health care settings such as wearing gloves, mask and protective glasses.¹² It was noted that there is a higher rate of students who had unreported exposures. It may be entirely related to the level of compliance with the reporting requirements and design of the dental curriculum as well as clinical responsibilities and further warrants investigation.

In conjunction with general improvements in the dental course curriculum, didactic and clinical procedures related to infection control would be needed to address to improve their knowledge in the risk of occupational exposures. Also, a system is needed to identify such students with high occupational exposures so that appropriate action can be taken.

References

1. Porter KM, Scully C, Porter S, Theyer Y. Needlestick injuries to dental personal. *J Dent* 1990; 18: 258-262.
2. Samaranyake L. Rules of infection control. *Int Dent J* 1993; 43: 578-584.
3. Klein RS, Phelam JA, Freeman K, Schable C, Friedland GH, Trieger N. Low occupational risk of human immunodeficiency virus infection among dental professionals. *N Engl J Med* 1988; 813: 86-90.
4. Stewardson DA, Palenik CJ, McHugh ES, Burke FJT. Occupational exposures occurring in students in a UK dental school. *Eur J Dent Educ* 2002; 6: 104-113.
5. Siew C, Grunninger MS, Miaw CL, Needle EA. Percutaneous injuries in practicing dentists. *J Am Dent Assoc* 1995; 126: 1227-1234.
6. Kennedy JE, Hasler JF. Exposures to blood and body fluids among dental school-based dental health care workers. *J Dent Educ* 1999; 63: 464-469.
7. Gooch BF, Cardo DM, Marcus R. Percutaneous exposures to HIV infected blood among dental care workers enrolled in the CDC needlestick study. *J Am Dent Assoc* 1995; 126: 1237-1242.
8. Gerberding JL. Management of occupational exposures to blood-borne viruses. *N Engl J Med* 1994; 332: 444-451.
9. Kurdy S, Fontaine RE. Survey on infection control MOH dental clinics, Riyadh. *Saudi Epidemiol Bull* 1997; 3: 21-28.
10. Ramos-Gomez F, Ellison J, Greenspan D, Bird W, Lowe S, Gerberding JL. Accidental exposures to blood and body fluids among health care workers in dental teaching clinics: a prospective study. *Am J Dent Assoc* 1997; 128: 1253-1261.
11. Mitsui T, Iwano K, Masuko K. Hepatitis C virus infection in medical personnel after needlestick accidents. *Hepatology* 1992; 16: 1109-1114.
12. Kohn WG, Harte JA, Malvitz DM, Collins AS, Cleveland JL, Eklund KJ; Centers for Disease Control and Prevention. Guidelines for infection control in dental health care settings-2003. *J Am Dent Assoc* 2004; 135: 33-47.