

A SURVEY OF CROSS-INFECTION CONTROL PROCEDURES: KNOWLEDGE AND ATTITUDES OF TURKISH DENTISTS

Emir YÜZBAŞIOĞLU¹, Duygu SARAÇ², Sevgi CANBAZ³, Y. Şinasi SARAÇ², Seda CENGİZ⁴

1- DDS, PhD, Former Research Assistant, Department of Prosthodontics, Faculty of Dentistry, Ondokuz Mayıs University, Samsun, Turkey.

2- DDS, PhD, Associate Professor, Department of Prosthodontics, Faculty of Dentistry, Ondokuz Mayıs University, Samsun, Turkey.

3- MD, Associate Professor, Department of Public Health, Faculty of Medicine, Ondokuz Mayıs University, Samsun, Turkey.

4- DDS, PhD, Assistant Professor, Department of Prosthodontics, Faculty of Dentistry, Zonguldak Karaelmas University, Zonguldak, Turkey.

Corresponding address: Dr. Emir Yüzbaşıoğlu, D.D.S., Ph.D. - Yıldız Posta Cad. Evren Sitesi - C-D Blok No:34, 34349 - Gayrettepe - Istanbul / Türkiye - Phone: +90 212 347 55 77 - Fax: +90 212 347 55 70 - E-mail: emiryuzbasioglu@hotmail.com

Received: November 6, 2008 - Modification: February 15, 2009 - Accepted: July 19, 2009

ABSTRACT

Objectives: The objective of this study was to investigate the knowledge, attitudes and behavior of Turkish dentists in Samsun City regarding cross-infection control. Material and methods: A questionnaire was designed to obtain information about procedures used for the prevention of cross-infection in dental practices and determine the attitudes and perceptions of respondent dental practitioners to their procedures. The study population included all dentists in the city of Samsun, Turkey, in April 2005 (n=184). The questionnaire collected data on sociodemographic characteristics, knowledge and practice of infection control procedures, sterilization, wearing of gloves, mask, use of rubber dam, method of storing instruments and disposal methods of contaminated material, etc. Questionnaire data was entered into a computer and analyzed by SPSS statistical software. Results: From the 184 dentists to whom the questionnaires were submitted, 135 participated in the study (overall response rate of 73.36%). As much as 74.10% dentists expressed concern about the risk of cross-infection from patients to themselves and their dental assistants. Forty-three percent of the participants were able to define "cross-infection" correctly. The greatest majority of the respondents (95.60%) stated that all patients have to be considered as infectious and universal precautions must apply to all of them. The overall responses to the questionnaire showed that the dentists had moderate knowledge of infection control procedures. Conclusions: Improved compliance with recommended infection control procedures is required for all dentists evaluated in the present survey. Continuing education programs and short-time courses about cross-infection and infection control procedures are suitable to improve the knowledge of dentists.

Key words: Cross-infection control. Knowledge. Attitude. Turkish dentists.

INTRODUCTION

Dentists might be occupationally exposed to infectious materials, including body substances and contaminated supplies, equipment, environmental surfaces, water, or air. Cross-infection can be defined as the transmission of infectious agents between patients and staff within a clinical environment²⁵. Infection control, which is one of the most discussed topics in dentistry, has become such an integral part of the practice to the extent that dental health workers no longer question its necessity^{28,29}.

Concerns about control of infection in dentistry increased considerably by a report of transmission of human immunodeficiency virus (HIV) from an American dentist to five of his patients^{6,8}. With the presence of people who are infected with hepatitis B and C and the HIV viruses, cross-infection has become a major concern dentists, dental personnel

and patients³⁰. Numerous surveys and studies have shown that the incidence of hepatitis B developing after needle stick injuries from HbsAg patients is approximately 20.0% compared with an estimate of 0.4% following similar exposure to the HIV^{6,36}.

Dental care professionals are at high risk of cross-infection while treating patients. This occupational potential for disease transmission becomes evident when it is considered that most human microbial pathogens have been isolated from oral secretion^{10,29}. In addition, a majority of carriers of infectious diseases cannot be easily identified^{19,21}. Research has shown that infective hazards are present in dental practice because many infections can be transmitted by blood or saliva via direct or indirect contact, droplets, aerosols, or contaminated instruments and equipment²¹. For this reason, since the end of the 1980s, many surveys have been carried out in several countries, especially in North America and Europe, to investigate practices to control infection and compliance with

universal precautions in dental surgeries^{4,12,13,14,15,32,34}.

Previous seroepidemiological studies have confirmed these occupational hazards, showing higher concentrations of serum antigen and antibodies for hepatitis B^{23,26}, hepatitis C^{16,31}, and Legionella spp.²⁷, in dentists than in the lay population and an increased prevalence of respiratory infections¹¹ and symptoms² possibly related to aerosols.

The use of procedures to control infection and universal precautions in dental surgeries is effective in preventing microbial pollution and cross-contamination, and is strongly supported by organizations such as the Centers for Disease Control and Prevention, the American Dental Association, schools of dentistry, and many other health agencies and professional associations⁸. Universal precautions consider that all patients have to be accepted as an infectious patient and apply these precautions to all patients⁷. However, infection control policies in developing countries have not been widely documented²⁴. Most hospitals have no infection control programs due to the lack of awareness of the problem or absence of properly trained personnel³⁰.

Although many surveys about cross-infection control procedures have been carried out in several countries, there is no report in recent literature about how Turkish dentists manage the control of cross-infection in their practice. The aim of this descriptive study was to investigate the knowledge, attitudes and behavior of Turkish dentists in Samsun City to cross-infection control.

MATERIAL AND METHODS

The study was conducted as a descriptive survey of private dental practices in the city of Samsun, Turkey. A self-administered questionnaire was designed to obtain information about procedures used for the prevention of cross-infection in dental practices and determine the attitudes and perceptions of respondent dental practitioners to their procedures. The questionnaire was pre-tested, revised, and retested before use. The study population included all dentists in city of Samsun, Turkey, in April 2005 (n=184) to whom the questionnaires were submitted. A list of private dental units was obtained from the Chamber of Dentists of Samsun City, Turkish Dental Association. Two researchers gathered questionnaire data by face-to-face interviews. No tracking system was used to determine who responded and who did not, in order to ensure anonymity. The questionnaire required data on sociodemographic characteristics, knowledge and practice of infection control procedures, sterilization, wearing of gloves, mask, use of rubber dam, method of storing instruments and disposal methods of contaminated material, etc.

Questionnaire data was entered into a computer and analyzed by statistical software (SPSS 12.0 for Windows, SPSS Inc., Chicago, USA). The accuracy of input data was verified by entering it twice with subsequent comparison of two data sets. No discrepancies were found in the data.

RESULTS

From the 184 dentists to whom the questionnaires were submitted, 135 actually participated in the study, which corresponds to an overall response rate of 73.36%. Sixty three (46.70%) of the respondents were women; 72 (53.30%) were men. The mean age of the dentists was 35.7 ± 10.1 years old. Nine dentists (6.70%) were specialists, 126 (93.30%) and were general dentists. The overall practicing time was 11.5 ± 9.7 years. The sociodemographic characteristics of the participants are shown in Table 1.

As much as 74.10% of dentists expressed concern about the risk of cross-infection from the patients to themselves and their dental assistants. Forty-three percent of the participants were able to define “cross-infection” correctly. Responses regarding and clarifying cross-infection are shown in Table 2.

The dentists were asked about universal precautions and their behaviors. The greatest majority of them (95.60%) stated that all patients have to be accepted as being infectious and universal precautions must apply to all of them. The methods that dentists preferred to prevent the transmission of infections are shown in Table 3.

Information was requested about available methods of sterilization. Multiple methods were available in many practices. An autoclave was available in 63 practices (46.70%), and facilities for dry heat sterilization in 89 practices (65.90%). Other procedures were reported as being used for sterilization, including cold chemical solutions in 47 practices (34.80%) and boiling water in 2 practices (1.50%).

The participants were argued about the time since the last servicing of the sterilization devices. Eleven (8.10%) participants had sent their sterilization device for servicing 1 week before . The responses about servicing of sterilization devices are shown in Table 4.

Questions were asked about disinfection of work going to and coming from dental laboratories. Impressions were reported as being sent to laboratories in plastic bags by 90 professionals (66.70%), in special containers by 14 professionals (14.10%). Twenty-six professionals (19.20%) had no preferred method of disinfection.

Respondents were asked about hazardous wastes. Fifty-one practitioners (37.80%) preferred to use puncture-resistant containers, 17 practitioners (12.60%) used plastic bottles as

TABLE 1- Sociodemographic characteristics of dentists

	n	%
Gender		
Female	63	46.7
Male	72	53.3
Professional status		
General dentist	126	93.3
Clinical oral specialist	9	6.7
Marital status		
Married	94	69.6
Single	41	30.4

TABLE 2- Definition and concern about cross-infection

	n	%
Definition of cross-infection		
Correct	58	43.0
Incorrect	77	57.0
Concern about the risk of cross-infection to themselves and their dental assistants.		
Yes	100	74.1
No	27	20.0
No idea	8	5.9

TABLE 3- Preferred methods to prevent the transmission of infections

	n	%
Use of universal precautions (gloves, masks, protective eyewear or face shield, and gowns)	130	96.3
Avoiding exposure sharp devices and contaminated instruments.	65	48.1
Preoperative and operative mouth rinses, use of high volume suction and rubber-dam.	32	23.7
Improving the quality of dental unit waterlines	19	14.1
Use of barrier protection or cleaning and disinfection of environmental surfaces between appointments.	91	67.4
Keeping the instruments sterile until usage	58	43.0

TABLE 4- Time since the last servicing of the sterilization devices

	n	%
One week	11	8.1
Four weeks	8	5.9
Six weeks	13	9.6
Twelve weeks	25	18.5
More than twelve weeks	78	57.8

TABLE 6- Infectious agents considered important by the participants

	n	%
HIV	124	91.9
HBV, HCV	119	88.1
<i>Mycobacterium tuberculosis</i>	83	61.5
<i>Neisseria gonorrhoeae</i>	29	21.5
<i>Treponema pallidum</i>	15	11.1
<i>Pseudomonas aeruginosa</i>	10	7.4
<i>Legionella pneumophila</i>	6	4.4

TABLE 5- Preferred barrier protection or cleaning and disinfection of environmental surfaces

	n	%
Dental unit's table and water trunks	83	61.5
Dental unit's head gear	61	45.2
Dental unit's light handle	41	30.4
Light curing devices	24	17.8
Dental radiograph equipment	25	18.5
Telephones, drawer and drawer handles	12	8.9

containers for scalpel blades, needles, syringe and unused sterile sharps. 67 practitioners (49.90%) had no preferred methods.

Information was requested about methods used on the prevention of infective aerosols. Fifty-six practitioners (41.60%) preferred high-speed aspirators, 7 practitioners (5.20%) preferred rubber-dam, 26 practitioners (13.90%) preferred pre-procedural mouth rinses, and 64 practitioners (47.40%) had no preferred methods.

Information was requested about environmental infection control. The surfaces that dentists prefer to use for barrier protection are listed in Table 5. Information was requested about infectious agents of concern in dentistry. Infectious agents that are important according to the dentists enrolled in this study are listed in Table 6.

TABLE 7- Preferred time of use of sterilized, wrapped or packed instruments

	n	%
One week	111	82.2
Four weeks	5	3.7
Six weeks	2	1.5
Twelve weeks	3	2.2
More than twelve weeks	14	10.4

TABLE 8- Use of dental handpieces and other devices attached to air and waterlines

	n	%
Cleaning with surface disinfectant solutions	108	80.0
Run for 30 s before dental treatment	40	29.6
Autoclaving	24	17.8
No preferred procedure	12	8.9

Questions were asked about pre-sterilization cleaning and aseptic storage. As much as 105 dentists (77.80%) preferred to store their instruments in disinfecting solutions and detergents, 8 (5.90%) used ultrasonic cleaner, 96 (71.10%) removed debris by scrubbing, 6 (4.40%) used anti-corrosive agents and 19 (14.10%) preferred packaging.

Information was requested about storage of sterilized wrapped or packed instruments. The responses to these items are listed in Table 7. The dentists were asked whether they used dental handpieces and other devices attached to air and waterlines. The responses to these items are listed in Table 8.

DISCUSSION

Due to the nature of their profession, dentists and dental assistants should not forget the risk of treating patients with probability of infectious diseases. Dentists, dental assistants and patients may be exposed to pathogenic microorganisms localized in oral cavity and respiratory tract including cytomegalovirus (CMV), HBV, HCV, herpes simplex virus (HSV) type 1 and 2, HIV, Mycobacterium tuberculosis, staphylococci, streptococci and other viruses and bacteria⁵. These microorganisms could be transmitted to the dental health care professionals by direct contact with a patient’s saliva, blood, skin, and oral secretions, or by indirect contact through injuries caused by sharp contaminated instruments, or by droplet infection from aerosols or spatter^{5,7,33}. There are two reasons why dental health care workers must wear operating gloves: to prevent transmission of infection from the operator’s hands to the patients, and to prevent contact of blood and saliva with the operator’s hands³⁵.

In this present study, 96.30% of dentists preferred to use

barrier techniques such as gloves, masks and protective spectacles. According to Al-Rabeah and Mohamed³, 100% of dentists use gloves and 90% of them use masks while treating their patients. Al Ruhaimi¹ stated that between 2%-4% of dental professionals in Saudi Arabia never wore gloves when treating patients. In another study, authors showed that about 90% of dentists in Kuwait wore gloves, 75% wore masks and 52% wore protective spectacles²⁴. Treasure and Treasure³² showed that in New Zealand 42% of dentists wore gloves, 64.8% wore masks and 66.4% wore protective spectacles. McCarthy and MacDonald²⁰ showed that 91.8% of dentists in Ontario, Canada, always wore gloves, 74.8% always wore masks and 83.6% always wore protective spectacles.

91.90% and 88% of the participants attributed importance to HIV and Hepatitis B-C viruses, respectively. However, although the microorganisms, which are listed in Table 6, are very important in dental practice, those dentists that participated in this survey, had inadequate knowledge of these microorganisms.

In this study, 80% of dentists preferred to clean handpieces by wiping them with disinfectants, but only 17.8% of them stated that they preferred autoclave for sterilize handpieces. However, it is known live blood cells and bacterial and viral particles can survive inside handpieces even after thorough disinfection¹⁸. Many authors have emphasized the hazard of cross-infection by the use of dental instruments²². Some of these authors showed that 94% of dentists in Kuwait used autoclave to sterilize handpieces²⁴. Kurdy and Fontaine¹⁷ showed that 30% of dentists in Saudi Arabia had sterilized handpieces with autoclave and 90% of them autoclaved their instruments at the end the day. Al-Rabeah and Mohamed³ stated that 37.90% of dentists autoclaved handpieces. According to Miller²², the most common reason for not sterilizing handpieces is the fear of damage to the equipment.

Disposable syringes and needles, scalpel blades and other sharp items must be gathered in appropriate puncture-resistant containers⁷. In previous studies, 72%¹⁷ and 56.20%³ of dentists used puncture-resistant containers. In the present study, 37.80% of participants reported to use puncture-resistant containers to discard sharp items.

In dental practice, there is evidence that high-volume suction plays an important role in minimizing contamination of the treatment room by micro-particle aerosols that contain significant microbiological load²⁹. Al-Rabeah and Mohamed³ stated that 49.8% of dentists in Saudi Arabia used high-volume suction. The present survey revealed that only 41.60% of dentists studied used high-volume suction.

The responses to questionnaire showed that 95.60% of the participants assumed that all patients are infectious and that the same precautions must be used for all patients. However, excluding barrier techniques, simple and effective techniques, such as rubber-dam placement and preoperative use of mouthrinses, were reported by only a small number of dentists (Table 5).

As much as 74.10% of the dentists expressed concern about the risk of cross-infection to themselves and their dental assistants. However, only 43.00% of sample gave a proper definition to “cross-infection”.

CONCLUSION

The results of the present study showed that the knowledge of Turkish dentists is relatively weak about infection control procedures. This situation indicates that cross-infection control topics do not arouse interest among dentists, or that there is a deficiency in continuing dental education on how to avoid cross-infection in dental practice. Improved compliance with recommended infection control measures is required for all dentists. Continuing education programs and short-time courses about cross-infection and infection control procedures are suitable to improve the knowledge of dentists.

REFERENCES

- 1- Al-Ruhaimi KA. Response of dental professionals in Saudi Arabia towards hepatitis B vaccine and glove wearing. *Odontostomatol Trop.* 1991;14:24-8.
- 2- Allsopp J, Basu MK, Browne RM, Burge PS, Matthews JB. Survey of the use of personal protective equipment and prevalence of work related symptoms among dental staff. *Occup Environ Med.* 1997;54:125-34.
- 3- Al-Rabeah A, Mohamed AG. Infection control in the private dental sector in Riyadh. *Ann Saudi Med.* 2002;22(1-2):13-7.
- 4- Bentley EM, Sarll DW. Improvements in cross infection control in general dental practice. *Br Dent J.* 1995;179:19-21.
- 5- Bolyard EA, Tablan OC, Williams WW, Pearson ML, Shapiro CN, Deitchman SD. Guideline for infection control in health care personnel, 1998. Hospital Infection Control Practices Advisory Committee. *Am J Infect Control.* 1998;26:289-354.
- 6- Centers for Disease Control and Prevention. Possible transmission of human immunodeficiency virus to a patient during an invasive dental procedure. *MMWR Morbid Mortal Wkly Rep.* 1990;39:489-93.
- 7- Centers for Disease Control and Prevention. Recommended infection-control practices for dentistry. *MMWR Morbid Mortal Wkly Rep.* 1993;42:1-12.
- 8- Centers for Disease Control and Prevention. Update: transmission of HIV infection during invasive dental procedures-Florida. *MMWR Morbid Mortal Wkly Rep.* 1991;40:377-81.
- 9- Cohen AS, Jacobsen EL, Begole EA. National survey of endodontists and selected patient samples: infectious diseases and attitudes toward infection control. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1997;83:696-702.
- 10- Cottone JA, Terezhalmay GT, Molinari JA. Practical infection control in dentistry. 2nd edition. Baltimore: Williams and Wilkins; 1996.
- 11- Davies KJ, Herbert AM, Westmoreland D, Bagg J. Seroepidemiological study of respiratory virus infections among dental surgeons. *Br Dent J.* 1994;176:262-5.
- 12- DiAngelis AJ, Martens LV, Little JW, Hastreiter RJ. Infection control practices of Minnesota dentists: changes during 1 year. *J Am Dent Assoc.* 1989;118:299-303.
- 13- Gerbert B. AIDS and infection control in dental practices: dentists' attitudes, knowledge, and behavior. *J Am Dent Assoc.* 1987;114:311-4.
- 14- Gershon RR, Karkashian C, Vlahov D, Grimes M, Spannhake E. Correlates of infection control practices in dentistry. *Am J Infect Control.* 1998;26:29-34.
- 15- Gibson GB, Mathias RG, Epstein JB. Compliance to recommended infection control procedures: changes over six years among British Columbia dentists. *J Can Dent Assoc.* 1995;61:526-32.
- 16- Klein RS, Freeman K, Taylor PE, Stevens CE. Occupational risk for hepatitis C virus infection among New York City dentists. *Lancet.* 1991;338:1539-42.
- 17- Kurdy S, Fontaine RE. Survey on infection control in MOH dental clinics, Riyadh Saudi Epidemiol Bull. 1997;(3,4):21-8.
- 18- Lewis DL, Arens M, Appleton SS, Nakashima K, Ryu J, Boe RK, et al. Cross-contamination potential with dental equipment. *Lancet.* 1992;340:1252-4.
- 19- Martin MV. New concepts in cross infection control in dentistry. *Postgrad Dent.* 1990:8-11.
- 20- McCarthy GM, MacDonald JK. The infection control practices of general dental practitioners. *Infect Control Hosp Epidemiol.* 1997;18:699-703.
- 21- Merchant VA. Herpesvirus and other micro-organisms of concern in dentistry. *Dent Clin North Am.* 1991;35:283-98.
- 22- Miller CH. Sterilization: disciplined microbial control. *Dent Clin North Am.* 1991;35:339-55.
- 23- Mori M. Status of viral hepatitis in the world community: its incidence among dentists and other dental personnel. *Int Dent J.* 1984;34:115-21.
- 24- Morris E, Hassan FS, Al Nafisi A, Sugathan TN. Infection control knowledge and practices in Kuwait: a survey on oral health care workers. *Saudi Dent J.* 1996;8:19-26.
- 25- Mutlu S, Porter SR, Scully C. Cross-infection control in dentistry. *Erofset, Istanbul, Turkey;* 1996.
- 26- Panis B, Roumeliotou-Karayannis A, Papaevangelou G, Richardson SC, Mitsis F. Hepatitis B virus infection in dentists and dental students in Greece. *Oral Surg Oral Med Oral Pathol.* 1986;61:343-5.
- 27- Reinthaler F, Mascher F, Stunzner D. Serological examinations for antibodies against Legionella species in dental personnel. *J Dent Res.* 1998;67:942-3.
- 28- Runnells RR. An overview of infection control in dental practice. *J Prosthet Dent.* 1988;59:625-9.
- 29- Samaranyake L. Rules of infection control. *Int Dent J.* 1993;43:578-84.
- 30- Sobayo EL. Nursing aspects of infection control in developing countries. *J Hosp Infect.* 1991;18(Suppl A):388-91.
- 31- Thomas DL, Gruninger SE, Siew C, Joy ED, Quinn TC. Occupational risk of hepatitis C infections among general dentists and oral surgeons in North America. *Am J Med.* 1996;100:41-5.
- 32- Treasure P, Treasure ET. Survey of infection control procedures in New Zealand dental practices. *Int Dent J.* 1994;44:342-8.
- 33- Verrusio AC, Neidle EA, Nash KD, Silverman S Jr, Horowitz AM, Wagner KS. The dentist and infectious diseases: a national survey of attitudes and behavior. *J Am Dent Assoc.* 1989;118:553-62.
- 34- Woo J, Anderson R, Maguire B, Gerbert B. Compliance with infection control procedures among California orthodontists. *Am J Orthod Dentofacial Orthop.* 1992;102:68-75.
- 35- Wood PR. A practical gloving and handwashing regimen for dental practice (letter). *Br Dent J.* 1992;172:367-8.
- 36- Wood PR. Cross infection control in dentistry: a practical illustrated guide. London: Wolfe Publishing; 1992.