

Health hazard evaluation in private dental practices: a survey in a province of northern Italy

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Abstract. The purpose of this questionnaire survey was to evaluate the knowledge and attitudes of private dental health care workers about cross-infection hazards through examination of practising behaviour in respect of infection control. A questionnaire was sent by mail to the private dentists operating in Parma province. The survey concerned 7 groups of questions about demographic data, personal protective equipment, immunization, sterilization and disinfection, waste disposal and occupationally acquired injuries, behaviour. Four hundred questionnaires were sent to the members of the Medical and Dentist College of Parma: 122 were returned and analysed (30.5%). Among the infectious diseases 45% of the interviewed think that the most dangerous diseases are Hepatitis B and C, followed by HIV infection (21.5%). The most used personal protective equipments are gloves (98%), masks (95%) and protective eyewear (94%). Sixty eight per cent of the dentists treat HBV, HCV, HIV, TB, HSV suffering patients at the end of the working day. Twenty nine point 7% of them claim to have written protocols to follow in case of accident. Altogether the results show a good knowledge of the most important risks related to dentistry activity and of the main procedures for the infection control and management.

Key words: Dentistry, biological risk, procedure control, postal questionnaire

Introduction

Dental settings are high risk environment for biological risk, either for transmission modalities that could be realized, or for the wide range of micro organisms that pose a threat, as it has been reported in literature (1, 2).

Since the early publications in 1993 of the Centers for Disease Control and Prevention guidelines, that first described the concept of universal infection control (3), some literature data would indicate not such a good application and adherence to this protocol (4, 5). All patients should be treated as potential carriers of pathogenic micro-organisms.

The aim of this study was to evaluate dentists' knowledge and attitude (behaviour) about cross-infections control procedure, according to their degree in Medicine or post degree specialization in Stomatology or the new course of study in Dentistry.

Materials and Methods

On February 2002, a questionnaire was sent by mail to all private dentists in Parma province.

A presentation letter explaining the aims and goals of the study was attached to the questionnaire. Despite a prepaid reply envelope enclosed in the que-

stionnaire pack, the response rate was about 30% only, however equivalent to other similar investigation performed with the same methodology (6-8).

One hundred and twenty two questionnaires were returned, all valid but one.

The questionnaire arranged by the SITI (Società Italiana di Igiene, Medicina Preventiva e Sanità Pubblica) research group "Hygiene in dental practice" titled "Health hazard evaluation in private dental practices: a survey in a province of northern Italy" was divided into seven groups of questions.

Group #1

Listing questions on personal data and on professional career: gender, age, type of graduation, professional rolls, weekly hours dedicated to dental assistance.

Group #2

Questions on professional asset: surface, total number of dental units and their location per room, units age, place of work environmental conditions and building features.

Group #3

Questions about disinfectants and toxic compounds mainly used to clean surfaces, instruments and hand pieces instruments.

Group #4 and #5

Questions about potential infectious risks awareness and their prevention through vaccination, security protocols adoption and individual protection tools.

Group #6

Questions about instruments management, with particular focus on instruments and hand pieces disinfections and sterilization.

Group #7

The last group of questions was about information source and available professional update modality.

Answers to the questions listed above were included in personal binders and, a statistic descriptive analysis was carried out on the data collected, before starting, where needed, with variance and frequency difference analysis.

Results

Four hundred questionnaires were sent to members of the Medical and Dentist College of Parma by mail, 122 were returned and analysed (30.5%). The results are summarized in tables 1 and 2.

First group: personal data and type of activities

The average age of the interviewed dentists was 43 years (S.D. 9.7; range 25-77), the mean period of activity was 15 years (range 0.4-50 years) and the weekly time dedicated to dental assistance was between 20 and 49 hours.

Males were prevalent (78.5%); 62% of the dentists had medical degree (and 31% were specialists in Stomatology), the other 38% had a Dentistry degree.

Second group: structural and organization characteristics of out-patients clinics

The average office area was 95 square metres; the dentists reported in 92% only one dental unit per room, in 62% the dental unit was older than 5 years.

The offices were equipped with a waiting room (100%), storage room (56.1%), settings for washing, disinfection and sterilization (78.3%), marble/ceramic floor (56%), walls with washable surfaces (91.7%), pedal or lever tap in about 100% of the cases and disposable hand drier used by 88% of the sample.

Third group: disinfectants and toxic compounds

A variety of chemical products were usually employed by dentists in their practice, but the most common active principles were mainly glutaraldehyde solution for instruments and quaternary ammonium (QAC) for surfaces and hand pieces.

Table 1. Perception of risk

		N.	Percentage
<i>Awareness of risk</i>			
	Hepatitis	142	44.94
	HIV	68	21.52
	TBC	33	10.44
	Influenza	12	3.80
	HSV	40	12.66
	Other	21	6.64
	Total	316	100
<i>Accident</i>			
Needle stick and other injuries in the last 5 years	Total	88	73.0
	With needles	48	54.5
	With cutters	18	20.45
	Other	22	25.0
<i>Acquired diseases</i>			
	Total	3	2.4
	HBV	2	1.6
	HSV1	1	0.8
<i>Prevention</i>			
Vaccination against HBV seroconversion test		107	89.2
		74	71.8
<i>Periodic controls</i>			
Serologic test	HBV	78	69.0
	HCV	71	64.5
	HIV	62	57.4

Fourth group: awareness of risk

Among the infectious diseases 45% of the interviewed thought that the most dangerous diseases were Hepatitis B (HBV) and C (HCV) virus, followed by Human Immunodeficiency Virus (HIV) infection (21.5%), Herpes Simplex (HSV) and *Mycobacterium tuberculosis* (13% and 10% respectively).

Fifth group: prevention of biological risk

Eighty nine per cent of the dentists were vaccinated against HBV virus infection and 72% had tested the seroconversion.

In relation to the periodic controls, 69% claimed the search for HBV markers, 65% for HCV, 57% for HIV.

Seventy three per cent of the dentists had an accident in the last 5 years. The accidents were mainly caused by needle stick injuries (54.5%), frees

(20.45%), other instruments as well as extractive levers, specillum etc. (25%).

Forty eight point two per cent of them thought that surgical acts as well as medical treatments of implant, avulsion or abscess were very dangerous or at high risk for the patients.

The most used personal protective equipments were gloves (98%), masks (95%) and protective eyewear (94%).

Ninety nine per cent of the dentists changed gloves after each patient and 27% also changed the mask; 94% eliminated needles in suitable boxes. Sixty eight per cent of the interviewed claimed to wash hands before and after each patient; the 27.9% of them used disinfectants, first of all clorexidine and QAC. Sixty eight per cent of the dentists treated HBV, HCV, HIV, TB, HSV suffering patients at the end of the working day and 29.7% claimed to have written protocols to follow in case of accident.

Table 2. Protection tools

		N°	Percentage	
<i>Hands washing</i>				
before and after each patient		83	68.0	
more times during the day		42	34.4	
at the beginning and at the end of the day		4	3.3	
<i>With</i>				
liquid soap or detergent		105	86.0	
disinfectant		34	27.9	
water		3	2.5	
<i>Individual protection tools</i>				
Dental dam		56	45.9	
Masks		116	95.1	
Protective eyewear		115	94.3	
Head gear		26	21.3	
Single normal gloves		116	95.1	
Single thick gloves		24	19.7	
High speed turbin		108	88.8	
Disposable coat		62	50.8	
<i>Protection tools</i>				
Low speed handpieces		69	81.2	
High speed handpieces		106	93	
Air depuration		17	23.6	
Air conditioning		86	78.9	
<i>Dental unit characteristics</i>				
One way valves		80	39.02	
Filters		89	43.41	
Cleaning in place system		32	15.60	
Other system		4	1.95	
<i>Instruments in use</i>				
Boiler		4	3.3	
Dry heat stove		30	24.6	
Autoclaves		115	94.3	
Chemiclaves		15	12.3	
Sterilizer quartz beads		46	37.7	
Micro-wave sterilizer		5	4.1	
UV lamps		25	20.5	
		Disinfection	Sterilization	Film
<i>Handpieces and instruments</i>				
After each patient	Micromotor	75 (49.34%)	59 (38.81%)	18 (11.84%)
	turbine	74 (49%)	59 (39.07%)	18 (11.92%)
	air-water gun	86 (58.10%)	31 (20.94%)	31 (20.94%)

Sixth group: management of the instruments in use

The analysis showed that dental units received filtered (38.2%) and demineralised (36.87%) water and they were equipped with filters (43.41%) and one way valves (39.02%).

The disinfection of the suction circuit of the dental unit was performed about every 2 days. Before the sterilization, the instruments were cleaned up and then disinfected in 56.76% or treated with ultrasounds (20.10%).

The reusable instruments that couldn't be sterilized were :

- Cleaned and disinfected in 75.86%.
- Disinfected and cleaned in 12.06%.
- Disinfected only in 11.20%.

The hand pieces and the air-water gun were disinfected after each patient respectively in 49% and 58%. Thirty eight point five per cent of the dentists used a different sterilization and disinfections pattern for high risk patients dedicated instruments; this procedure included increased time of contact with detergents and disinfectant solution, increased number of sterilization cycles and use of dedicated instruments.

Eighty two point eight per cent of the dentists prefer reusable cutters and 98% of the sample use them only once.

In 79% of the cases dental impressions were disinfected and in 60.4% the prostodontics manufactures were disinfected too. Offices were provided with autoclaves (94.3%), sterilizer quartz beads (37.7%), dry heat stoves (24.6%), UV lamps (20.5%) chemoclaves (12.3%); in 79.7% of the cases were also present effectiveness indicators for stoves and autoclaves and in 86.9% also sterilization efficacy controls. In 95.1% of the cases sterile materials were kept in closed shelves.

Seventh group: informations sources

In the questionnaire 65% of the dentists considered their level of knowledge about professional risk and prevention of the infectious diseases transmission sufficient and 33.3% elevated.

The principal information sources were: special reviews (83.6%), post university masters (48.4%) and university courses (30.3%).

Fifty six point six per cent of the dentists followed stages about infection risk evaluation in dentistry according to the law 626/94 and D.M. 16/01/97; these stages were mainly organized by ANDI (Associazione Nazionale Dentisti Italiani) (36.88%).

Discussion

Dentistry private practice is about 90% of dentistry assistance in Italy. This profession is characterized mainly by individual workers or associated with other colleagues; although they share settings and instruments they use to manage the different aspects of their job individually.

During daily routine the private dentist carries on a wide variety of tasks, ranging from instruments management to maintenance of safe environment and equipment.

Hygienic problems correlated to dentistry assistance should not be a simply work's appendices, but focus of educational intervention of those, either at academic or at professional level, who take care of education and training.

To improve information about biological risk, as well as procedure associated to cross-infections prevention, a learning instrument (the questionnaire) on dentist's knowledge and attitude has been arranged in order to photograph the present situation and to carry out a cultural journey based on the highlighted needs.

From the collected data an overall good knowledge about risk-related behaviour and effective control of procedures to reduce that threat, resulted despite some mismatching data.

HBV and HCV, by the way, as emerged in previous survey, are considered the most contagious diseases as well as HIV, meanwhile TB and Influenza are considered less dangerous.

Probably the formula of the question was not so clear, thus the interviewed dentist has considered the disease intrinsic dangerousness and not the risk of spread or rate transmission.

Nevertheless, active immunization against HBV is very frequent among the youngest dentists, while flu vaccination is a rarely accepted practice. Although

they claim to be afraid to contract HCV and HIV infection, a relatively small percentage of dentists undergo periodic serological controls.

Although half of the dentists claim they have had some injury in the last 5 years, just a few of them have a written protocol in case of accident.

It would be probably interesting to know whether in the daily routine the new patient's is remote and recent anamnesis is performed. Nevertheless, this practice may result theoretically superfluous if we start from the point that all patients may be potentially able to carry infections.

The correct dental unit management represents a very important step on the way to prevention.

Water, in particular, represents a critical hazard point. The most common cause of dental unit's water contamination is supposed to be the biofilm forming (9-11) composed by micro-organisms that initially sticks reversibly to the water system wall. Thanks to the production of polysaccharide, the stickiness becomes irreversible and the biofilm becomes a substrate to grow up and proliferation of other micro organisms including some pathogens ones. Inside the biofilm micro organisms are more resistant to antimicrobial action and even more difficult to remove (12). Despite the difficult servicing of the filtration based systems, 38.12% of the dentists claimed to use filtered water, while 12.7% only had sterile water based instruments (for surgery). A short rate used disinfected water even though the active principle is not reported.

Disinfections and sterilization practice are widely accepted, in the offices autoclaves with efficiency indicators and efficacy controls (47.9%) appear, but also quartz beads sterilizations, dry ovens, UV lamps, often at the meantime.

Despite a good overall knowledge regarding related health-hygienic procedures, only 33.3% of the interviewed dentists considered their information level good; this rate was greater between professionals coming from the new study course, but not in a really statistic significant way.

References

1. Gillerist JA. Hepatitis viruses A, B, C, D, E and G: implications for dental personnel. *J Am Dent Ass* 1999; 12: 197-200.
2. Monarca S, Grottolo M, Renzi D, et al. Evaluation of environmental bacterial contamination and procedures to control cross infection in a sample of Italian dental surgeries. *Occup Environ Med* 2000; 57: 721-6.
3. Center for Disease Control and Prevention. Recommended infection control practices for dentistry. CDC MMWR 1993; 42: 1-12.
4. Maupome G, Borges-Yanes SA, Diez-De-Bonilla FJ, Iri-goten Camacho ME. Attitudes toward HIV-infected individuals and infection control practices among a group of dentists in Mexico City: a 1999 update of the 1992 survey. *Am J Infect Control* 2002; 30: 8-14.
5. Gordon BI, Burke FJT, Bagg J, Marlborough HS, McHugh ES. Systematic review of adherence to infection control guidelines in dentistry. *J Dent* 2001; 29: 509-16.
6. Montagna MT, Napoli C, Tatò D, et al. Risultati di un'indagine multicentrica sugli aspetti igienico-sanitari legati all'assistenza odontoiatrica privata. In press.
7. Monarca S, Galli MG, Tarsitani G, et al. Valutazione dei problemi igienico-sanitari legati all'assistenza odontoiatrica pubblica: indagine in 14 città italiane. *Ann Ig* 2002; 14: 15-25.
8. Bailey KD. Metodi della ricerca sociale. (Bologna, Il Mulino, 1985)
9. Gilbert P, Das J, Foley I. Biofilm susceptibility to antimicrobials. *Adv Dent Res* 1997; 11: 160-7.
10. Williams JF, Johnston AM, Johnson B, Huntington MK, Mackenzie CD. Microbial contamination of dental unit waterlines: prevalence, intensity and microbiological characteristics. *J Am Dent Assoc* 1993; 124: 59-65.
11. Mayo JA, Oertling, Andrieu SC. Bacterial biofilm: a source of contamination in dental air-water syringes. *Clin Prev Dent* 1990; 12: 13-20.
12. Dibdin GH, Assinder SJ, Nichols WW, Lambert PA. Mathematical model of beta-lactam penetration into a biofilm of *Pseudomonas aeruginosa* while undergoing simultaneous inactivation by released betalactamases. *J Antimicrob Chemother* 1996; 38: 757-69.

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