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# Compliance with occupational post-exposure protocol for injuries among dental surgeons

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## ABSTRACT

**OBJECTIVE:** To analyze the compliance with occupational post-exposure protocol for accidents and factors associated with compliance among dental surgeons.

**METHODS:** A cross-sectional study was performed in the municipality of Montes Claros, Southeastern Brazil, from 2007 to 2008, with accident reports from needles and sharp instruments among practicing dental surgeons. Variables describing the dentists' characteristics, work conditions, clients, injuries from needles and sharp instruments and post-accident actions were evaluated by means of a previously tested, structured questionnaire. The data underwent descriptive analysis and chi-square testing ( $p < 0.05$ ).

**RESULTS:** A total of 241 dentists (89.2%) answered the questionnaire. Compliance with occupational post-exposure protocol was reported by 51.5%. The majority of the professionals reported seeing blood at the time of the accident. Burs were the instrument most often involved in accidents, and the finger was the most injured body part. Compliance with a post-exposure protocol was more prevalent among those with greater monthly income (OR=2.42; 95% CI=1.03;5.71), continuing education in the last two years (OR=2.16; 95% CI=1.09;4.27) and who took regular breaks every four hours (OR=1.23; 95% CI=1.23;4.92). Dental surgeons who attended to children (OR=0.50; 95% CI=0.27;0.93) and to individuals from the middle, middle-high and high socioeconomic classes (OR=0.54, 95% CI=0.31;0.95) showed less compliance with the occupational post-exposure protocol. The frequency of compliance to a post-exposure protocol was significantly greater among individuals who followed the actions described in post-exposure protocols.

**CONCLUSIONS:** There is low compliance with occupational post-exposure protocols among dentists, which is influenced by the knowledge and monthly income of professionals, by taking regular breaks, by age group and the socioeconomic class of the clientele.

**DESCRIPTORS:** Dentists. Post-Exposure Prophylaxis. Health Behavior. Occupational Exposure, prevention & control. Accidents, Occupational, prevention & control.

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## INTRODUCTION

The main cause of occupational accidents in health professionals is related to the use of needles and sharp instruments.<sup>3</sup> In dentistry, occupational accidents involving exposure to biological material are frequent due to working with these instruments in a field with restricted vision and subject to the movement of patients.<sup>16,21</sup> The prevalence of occupational exposure was 39.1% among dentists in the city of Florianópolis, Southern Brazil, predominantly from percutaneous injuries.<sup>9</sup> Percutaneous exposures represent almost all accidents involving biological material among dental surgeons of public hospitals in Brasília, federal district.<sup>3</sup> Other research in Brazil, considering various reference periods (six months, one year, and the professional career), identified a high prevalence of accidents with needles and sharp instruments among dental surgeons with values varying from 26.0% to 75.0%.<sup>8,12,18</sup>

Blood is the most frequent biological material in occupational exposures, which is worrisome since it can carry pathogens such as hepatitis B (HBV) and C (HCV) and the human immunodeficiency virus (HIV).<sup>21</sup> Workplace accidents with blood and other potentially contaminated fluids should be treated as medical emergencies, since prophylaxis for HIV and hepatitis B infection need to start soon after the accident for the highest efficacy.<sup>7</sup> Despite the risk of infection in dentistry from bloodborne pathogens is considered low, there are proven cases of occupational transmission in dentistry.<sup>4,7</sup> The accident can even have psychosocial repercussions, causing changes in social, family, and work relationships.<sup>13</sup>

No post-exposure measures are completely effective, and chemoprophylaxis to reduce the risk of HCV transmission after occupational exposure do not exist.<sup>9</sup> Therefore, the occupational transmission of infections should be avoided through the use of measures to reduce exposure to biological materials, including a combination of standard precautions, engineering measures, work practices and administrative controls.<sup>7</sup> Although blood contact with skin and mucosa can be reduced by the use of traditional barriers, such as gloves, they are not effective in preventing injuries from needles and sharp instruments.<sup>6</sup>

In situations where occupational exposures can not be avoided, post-exposure actions can prevent infections and should be adopted. These measures should include

the immediate evaluation of the injury, chemoprophylaxis when necessary, counseling for the professional and for the patient and ongoing monitoring of the professional.<sup>12,a,b</sup> In Brazil, the Ministry of Health has made manuals available to dentists, containing prevention guidelines and action protocols for occupational accidents with biological material.<sup>a,b</sup> These actions should be promoted among the professionals and adopted in health establishments, including in dental offices and clinics.

Considering the situation, the objective of this study was to analyze compliance with an occupational post-exposure protocol, the factors associated with compliance among dentists and the characteristics of the injuries involved.

## METHODS

This cross-sectional epidemiological study was performed in the city of Montes Claros, Southeastern Brazil, between September of 2007 and March of 2008. The study scope was dentists registered with the Montes Claros section of the Regional Dentistry Council (*Conselho Regional de Odontologia, CRO/MG*), Minas Gerais. The exclusion criteria used were: not performing clinical work or attending outside the municipality, being retire or being away from work due to illness. To select the study participants, initial contact with all the professionals was attempted by telephone or in person, and the research was explained. Three attempts were made to contact by telephone or by office visit

Participants answered a self-administered, structured questionnaire.<sup>c</sup> The tool's reproducibility was tested with Kappa coefficient. The questionnaires were distributed in unmarked, closed envelopes and gathered after eight weeks at the participants' workplace. The following groups of variables were analyzed: dentists' characteristics, work conditions of the dentists, characteristics of clients, characteristics of injuries from needles and sharp instruments suffered by dentists, and post-accident actions.

The variables concerning the dentists' characteristics were about sociodemographics (age group, sex, marital status, monthly income), professional training (years since graduation, degree level and continuing education

<sup>a</sup> Ministério da Saúde. Secretaria de Políticas de Saúde. Coordenação Nacional de DST e Aids. Controle de infecções e a prática odontológica em tempos de AIDS: manual de condutas – Brasília; 2000[cited 2009 Feb 23]. Available from: [http://www.aids.gov.br/final/biblioteca/manual\\_odonto.pdf](http://www.aids.gov.br/final/biblioteca/manual_odonto.pdf)

<sup>b</sup> Ministério da Saúde. Portaria nº 777, de 28 de abril de 2004. Dispõe sobre os procedimentos técnicos para a notificação compulsória de agravos à saúde do trabalhador em rede de serviços sentinela específica, no Sistema Único de Saúde – SUS. *Diário Oficial Uniao*. 29 abr. 2004[citado 2009 abr 14];Seção 1:37-8. Available from: <http://dir2001.saude.gov.br/sas/Portarias/Port2004/GM/GM-777.htm>

<sup>c</sup> Martins AMEBL. Uso de equipamento de proteção individual e vacinação contra Hepatite B entre cirurgiões dentistas de Montes Claros, MG [master's dissertation]. Belo Horizonte:Universidade Federal de Minas Gerais; 2001.

in the last two years), vaccination against hepatitis B and knowledge of the occupational post-exposure protocol proposed by the Ministry of Health. The following work conditions were evaluated: length of clinical practice, work days per week, hours per day worked in the clinic, service location, work system utilized, simultaneous attendance of patients, number of patients in four hours, regular work breaks every four hours and level of professional satisfaction. Professional satisfaction was evaluated on a scale of 1 to 10 and was respectively categorized as low, medium and high, at 0 to 6, 7 to 8 and 9 to 10 points. The clients' characteristics were age group, socioeconomic class, percentage of patients with insurance and care of patients who knew they had HIV, HBV, or HCV.

Accidents with needles and sharp instruments were characterized by the amount of time elapsed since the injury, the most frequent instrument used in the accident, the body part most frequently injured and the presence of bleeding at the time of injury.

The study analyzed the following occupational post-exposure actions: compliance with a post-exposure protocol; thorough washing of the injury with soap and water; the depth of the injury; the dental procedure being performed and the instrument used at the time of the accident; search for the patient's personal information or medical records which could establish a risk of infection; performance of serological tests for HBV and HIV antibodies; counseling the patient to undergo serological testing for HBV and HIV; and finally, reporting the accident to a health monitoring body.

The study identified 565 dentists registered with the Montes Claros subsection of the CRO/MG, of which 60 were unable to be contacted. Among the 505 identified, 333 were eligible. Of the 172 excluded, 109 were not clinically active or worked outside the municipality, 56 were retired and seven were not working due to illness. There were 297 dentists who participated for a response rate of 89.2%. Of the 297 participants, 241 reported having suffered an injury with needles or sharp instruments during their career. The analysis was therefore restricted to these 241 professionals.

The data underwent a descriptive analysis. The association between reporting compliance or non-compliance with a post-exposure protocol to the variables relating to the dentists' characteristics, work conditions of the dentists, the characteristics of clients services and occupational post-exposure actions were evaluated using a Pearson chi-square test (with a 95% significance level). In the bivariate analysis, the variables marital status, degree level, hours per day worked in the clinic, service location and age group of the clients were dichotomized. The statistical analysis was performed with SPSS 15.0 software.

The study was approved by the Ethics Committee of the *Faculdades Unidas do Norte de Minas* (FUNORTE/01/2006).

## RESULTS

Of the 241 professionals who reported an injury from a needle or sharp instrument during their career, a total of 227 answered the question about compliance with an occupational post-exposure protocol, and 117 (51.5%) reported compliance with some protocol. The level of agreement to each question varied from 0.81 to 0.92.

The average age of the participants was 37.4 years (SD= 9.5), with the majority being women, married, and earning between six and ten minimum salaries. Approximately half had graduated within less than ten years, and the majority had a specialization as their highest degree. Participation in continuing education courses in the last two years was high, as was reported completion of the HBV vaccination schedule. About half reported knowledge of the existence of an occupational post-exposure protocol from the Ministry of Health (Table 1). Regarding the dentists' work conditions, the majority reported performance of clinical activity for more than six years, worked in the clinic from five to six days per week, and worked from five to eight hours per day. Almost half provided services exclusively in a private office. The majority reported providing care with four hands, not attending two or more patients simultaneously, and caring for between five and eight patients per four hour work shift. The majority reported not taking regular work breaks. The majority also reported a high level of satisfaction with the profession. In respect to the characteristics of the clients cared for by the professionals, the majority reported providing care to children as well as to adults. Half of the patients were from a low of medium-low socioeconomic class. Few professionals reported having knowingly provided services to people with HIV, HBV or HVC (Table 2).

The majority of professionals reported that the bur was the instrument most frequently involved, with the finger being the principal place of injury and with detection of blood at the moment of injury. In regards to post-accident actions, the vast majority of participants reported thoroughly washing the location with soap and water after an injury with needles of sharp instruments. The majority reported not remembering if blood was drawn, the depth of the wound or the discovery of the injury, as well as not seeking out the patient's medical history and personal information. Few reported having performed serological tests for HBV and HIV after the exposure. Counseling the patient to undergo serological tests and the notification of accidents were the least practiced procedures (Table 3).

**Table 1.** Dentist's characteristics according to sociodemographic variables, professional training, vaccination against hepatitis B and knowledge of an occupational post-exposure protocol. City of Montes Claros, Southeastern Brazil, 2007-2008.

Variable	n	%
Sociodemographic variables		
Age group (years)		
23 to 30	45	20.7
31 to 40	60	27.7
41 to 50	57	26.3
More than 50	55	25.3
Sex		
Male	112	47.1
Female	126	52.9
Marital status		
Married	157	65.7
Single	69	28.9
Separated/divorced	11	4.6
Widowed	2	0.8
Monthly income in minimum salaries		
1 to 5	36	15.6
6 to 10	124	53.7
More than 10	71	30.7
Professional training		
Years since graduation		
1 to 5	44	19.6
6 to 10	67	29.9
11 to 21	55	24.6
More than 21	58	25.9
Degree level (Highest degree)		
Bachelors	84	35.6
Specialization	131	55.5
Masters	19	8.1
Doctorate	2	0.8
Continuing education in last two years		
Yes	190	79.5
No	49	20.5
Vaccination against hepatitis B		
Completed	212	91.4
No vaccination or incomplete	20	8.6
Knowledge of the occupational post-exposure protocol		
Yes	111	47.6
No	122	52.4

Note: The numbers of observations and the percentages refer to the number of valid observations for each variable.

**Table 2.** Workplace characteristics of dental surgeons and of their clientele. City of Montes Claros, Southeastern Brazil, 2007-2008.

Variable	n	%
Work conditions of the dentists		
Length of clinical practice (years)		
Less than 5	53	22.2
6 to 15	98	41.0
More than 15	88	36.8
Work days in the clinic per week		
1 to 4	46	19.5
5 to 6	190	80.5
Daily hours worked in the clinic		
Less than 4	35	14.6
From 5 to 8	140	58.6
More than 8	64	26.8
Service location		
Private office	111	46.3
Private and public office	39	16.2
Other	90	37.5
Work system utilized		
Two hands	77	32.6
Four hands	159	67.4
Simultaneous attendance of patients		
Yes	32	13.4
No	207	86.6
Number of patients cared for in 4 hours		
1 to 4	74	31.1
5 to 8	124	52.1
9 or more	40	16.8
Work breaks every 4 hours		
No	114	47.9
Between every patient	71	29.8
Always when tired	53	22.3
Level of professional satisfaction		
Low	30	12.6
Medium	68	28.5
High	141	58.9
Characteristics of clientele		
Age group of clientele		
Only adults	60	25.5
Only children	5	2.1
Children and adults	170	72.4
Socioeconomic class of clientele		
Low/ medium low	104	50
Medium/ medium high and high	104	50
Percentage of patients with insurance		
Does not accept insurance No	79	37.3
From 1 to 24 %	62	29.2
From 25 or more	71	33.5

To be continued

Tabela 2 continuation

Variable	n	%
Care of patient who know they have HIV		
No	159	66.5
Yes	80	33.5
Care of patient who know they have HB or HC		
No	171	72.2
Yes	66	27.8

Note: The numbers of observations and the percentages refer to the number of valid observations for each variable.

An association was found between compliance with the post-exposure protocol and the dentist's monthly income, continuing education in the last two years, regular work breaks every four hours, age group and the socioeconomic class of the clients. The frequency of professionals that complied with a protocol significantly increased with an increase in the monthly income from the level of one to five minimum salaries to the level of 11 or more minimum salaries. There was a significantly greater frequency of compliance with a post-exposure protocol among those who had continuing education in the last two years and who reported always taking breaks when they are tired. Compliance with an occupational post-exposure protocol was respectively lower among those who only cared for children or children and adults and among those who cared for individuals from middle, low or high socioeconomic classes, when compared to those who attended to children and adults and to those who attended to individuals from low or middle classes (Table 4).

Overall the frequency of compliance with a post-exposure protocol was significantly greater ( $p < 0.05$ ) among those who reported performing the actions. However, even among those who reported compliance with a post-exposure protocol, many of them did not correctly follow the actions stipulated in the protocols. For example, out of the dentists who reported compliance, only 54% said they underwent an HIV test. An even smaller percentage made an official notification of the injury (Table 5).

## DISCUSSION

Occupational risk from infectious agents has been recognized since the beginning of the 1940s. Nonetheless, prophylactic measures and clinical and laboratory monitoring of workers exposed to bloodborne pathogens were only developed and implemented since the AIDS epidemic, in the beginning of the 1980s. In 1996 in Brazil, the Ministry of Health published the "Procedures in workplace accidents involving exposure to material potentially contaminated with the AIDS virus".<sup>d</sup> In 2000, a publication distributed for free by

professional societies to all dental surgeons described the actions following an occupational injury.<sup>a</sup> Recently, the *Agência Nacional de Vigilância Sanitária* (National Health Monitoring Agency) published and promoted the actions to be followed after an accident from needles and sharp equipment, which were freely available on-line.<sup>b</sup> Approximately half of dentists (52.4%) reported not knowing about the existing of occupational post-exposure protocols. A potential explanation for this result can be the fact that more than half of participating dental surgeons had graduated more than 11 years earlier, when possibly this topic was not addressed in their education.

The proportion of completed HBV vaccination among dentists in this study was greater (91.4%) than reported in 1999 (74.9%) among dental surgeons in the same city, who suffered and did not suffer workplace accidents.<sup>11</sup> This increase appears to reflect on a greater awareness among professionals of the need and importance of primary preventative vaccination against hepatitis B, since one of reasons observed for not vaccinating was lack of information.<sup>11</sup> Compared to international studies, the prevalence of completed vaccination among dental surgeons was greater than observed in Germany (74%)<sup>1</sup> and in Thailand (68%),<sup>10</sup> but approximated the rate observed in South Africa (90%)<sup>20</sup> and in the United Kingdom (99,0%).<sup>15</sup> In this study, the professionals were not asked about post-vaccination immunity against hepatitis B, which should be verified within one month after the last dose in the vaccination schedule. The professionals, who did not develop adequate antibody levels after the primary vaccination schedule, should complete a second series of three vaccine doses or evaluate if they are infected with HBV.<sup>7</sup>

In this study, the instruments most often involved in accidents were burs, followed by dental explorer. Other studies in the literature with different samples of dentists showed similar results.<sup>6,8,16</sup> Dental surgeons in the municipality of Sertãozinho, Southeastern Brazil, reported a greater frequency of accidents with syringe needles and burs appeared in third place.<sup>2</sup> Consistent with other studies, the finger was the body part most

<sup>d</sup> Brígido LFM, Pinheiro MC. Procedimentos frente a acidentados de trabalho com exposição a material potencialmente contaminado com vírus da AIDS (HIV). *Bol Epidemiol AIDS*. 1996;4(3):3-5.

**Table 3.** Characteristics of accidents with needles and sharp instruments and post-accident actions adopted by dentists. City of Montes Claros, Southeastern Brazil, 2007-2008.

Variable	n	%
Characteristic of the accident		
Amount of time elapsed since the injury		
Last six months	55	22.9
More than six months	185	77.1
Most frequent instrument used at time of accident		
Burs	39	24.1
Explorer	30	18.5
Needle for anesthesia	26	16.0
Other	67	41.4
Body part most often injured		
Finger	132	57.4
Hand	67	29.1
Forearm	25	10.9
Other	6	2.6
Presence of bleeding at the time of injury		
No	104	43.7
Yes	134	56.3
Post-exposure actions		
Thorough washing of the injury with water and soap		
Yes	225	95.3
No	11	4.7
Noticed the occurrence of bleeding		
Yes	71	30.3
No	163	69.7
Noted the depth of the injury		
Yes	56	23.9
No	178	76.1
Noted the dentistry procedure that was being performed		
Yes	70	30.7
No	158	69.3
Noted the instrument used at the time of accident		
Yes	78	65.9
No	151	34.1
Searched for the patient's personal information and medical history		
Yes	157	67.1
No	77	32.9
Performed an HBV test		
Yes	30	12.8
No	123	52.6
No, because already vaccinated	53	22.6
No, because already vaccinated and tested immunity	28	12.0
Performed an HIV test		
Yes	66	28.4
No	166	71.6

To be continued

Tabela 3 continuation

Variable	n	%
Counseled the patient to undergo an HBV test		
Yes	45	19.3
No	188	80.7
Counseled the patient to undergo an HIV test		
Yes	43	18.5
No	190	81.5
Reported the accident to a health monitoring organization		
Yes	33	14.3
No	197	85.7

Note: The numbers of observations and the percentages refer to the number of valid observations for each variable.

often injured.<sup>16</sup> In order to avoid such accidents, precautions should be taking when receiving, using or passing sharp instruments by not directing the point towards the recipient. Besides this, syringes and needles should never be reused, bent, broken or manipulated by hands. Simple procedures such as not leaving burs and other common instruments setup on the micromotor or rotary instrument can reduce accidents during clinical dentistry. Considering that the fingers are the most frequently injured body part, it has been observed that one glove can reduce the volume of blood injected by suture needles by 70%. In the case of hypodermic needles, a glove can reduce blood exposure by 35 to 50%.<sup>17</sup>

Blood was the biological material observed by 56.3% of dental surgeons at the time of accident. Contact with blood can be responsible for the transmission of HIV and the hepatitis virus. Despite the low risk of transmission, all occupational exposures to blood or other potentially infectious material, including saliva, should be evaluated irrespective of the visible presence of blood.<sup>7</sup> In the same way, compliance with a post-exposure protocol is fundamental to reducing the odds of infection. Therefore, the compliance of only 51.5% of dentists in this study to post-exposure protocols should be questioned. In previous research, non-compliance with occupational post-exposure protocols was explained by the fact that professionals felt intimidated from submitting the patient to the measures and from reporting the accident.<sup>19</sup> Nonetheless, work conditions appear to interfere with the adoption of post-exposure protocols, since the variables of monthly income, taking of work breaks every four hours, age group and socioeconomic class of the clientele interfered with the prevalence of compliance. Additionally, the results suggest that knowledge supports adherence to the protocols, since it was more frequent among those who performed continuing education courses in the last two years.

It is worrisome that greater percentages of dental surgeons reported compliance with a protocol but did not adopt the recommended actions in the occupational post-exposure protocols (percentages varied from 4.5%

to 83.9%). This discrepancy illustrates the actual situation of the lack of compliance among dental surgeons, even with the high prevalence of accidents reported in the present study and in a previous study.<sup>11</sup> Previous research showed high percentages of dentists that do not follow appropriate procedures following occupational exposure.<sup>8,14</sup>

Among the immediate precautions after a percutaneous injury, thorough washing of the exposed location with water and soap was reported by almost all the professionals, a result similar to a report in Florianópolis, Santa Catarina state.<sup>9</sup> Washing helps reduce the level of microorganisms under an infectious dose, but scrubbing should not be performed in order to avoid moving a virus deeper into tissues.<sup>b</sup>

In the characterization of the accidents, it was observed that few professionals noted the depth of the injury, the occurrence of blood, and the procedures and instrument used at the time of accident. This data, that indirectly reveals the quantity of blood transferred in the exposure, are necessary so that a specialized doctor can determine the severity of the injury and decide to prescribe the post-exposure chemoprophylaxis.

A case-control study,<sup>5</sup> confirmed that the risk of HIV transmission was influenced by the depth of the injury, by the presence of visible blood at the location, and was greater when the patient was in a terminal phase of the disease or with AIDS. This study also showed that zidovudine prophylaxis following percutaneous exposure to HIV contaminated blood reduces the rate of seroconversion by approximately 81%.

The occupational post-exposure protocol still recommends the performance of HIV and HBV tests for the professional and the patient in order to indicate antiretroviral chemoprophylaxis for HIV infection, which should ideally be started after two hours from the accident, or the administration of hyperimmune gamma globulin for hepatitis B, which has a greater efficacy with timely use within 24 to 48 hours after



**Table 4.** Relationship between compliance with a post-exposure protocol to variables related to the dentists' characteristics, work conditions and characteristics of the clientele. City of Montes Claros, Southeastern Brazil, 2007-2008.

Variable	Compliance with a post-exposure protocol		Odds ratio	95% CI	p value
	n	%			
Age group					
23 to 30	26	25.5	1		
31 to 40	28	27.5	0.61	0.28;1.33	0.21
41 to 50	23	22.5	0.55	0.24;1.24	0.15
More than 50	25	24.5	0.75	0.33;1.72	0.50
Sex					
Male	48	42.1	1		
Female	66	57.9	1.43	0.84;2.42	0.19
Marital status					
Married	69	60	1		
Single/separated/divorced/widowed	33	46	0.64	0.37;1.12	0.12
Monthly income in minimum salaries					
1 to 5	12	10.7	1		
6 to 10	63	56.3	2.06	0.94;4.55	0.07
11 or more	37	33	2.42	1.03;5.71	0.04
Years since graduation					
1 to 5	25	23.4	1		
6 to 10	32	29.9	0.68	0.31;1.47	0.33
11 to 21	27	25.2	0.78	0.34;1.76	0.55
More than 21	23	21.5	0.61	0.27;1.40	0.24
Degree level (Highest degree)					
Bachelors	34	29.8	1		
Specialization/ Masters/ Doctorate	80	70.2	1.50	0.85;2.61	0.16
Continuing education in last two years					
Yes	100	86.2	1		
No	16	13.8	2.16	1.09;4.27	0.03
Vaccination against hepatitis B					
Completed	94	87.8	1		
Not vaccinated or incomplete	13	12.8	0.40	0.15;1.09	0.07
Knowledge of occupational post-exposure protocol					
No	54	49.1	1		
Yes	52	55.2	1.28	0.75;2.17	0.36
Length of clinical practice					
Less than 5 years	31	27	1		
6 to 15 years	45	39.1	0.61	0.31;1.21	0.16
more than 15 years	39	33.9	0.68	0.33;1.38	0.28
Work days in the clinic per week					
1 to 4	26	22.6	1		
5 to 6	89	77.4	0.69	0.35;1.34	0.27
Daily hours worked in the clinic					
Up to 8	86	73.5	1		
More than 8	31	26.5	0.88	0.49;1.57	0.66

To be continued

Tabela 4 continuation

Variable	Compliance with a post-exposure protocol		Odds ratio	95% CI	p value
	n	%			
Service location					
Private office	51	44	1		
Other	65	56	1.23	0.73;2.08	0.44
Work system utilized					
Two hands	32	27.8	1		
Four hands	83	72.2	1.55	0.88;2.73	0.13
Simultaneous attendance of patients					
Yes	15	13	1		
No	100	87	0.59	0.34;1.03	0.06
Number of patients cared for in 4 hours					
1 to 4	36	31.3	1		
5 to 8	60	52.2	0.98	0.54;1.78	0.95
9 or more	19	16.5	0.87	0.39;1.91	0.73
Work breaks every 4 hours					
No	49	42.2	1		
Between every patient	34	29.3	1.48	0.79;2.76	0.21
Always when tired	33	28.5	2.46	1.23;4.92	0.01
Level of professional satisfaction					
Low	14	12.1	1		
Medium	31	27	1.07	0.44;2.59	0.88
High	70	60.9	1.17	0.53;2.62	0.69
Age group					
Only adults	36	31.6	1		
Only children/ adults and children	78	68.4	0.50	0.27;0.93	0.03
Socioeconomic class of clients					
Low/ medium low	57	59.4	1		
Medium/ medium high and high	39	40.6	0.54	0.31;0.95	0.03
Percentage of patients with insurance					
Does not accept insurance	34	34.3	1		
From 1 to 24 %	29	29.3	1.25	0.63;2.49	0.53
25% or more	36	36.4	1.36	0.70;2.62	0.36
Care of patients who know they have HIV					
No	46	39.3	1		
Yes	71	60.7	0.59	0.34;1.03	0.06
Care of patients who know they have HB or HC					
No	34	29.1	1		
Yes	83	70.9	0.94	0.53;1.68	0.83

the accident.<sup>a,b</sup> Besides this, clinical and laboratory monitoring should be done for all injured professionals who have been exposed to patients with unknown serology or patients infected with HIV, HBV or HCV, independent of the use of chemoprophylaxis and immunizations.<sup>a</sup> In this study, 28.4% and 12.8% of the participants, respectively, underwent testing for HIV and HBV, and a small proportion of dentists reported

the performance of tests for the patient. These findings show the lack of compliance and knowledge of the post-exposure protocol by a large part of dental surgeons in Montes Claros. This may also reflect on a reluctance of professionals to be tested for HIV and other bloodborne pathogens, probably associated with discrimination or adverse professional consequences.<sup>14</sup> Additionally, the dentist may fear revealing to the patient that they

**Table 5.** Relationship between reported compliance with a post-exposure protocol and actions after accidents among dental surgeons. City of Montes Claros, Southeastern Brazil, 2007-2008.

Post-exposure actions	Compliance with a post-exposure protocol				OR	95% CI	p value
	No		Yes				
	n	%	n	%			
Thorough washing of the injury with soap and water	102	93.6	113	97.4	2.59	0.6;10.3	0.18
Noted the occurrence of bleeding	21	19.4	50	43.1	3.15	1.7;5.7	0.00
Noted the depth of injury	9	8.4	46	39.7	7.16	3.3;15.6	0.00
Noted the dentistry procedure being performed	16	15.2	52	46.0	4.74	2.5;9.1	0.00
Noted the instrument used at time of the accident	16	15.5	59	51.3	5.73	3.1;10.9	0.00
Searched for patient's personal information and medical history	55	51.4	95	81.9	4.28	2.3;7.8	0.00
Performed HBV test	33	30.8	73	63.9	3.81	2.2;6.6	0.00
Performed HIV test	15	14.0	47	40.9	4.24	2.2;8.2	0.00
Counseled patient to undergo HBV testing	10	8.3	33	28.9	3.95	1.8;8.5	0.00
Counseled patient to undergo HIV testing	12	11.2	29	25.4	2.70	1.3;5.6	0.01
Reported accident to a health monitoring body	5	4.8	28	24.8	6.59	2.4;17.8	0.00

suffered an injury involving biological material and be constrained from asking the patient about their serological status because of the relation of these diseases to sexually transmission and to injection drug use.<sup>9</sup>

Among health professionals working at public hospitals in the Federal District, including dental surgeons, 80.3% performed an HIV test after occupational accidents.<sup>e</sup> The fact that the professionals were in a hospital environment may have facilitated performing the test. Besides this, other health professionals, such as doctors and nurses may have greater knowledge of the risk of infection and the appropriate actions to take to avoid infection when compared to dentists. On the other hand, in this study 67.1% of professionals reported searching for the patient's personal information and evaluating their medical and life history to establish some risk level of infection. It may be more prudent to perform all the steps of post-exposure protocols, in order to most effectively reduce the occupational risk of infection.

The undernotification of accidents to a health monitoring system was also reported by other researchers. This has been explained through the perception of a low severity exposure, the perceived low risk from the patient, the lack of knowledge of the need to notify and the complexity of the process involved in registering an accident or the problems caused by interrupting the procedure and the work day in search of medical care

and the tests.<sup>9,16</sup> The undernotification observed was expected, since compulsory notification of injuries involving exposure to biological material was officially required on the 28 of April of 2004, by the *Portaria 777*.<sup>b</sup> The notification of workplace accidents is mandatory and provides data about the number, distribution and characteristics of accidents and victims, thereby constituting an indispensable database for the identification, creation and control of preventative measures.<sup>f</sup>

It is intriguing that 51.5% of dentists reported adopting an occupational post-exposure protocol and that the frequency of adopting proscribed post-exposure measures varies from 14.3% to 95.3%. Considering the nature of research, it can be speculated that the results overestimate the compliance with occupational post-exposure protocols, since subjects tend to falsely report acceptable behaviors. Therefore, permanent educational actions and individual and collective protective measures are fundamental to prevention occupational exposures to biological material. Prevention is the main and most effective measure for avoiding occupational transmission of diseases in dental practice.

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<sup>f</sup> Aquino JD. Considerações críticas sobre a metodologia de coleta e obtenção de dados de acidentes do trabalho no Brasil. São Paulo [master's dissertation]. Faculdade de Economia, Administração e Contabilidade da USP;1996.

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