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# Experience of injuries with sharp objects and perception of the institutional strategy for the control of hepatitis B vaccination

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**Abstract** The study evaluated the perception of dental students who have or have not experienced accidents with sharp objects regarding the institutional strategy for controlling hepatitis B vaccination. A retrospective observational case-control study was conducted involving 139 participants, of whom 36 had experienced accidents with sharp objects in a dental clinic (case group – CG) and 103 had not (control group – CGt). Information about accidents was obtained from institutional notification forms. Participants completed an online questionnaire assessing their perceptions of the institutional policies on mandatory vaccination and the occupational risks faced by dental professionals. A total of 204 students were enrolled across six classes in which cases were reported (36 cases, 17.6%). The most common cause of accidents was the anesthesia needle, and 72.2% of accidents occurred with students in the fifth and sixth semesters of the undergraduate program (third year). CGs assigned higher scores to the importance of mandatory vaccination and reported lower confidence levels regarding the risk of contracting hepatitis B and HIV in the event of a biological accident. It was concluded that one in six students reported sharp objects-related accidents, the majority of which could have been prevented by adherence to biosafety protocols. For most students, the experience of such an accident led to a deeper understanding of the biological risks involved.

**Descriptors:** Vaccination. Hepatitis B. Seroconversion. Wounds, Stab.

**Experiencia de accidentes con objetos punzantes y percepción de la estrategia institucional para el control de la vacunación contra la hepatitis B**

**Resumen** El estudio evaluó la percepción de los estudiantes de odontología que han experimentado o no accidentes con objetos punzantes en relación con la estrategia institucional para controlar la vacunación contra la hepatitis B. Se realizó un estudio retrospectivo observacional de caso-control con la participación de 139 estudiantes, de los cuales 36 experimentaron accidentes con objetos punzantes en una clínica (grupo de casos – GC) y 103 no experimentaron accidentes (grupo de control – GCt). Los datos sobre los accidentes se obtuvieron de los formularios de notificación institucionales. Los participantes completaron un cuestionario en línea evaluando su percepción sobre las políticas institucionales de vacunación obligatoria y los riesgos ocupacionales a los que se enfrentan los profesionales de la odontología. Un total de 204 estudiantes participaron en las seis clases en las que se reportaron casos (36 casos, 17.6%). La causa más común de accidentes fue la aguja de anestesia, y el 72.2% de los accidentes ocurrieron con estudiantes en el quinto y sexto semestres del programa de grado (tercer año). El GC asignó puntuaciones más altas a la importancia de la vacunación obligatoria y reportó niveles más bajos de confianza en cuanto al riesgo de contraer hepatitis B y VIH en caso de un accidente biológico. Se concluyó que uno de cada seis estudiantes reportó accidentes relacionados con objetos punzantes, la mayoría de los cuales podrían haberse prevenido mediante el cumplimiento de los protocolos de bioseguridad. Para la mayoría de los estudiantes, la experiencia de este tipo de accidente contribuyó a una mayor comprensión de los riesgos biológicos involucrados.

**Descriptores:** Vacunación. Hepatitis B. Seroconversión. Heridas Punzantes.

**Vivência de acidentes perfurocortantes e percepção sobre a estratégia institucional de controle da vacinação contra hepatite B**

**Resumo** O estudo avaliou a percepção de alunos de Odontologia que vivenciaram ou não acidentes perfurocortantes quanto à estratégia institucional de controle da vacinação contra hepatite B. Realizou-se um estudo observacional do tipo caso-controle retrospectivo, com a participação de 139 voluntários, dos quais 36 vivenciaram acidentes perfurocortantes em clínica (grupo caso - GCs) e outros 103 não vivenciaram acidentes (grupo controle - GCt). Informações sobre os acidentes

foram obtidas a partir das fichas de notificação institucionais. Os voluntários responderam a um questionário eletrônico abordando a percepção sobre as exigências institucionais relacionadas à obrigatoriedade da vacinação e ao risco ocupacional do cirurgião-dentista. Um total de 204 alunos representava o universo de alunos matriculados nas 6 turmas em que houve casos notificados (36; 17,6%). O material que mais provocou acidentes foi a agulha de anestesia e 72,2% dos acidentes ocorreram com alunos do quinto e sexto períodos do curso de graduação (3º ano). GCs atribuiu maiores notas para a obrigatoriedade de vacinação e relatou menos segurança quanto ao risco de contrair hepatite B e HIV no caso de um acidente biológico. Conclui-se que um em cada seis alunos teve notificação de acidente perfurocortante, sendo que a maioria desses eventos poderia ter sido evitada com a adesão aos protocolos de biossegurança. Para a maioria dos estudantes, a vivência do acidente contribuiu para uma maior compreensão do risco biológico envolvido.
**Descritores:** Vacinação. Hepatite B. Soroconversão. Ferimentos Perfurantes.

## INTRODUCTION

Dentistry courses are responsible for the quality of teaching and the multiplication of infection control practices, and the adequate training of students aimed at patient protection and the establishment of safe working conditions[1-4]. To this end, biosafety recommendations are frequently updated and published[5,6].

It is recognized that hepatitis B virus (HBV) infection is a significant occupational risk for dentists[7,8], and for this reason, it is recommended that all professionals be immunized before entering clinical practice. In the case of hepatitis B, immunity after three vaccine doses is proven when the anti-HBs serological test is ≥10 IU/ml, a result that proves the presence of antibodies against the disease[9].

Despite the strong national and international recommendation based on guidelines of the World Health Organization, studies have shown that the immunization rate among dentistry students varies greatly in Brazil and abroad. Considering students who completed the three doses of the vaccine, a study conducted at six public and private universities in Rio de Janeiro showed that 90.8% of dentistry students were vaccinated and only 25% of them had taken the anti-HBs test[10]. Studies evaluated students at the Federal University of Paraíba and reported that 50% of them completed the basic vaccination schedule and of these, only 9.9% underwent the laboratory test to confirm seroconversion[11]. An evaluation conducted at two public and private institutions in São Paulo showed that 44.5% of students were not immune due to lack of anti-HBs tests. Furthermore, 54.5% were unaware of the etiological agent, the anti-HBsAG test (69.5%) and the need to prove immunization status (78.6%)[12]. Another study with dentistry students at a private university in São Paulo found that only 20.2% of students reported they had been vaccinated with 3 or 4 doses of the vaccine and 15.5% reported they had taken the laboratory test to confirm seroconversion[13]. In a study conducted at the Federal University of Piauí, after evaluating dentistry students, results reported that 62.2% completed the vaccination schedule and 5.6% took the anti-HBs test[14].

When analyzing studies on this topic, it can be verified that in most dentistry courses evaluated, students did not show spontaneous preventive behavior in relation to hepatitis B, which confirms the presence of a gap between awareness of the importance of vaccination and personal behavior, since the consequence of incomplete vaccination among health students represents an increased risk of infections, increasing demands on issues related to vaccination[15].

In line with the knowledge about the risk of cross-infection related to hepatitis B, the Biosafety Committee of "Faculdade São Leopoldo Mandic" established as a rule for students the requirement to submit a copy of their vaccination card before starting clinical activities, which shows, among other vaccines, that they have completed the vaccination schedule against hepatitis B and the seroconversion test. This initiative is based on the biosafety protocol of higher education institutions (HEI), which in turn is based on infection control practices nationally and internationally adopted[5-9]. A previous study[16] conducted at HEIs showed that between 2006 and 2013, 100% of students enrolled in dentistry courses were vaccinated and 91.3% seroconverted based on anti-HBs results, values that are quite significant in relation to those already reported in literature.

In educational institutions, pedagogical efforts accompanied by continuing education should motivate students to use standard precautions correctly and routinely[2-7]. In this context, to date, there has never been an attempt to analyze the strategy from the perspective of students who have or have not experienced accidents with sharp objects, nor whether the occurrence of an accident has a positive impact on their perception of this institutional obligation.

## METHOD

This study was conducted in accordance with precepts determined by Resolution No. 466 of 2012 and was approved by the Research Ethics Committee of the São Leopoldo Mandic School of Dentistry and Dental Research Center under CAAE number 96502318.9.0000.5374. All participants agreed to participate in the study by signing the informed consent form and although researchers approached participants individually, when filling out the research instrument, data that would allow their identification were not collected.

A retrospective case-control observational study was developed with students from the Dentistry course who experienced or did not experience accidents with sharp objects between 2011 and 2017, considering the characteristics of the student, the source patient and the accident. Volunteers answered an electronic questionnaire that addressed their perception of the institution's requirements related to mandatory vaccination and the occupational risk for dentists.

The study was based on information from the institution's Biosafety Department, which is responsible for recording accidents with sharp objects involving biological risk that occurred during the undergraduate dentistry program. The study group consisted of 36 dentistry students with reported accidents between 2011 and 2017.

Three controls were selected for each case, and the control group consisted of 103 students. Controls were paired by enrollment class, based on knowledge of the case data, considering a random selection based on the list of students enrolled during the course periods and who had not experienced reported accidents during the undergraduate program. For this period, Table 1 shows the proportion of cases in relation to the total number of students enrolled per academic year.

**Table 1.** Frequency of students enrolled in the undergraduate course and of reported accidents in the Biosafety Department.

| Year | Students enrolled in the 1st year | Students enrolled in the HEI* | Accidents with sharp objects |
|---|---|---|---|
| 2011 | 30 | 128 | 01 |
| 2012 | 33 | 127 | 07 |
| 2013 | 33 | 125 | 06 |
| 2014 | 43 | 272 | 06 |
| 2015 | 45 | 290 | 09 |
| 2016 | 37 | 299 | 05 |
| 2017 | 50 | 315 | 02 |
| Total | 271 | 1556 | 36 |

*Information obtained from the undergraduate course office.

The characterization of the accident with sharp objects was based on information contained in notification forms, with the following data being collected for the case group:

- Conditions of the accident: date and time of occurrence; type of exposure; body area affected in the accident; biological material involved in the exposure (saliva, blood or others); use and type of PPE at the time of the accident, cause and description of the accident; clinic where the accident occurred;

- Data on the source patient: age, sex, pertinent information in the anamnesis, profession.

- Data on the health professional: age, sex, previous experience with accidents with sharp objects, vaccination status for Hepatitis B, performance of the anti-HBs test.

Regarding the students' perception of the occupational risk control strategy, participants in the case and control groups received, via their email addresses, a questionnaire developed based on a previous study[17], submitted to a pilot study to assess the feasibility of the adaptations made.

The topics covered included aspects related to the characterization of respondents and routine clinical conduct aimed at protection against biological accidents. A central question investigated the occurrence of accidents, and for those who responded affirmatively, additional questions were asked about causes, feelings and reactions experienced, consequences, knowledge of risks, use of protective equipment at the time of the accident, conduct adopted after the incident, including notification to the Biosafety Sector, vaccination status at the time of the accident and feelings regarding the institutional requirement regarding vaccination. Three days after the first submission, a telephone contact was made to clarify doubts, confirm receipt of the questionnaire and request a response and resend.

After tabulation, descriptive analysis of categorical variables was performed and data were analyzed using percentage values and numerical variables by minimum and maximum values, means, standard deviation, medians, mode and percentiles. Bivariate analyses were performed for associations between variables and comparisons of proportions between study groups using the Pearson's chi-square test or the Fisher's exact test. The significance level assumed was 5% ($p<0.05$) and the confidence interval was 95%.

## RESULTS

Regarding the characterization of accidents with sharp objects, it was possible to verify that among the 36 cases of notification of accidents with sharp objects, 97.2% occurred with female students (Table 2). Of the total, 11.1% had already had previous experience with accidents with sharp objects and for 88.9%, there was no answer about vaccination status. When asked about whether or not they had performed/presented an anti-HBs test, 38.9% answered yes and 55.6% answered no. Higher concentration of accident cases was observed in the fifth and sixth periods (72.2% of the total).

In Table 3, it can be verified that in relation to the type of exposure, most accidents involved needles, followed by drills. The finger was the most affected body area and most cases involved saliva and blood. Furthermore, in all cases, it was reported that the students were using PPE at the time of the accident. When asked about the classification of the risk of accident, only 5.6% classified it as high.

Table 4 shows that 91.2% of students in the case group had an accident at the dental clinic only once. According to students, the causes that led to the accident were carelessness and haste, and concern and fear were the feelings that most prevailed at the time of the accident. Furthermore, for the majority of respondents, the accident had positive consequences for their personal and/or professional lives.

Regarding the students' perception of the occupational risk control strategy adopted by the HEI, based on questionnaires completed by students in case and control groups, Table 5 shows a significant difference between groups regarding sex, the score given to the institutional requirement regarding the mandatory vaccination of students, and safety regarding the risk of contracting hepatitis B and HIV in the event of a biological accident. In the case group, more women were identified and higher scores were given for the mandatory vaccination, while in the control group, higher scores were given for how they would feel about the risk of contracting these diseases in the event of an accident.

**Table 2.** Profile of Dentistry students who had notification of accidents with sharp objects.

| Variable | Category | Frequency | % |
|---|---|---|---|
| Sex | Female | 35 | 97.2% |
| | Male | 1 | 2.8% |
| Previous experience | No | 32 | 88.9% |
| | Yes | 4 | 11.1% |
| Vaccination status | Yes | 4 | 11.1% |
| | No response | 32 | 88.9% |
| Anti-HBs | No | 20 | 55.6% |
| | Yes | 14 | 38.9% |
| | No response | 2 | 5.6% |
| Student's class | 2011 | 1 | 2.8% |
| | 2012 | 7 | 19.4% |
| | 2013 | 6 | 16.7% |
| | 2014 | 6 | 16.7% |
| | 2015 | 9 | 25.0% |
| | 2016 | 5 | 13.9% |
| | 2017 | 2 | 5.6% |
| Enrollment period at the time of occurrence | 3 | 2 | 5.6% |
| | 4 | 2 | 5.6% |
| | 5 | 13 | 36.1% |
| | 6 | 13 | 36.1% |
| | 7 | 4 | 11.1% |
| | 8 | 1 | 2.8% |
| | No response | 1 | 2.8% |

| Variable | Mean | Standard deviation |
|---|---|---|
| Student age | 21.47 | 3.16 |
| Students in the class | 35.64 | 3.34 |
| Number of accidents in the class | 6.42 | 2.03 |

**Table 3.** Frequency distribution of the characteristics of accidents with sharp objects experienced by Dentistry students.

| Variable | Category | Frequency | % |
|---|---|---|---|
| Type of exposure | Needle | 20 | 55.6% |
| | Scalpel | 1 | 2.8% |
| | Drill | 4 | 11.1% |
| | Carpule | 3 | 8.3% |
| | Curette | 3 | 8.3% |
| | Micromotor | 1 | 2.8% |
| | File or drill | 1 | 2.8% |
| | Exploratory probe | 3 | 8.3% |
| Area | Finger | 30 | 83.3% |
| | Hand | 5 | 13.9% |
| | Leg | 1 | 2.8% |
| Biological material | Saliva | 6 | 16.7% |
| | Saliva and blood | 18 | 50.0% |
| | Blood | 10 | 27.8% |
| | No response | 2 | 5.6% |
| Use of PPE | Yes | 36 | 100.0% |
| Which PPE? | | | |
| Rubber gloves | No | 32 | 88.9% |
| | Yes | 4 | 11.1% |
| Lab coat | No | 5 | 13.9% |
| | Yes | 31 | 86.1% |
| Procedure gloves | No | 6 | 16.7% |
| | Yes | 30 | 83.3% |
| Mask | No | 9 | 25.0% |
| | Yes | 27 | 75.0% |
| Protective glasses | No | 11 | 30.6% |
| | Yes | 25 | 69.4% |
| Risk classification | Low | 13 | 36.1% |
| | Intermediate | 1 | 2.8% |
| | High | 2 | 5.6% |
| | No response | 20 | 55.6% |
| Clinical surgery | Surgery | 8 | 23.2% |
| | Basic Surgery | 2 | 5.6% |
| | Integrated | 24 | 70.6% |
| | Periodontics | 1 | 2.9% |
| | Prosthetics | 1 | 2.9% |
| | No response | 2 | 5.6% |

**Table 4.** Descriptive analysis of cases of accidents with sharp objects with notifications.

| Variable | Category | Frequency | % |
|---|---|---|---|
| Experienced the accident at the dental clinic | Yes. once | 31 | 91.2% |
| | Yes. more than once | 3 | 8.8% |
| Causes of the accident(s) | | | |
| Carelessness | No | 10 | 29.4% |
| | Yes | 24 | 70.6% |
| Haste | No | 19 | 55.9% |
| | Yes | 15 | 44.1% |
| Self-confidence | No | 32 | 94.1% |
| | Yes | 2 | 5.9% |
| Other | No | 31 | 91.2% |
| | Yes | 3 | 8.8% |
| What did you feel at the time of the accident? | | | |
| Fear | No | 15 | 44.1% |
| | Yes | 19 | 55.9% |
| Anger | No | 25 | 73.5% |
| | Yes | 9 | 26.5% |
| Concern | No | 4 | 11.8% |
| | Yes | 30 | 88.2% |
| Nothing | No | 31 | 91.2% |
| | Yes | 3 | 8.8% |
| Other | No | 33 | 97.1% |
| | Yes | 1 | 2.9% |
| Did this accident have any consequences for your personal and/or professional life? | Positive consequences | | |
| | No | 1 | 2.9% |
| | No response | 3 | 8.8% |
| Were you aware of the risks/consequences | No | 2 | 5.9% |
| involved in accidents with biological material? | Yes | 32 | 94.1% |

| Variable | Category | Frequency | % |
|---|---|---|---|
| PPE used at the time of the accident | | | |
| Lab coat | No | 1 | 2.9% |
| | Yes | 32 | 94.1% |
| | No response | 1 | 2.9% |
| Hat/cap | No | 5 | 14.7% |
| | Yes | 28 | 82.4% |
| | No response | 1 | 2.9% |
| Mask | No | 3 | 8.8% |
| | Yes | 30 | 88.2% |
| | No response | 1 | 2.9% |
| Gloves | No | 3 | 8.8% |
| | Yes | 30 | 88.2% |
| | No response | 1 | 2.9% |
| Rubber gloves | No | 6 | 17.6% |
| | Yes | 8 | 23.5% |
| | No response | 20 | 58.8% |
| Protective glasses | No | 6 | 17.6% |
| | Yes | 27 | 79.4% |
| | No response | 1 | 2.9% |
| What were the actions taken immediately after the accident? | Notification procedure and | 8 | 23.5% |
| | Only the first procedures | 3 | 8.8% |
| | Both procedures | 22 | 64.7% |
| | None | 1 | 2.9% |
| Did you seek guidance from a professional or specialized service? | I sought and was informed | 31 | 91.2% |
| Did you feel informed? | I sought and was not informed | 1 | 2.9% |
| | I did not seek | 2 | 5.9% |

**Table 5.** Comparison between case group (with notification of accidents) and control group regarding the perception of institutional strategies for protection against accidents and vaccination against hepatitis B.

| Variable | Category | Total | Group | | p-value |
|---|---|---|---|---|---|
| | | | Case* | Control | |
| | | n (%) | | | |
| Sex | Female | 101 (73.7%) | 30 (88.2%) | 71 (68.9%) | [1]0.0266 |
| | Male | 36 (26.3%) | 4 (11.8%) | 32 (31.1%) | |
| Year of admission | Up to 2013 | 62 (45.3%) | 14 (41.2%) | 48 (46.6%) | [1]0.5816 |
| | From 2014 | 75 (54.7%) | 20 (58.8%) | 55 (53.4%) | |
| Spontaneous use without teacher's demand | | | | | |
| Lab coat | No | 11 (8.0%) | 2 (5.9%) | 9 (8.7%) | [1]0.5952 |
| | Yes | 126 (92.0%) | 32 (94.1%) | 94 (91.3%) | |
| Hat/cap | No | 4 (2.9%) | 0 (0.0%) | 4 (3.9%) | [2]0.5718 |
| | Yes | 133 (97.1%) | 34 (100.0%) | 99 (96.1%) | |
| Mask | No | 8 (5.8%) | 3 (8.8%) | 5 (4.9%) | [2]0.4095 |
| | Yes | 129 (94.2%) | 31 (91.2%) | 98 (95.1%) | |
| Glove | No | 3 (2.2%) | 1 (2.9%) | 2 (1.9%) | [2]1.000 |
| | Yes | 134 (97.8%) | 33 (97.1%) | 101 (98.1%) | |
| Protective glasses | No | 42 (30.7%) | 10 (29.4%) | 32 (31.1%) | [1]0.8559 |
| | Yes | 95 (69.3%) | 24 (70.6%) | 71 (68.9%) | |
| PPE discarded after each service | | | | | |
| Lab coat | No | 61 (44.5%) | 16 (47.1%) | 45 (43.7%) | [1]0.5310 |
| | Yes | 74 (54.0%) | 16 (47.1%) | 58 (56.3%) | |
| | No response | 2 (1.5%) | 2 (5.9%) | 0 (0.0%) | - |
| Hat/cap | No | 63 (46.0%) | 14 (41.2%) | 49 (47.6%) | [1]0.7050 |
| | Yes | 72 (52.6%) | 18 (52.9%) | 54 (52.4%) | |
| | No response | 2 (1.5%) | 2 (5.9%) | 0 (0.0%) | - |
| Mask | No | 50 (36.5%) | 11 (32.4%) | 39 (37.9%) | [1]0.7211 |
| | Yes | 85 (62.0%) | 21 (61.8%) | 64 (62.1%) | |
| | No response | 2 (1.5%) | 2 (5.9%) | 0 (0.0%) | - |

| Variable | Category | Total | Group | | p-value |
|---|---|---|---|---|---|
| | | | Case* | Control | |
| | | n (%) | | | |
| Gloves | No | 3 (2.2%) | 2 (5.9%) | 1 (1.0%) | [2]0.1398 |
| | Yes | 132 (96.4%) | 30 (88.2%) | 102 (99.0%) | |
| | No response | 2 (1.5%) | 2 (5.9%) | 0 (0.0%) | - |
| Glasses | No | 131 (95.6%) | 30 (88.2%) | 101 (98.1%) | [2]0.2382 |
| | Yes | 4 (2.9%) | 2 (5.9%) | 2 (1.9%) | |
| | No response | 2 (1.5%) | 2 (5.9%) | 0 (0.0%) | - |
| | | Mean (standard deviation) | | | |
| Age | | 24.62 (4.44) | 25.15 (6.02) | 24.45 (3.80) | [3]0.9246 |
| | | Median (minimum; maximum) | | | |
| Score for vaccine requirement | | 10.00 (5.00; 10.00) | 10.00 (8.00; 10.00) | 10.00 (5.00; 10.00) | [3]0.0430 |
| Score for anti-HBS requirement | | 10.00 (0.00; 10.00) | 10.00 (5.00; 10.00) | 10.00 (0.00; 10.00) | [3]0.1601 |
| [4]With accident. how do you feel at risk for hepatitis? | | 7.00 (0.00; 10.00) | 5.00 (0.00; 10.00) | 7.00 (0.00; 10.00) | [3]0.0300 |
| [4]With accident. how do you feel at risk for HIV? | | 5.00 (0.00; 10.00) | 3.50 (0.00; 10.00) | 5.00 (0.00; 10.00) | [3]0.0149 |

[1]Chi-square test; [2]Fisher's exact test; [3]Mann Whitney test.[4] (0 – totally unsafe to 10 completely safe).

## DISCUSSION

Dentistry courses are responsible for teaching efficiency and disseminating infection control practices, providing adequate training for students to protect patients and establishing safe working conditions[2-10]. To this end, biosafety recommendations are frequently updated and published[5], and based on these, the SLM (São Leopoldo Mandic) biosafety manual was developed and is being updated[18]. The need for prevention and awareness campaigns to help improve healthcare students' adherence to vaccination is important[18], because although there is sufficient knowledge about the need to receive hepatitis B vaccination among students, many claim that they have not been vaccinated. According to Soriano[19], there must be more knowledge, practice and compliance with the rules and routines related to biosafety and vaccination as a fundamental form of prevention.

Analyzing the information on notifications of accidents with sharp objects in the present study, 97.2% occurred with female students, which can be explained by the fact that at the time the study was conducted, the frequency of female students at the HEI was 74.5%. This finding also corroborates the study by Gir et al. (2008)[21], and is consistent with the trend towards feminization of the profession.

Only 11.1% of students reported having had previous experience with accidents with sharp objects, which corroborates the fact that the majority have reported that the accident had positive consequences for their personal and/or professional lives. In addition, 94.1% reported that they were aware of the risks and consequences involved in accidents with biological material. When asked about having performed or presented an anti-HBs test, 55.6% responded negatively. Most accidents (72.2%) occurred with students in the fifth and sixth periods, when the highest frequency of clinical activities began in the curriculum in force at the time of the study. Among the materials involved, needles were the most frequently related to accidents, and the most affected body region was the finger, which had already been verified in a previous study[20]. However, this finding contrasts with another study[21], which indicated periodontal probes, ultrasonic tips and endodontic files as the most frequently involved materials. All students reported using PPE at the time of the accident. In the present study, 91.2% of students sought guidance from a professional or specialized service after the accident and felt informed, while in another study[20], only 21.3% sought specialized care. Finally, only 5.6% classified the accident as of high risk.

There was a significant difference between groups regarding the score given to the institutional requirement regarding mandatory vaccination, with the case group being higher. This result can be explained by the experience of the accident, which probably contributed to a greater understanding of the biological risk involved and the importance of vaccination. The case group also reported feeling less safe compared to the control group, regarding the risk of contracting Hepatitis B and HIV after a biological accident. Fear of changing lifestyle, of being close to death, and of the prejudice they could face from family, friends, and coworkers due to possible contamination by the HIV and Hepatitis B viruses was a common feeling among most of the interviewees after the accident with sharp objects[1], which may explain this finding.

Among the main causes of accidents with sharp objects highlighted are carelessness, failure to adopt preventive measures, patient conditions, and haste. Regarding the feelings involved, insecurity, fear of contamination, anger, and even tranquility stand out[17]. In the present study, the main cause of accidents was carelessness, followed by haste, and the most mentioned feelings were concern, fear, and anger, causes and feelings confirmed in another study[17].

Providing seroconversion confirmation through the anti-HBs test is as important as presenting vaccination cards that prove that the three doses of the Hepatitis B vaccine have been administered. Based on the results obtained, the importance of requiring the results of the anti-HBs tests is highlighted, as they increase the feeling of security for students who have suffered accidents with sharp objects, in addition to providing additional protection to students in the Dentistry course in the event of new accidents. Although data are not presented in this study, information from them indicates that the requirement was met, with 100% of students in subsequent classes presenting proof of having taken the anti-HBs test.

## CONCLUSION

Most students followed the recommended interval between vaccine doses, but there was a significant reduction in the frequency of students with proven seroconversion over the years. In the case group, the most affected students were female, with no previous experience with accidents, enrolled in the 5$^{th}$ and 6$^{th}$ semesters, and using PPE. They gave higher scores to the institutional requirement regarding mandatory vaccination and were less safe about the risk of contracting hepatitis B and HIV in the event of a biological accident, compared to the control group. The main causes of accidents were carelessness, haste, and self-confidence, while the feelings experienced during the accident were fear, anger, and concern. For most students, the accident had positive consequences for their personal and/or professional lives.

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