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ORIGINAL ARTICLE

Sharps Accidents: Occurrence and Knowledge Level among Brazilian Dental Students

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ABSTRACT

Objective: To evaluate the prevalence of sharps accidents among dental students in southwest Goiás state, Brazil, and further survey their knowledge of biosafety and post-injury management. **Material and Methods:** A cross-sectional analytical observational study was carried out in 2018 following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. The study population included dental students in the 4th and 10th course semester. A pre-formulated self-administered questionnaire containing 14 objective questions was used for data collection. Mean and standard deviation values were calculated. **Results:** A total of 308 responses were obtained. Overall, 15.9% of the respondents reported having previously experienced accidents with sharps. Most dental students who claimed to know the biological risks to which they are exposed were in the 5th and 8th course semesters, and 67.2% of them reported knowing how to proceed in the event of a sharp accident. **Conclusion:** A low prevalence of sharps accidents has been reported, and dental students are considered to have a good knowledge of biosafety.

Keywords: Needlestick Injuries; Wounds, Stab; Students, Dental; Surveys and Questionnaires.

Introduction

Sharp instrument injuries are the main form of human exposure to biological risks (e.g., disease transmission) due to direct or indirect manipulation of potentially contaminated biological materials [1-3]. While healthcare students and faculty staff are often exposed to biological hazards and work-related diseases, with varying risks and predisposing factors, their lack of compliance with biosafety protocols remains at relatively high figures [4,5]. To prevent the occurrence of accidents in the workplace, dental students should undertake early training in biosafety standards and decision-making in clinical practice, particularly regarding their exposure to biological materials and occupational risks [6,7].

Suppose appropriate preventive measures still need to be fully regarded. In that case, cross-infection may occur during dental care, increasing the risk of exposure to pathogens such as hepatitis viruses and human immunodeficiency virus (HIV), both inside and outside the dental office [4,8]. The contact of the dental staff with different individuals may expose them to a wide variety of airborne and bloodborne microorganisms found in saliva, blood, vapors, and bioaerosols, which can cause diseases such as herpes, influenza, rubella, measles, tuberculosis, hepatitis, syphilis, and AIDS [9]. Therefore, dental students should learn about preventive measures, adhere to vaccination schemes, use complete Personal Protective Equipment (PPE), thoroughly wash their hands, and care for disinfecting and sterilizing materials [10].

Biosafety measures are critical to maintaining the aseptic chain and should be encouraged through academic training to minimize occupational risks and avoid disease transmission [11]. In the event of potential contamination with biological materials, both the dental professional and the patient must be treated with urgent care and immediately submitted to a chemoprophylactic protocol for HIV and hepatitis B [12]. Biological exposure to blood and fluids of occupational origin can have drastic consequences, with emotional, social, family, professional, and financial implications. Hence, special attention should be given to the preventability of biological hazards to avoid or at least mitigate any negative impacts on the victim's quality of life [1,12].

Educators and dental schools must strive to recognize accidents with sharps in clinical care and instruct dental students to understand the importance of preventing these occurrences [13,14]. Therefore, this work proposed to evaluate the occurrence of sharps accidents among dental students and the behaviors after exposure. In addition, the study also sought to verify knowledge about biosafety, biological risks, and procedures for washing and sterilizing instruments.

Material and Methods

Study Design and Ethical Clearance

A cross-sectional analytical observational study was carried out following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [15]. The research project was submitted and approved by approval opinion number 2.508.502.

Setting and Participants

The study was carried out at a public university southwest of Goiás state in Brazil from August to December 2018. The study population consisted of dental students enrolled between the 4th and 10th course semesters, except those who had not been assigned clinical care activities in the school clinic.

Sample Size

The sample size was calculated using an electronic tool at www.surveysystem.com/sscalc.htm, considering a population of 479 dental students, a 95% confidence interval, and a 5% significance level. The final sample size estimated for this study was 213 participants.

Data Sources

For data collection, a pre-formulated self-administered questionnaire containing 14 objective questions was used and adapted by the researchers of this study [16]. The occurrence of sharp accidents, procedures and sharps most often involved in the injuries, measures adopted in the post-accident, the semester course at which accidents were more frequent, and whether Personal Protective Equipment (PPE) was adequately used were evaluated, as well as the biosafety knowledge of dental students. Eligible students were invited to participate in the study through the WhatsApp® messaging application. Those who agreed to participate were sent the self-administered questionnaire through an online form via the Google Forms® platform (https://docs.google.com/forms/u/0/).

Data Analysis

The data were analyzed descriptively. Mean and standard deviation values were calculated and plotted into graphs using Microsoft Excel® software.

Results

The demographic profile and course semester of the study participants are shown in Table 1. In total, 308 responses were obtained; most participants were females (76.9%).

Table 1. General characteristics of the study participants.

Variables	N	%
Gender		
Female	237	76.9
Male	71	23.1
Age Range		
Up to 19 Years Old	38	12.3
20–21 Years Old	118	38.3
22–23 Years Old	83	26.9
24 Years or Older	69	22.4
Course Semester		
4º Semester	41	13.3
5º Semester	33	10.7
6º Semester	52	16.9
7º Semester	30	9.7
8º Semester	64	20.8
9º Semester	39	12.7
10º Semester	49	15.9

Many dental students reported having experienced sharps accidents in dental school (15.9%, n=48). The injuries occurred most frequently during patient care (49%; n=24), followed by washing of materials (26.5%; n=13) and needle recapping (20.4%; n=10) (Figure 1A). The sharps most involved in the injuries were as follows: needle (57.1%, n=28), explorer probe (22.4%, n=11), curette (12.2%, n=6), and scalpel blade (4.1%, n=2) (Figure 1B).

Most sharps accidents reported by the dental students occurred in the following dental clinics/disciplines: Maxillofacial Surgery (28.6%, n=14), Integrated Clinic (24.5%, n=12), Restorative Dentistry (24.5%, n=12), and Endodontics (8.2%, n=9) (Figure 1C). Among those injured, 85.7% (n=42) reported wearing PPE when the accident occurred, compared to 14.3% (n=7) who did not.

As for post-injury measures, most students (51%, n=25) washed the wound with water and soap. Only 32.7% (n=16) of them informed the professor in charge about the situation, and 2.2% (n=6) responded they did not take any action after the accident (Figure 1D).

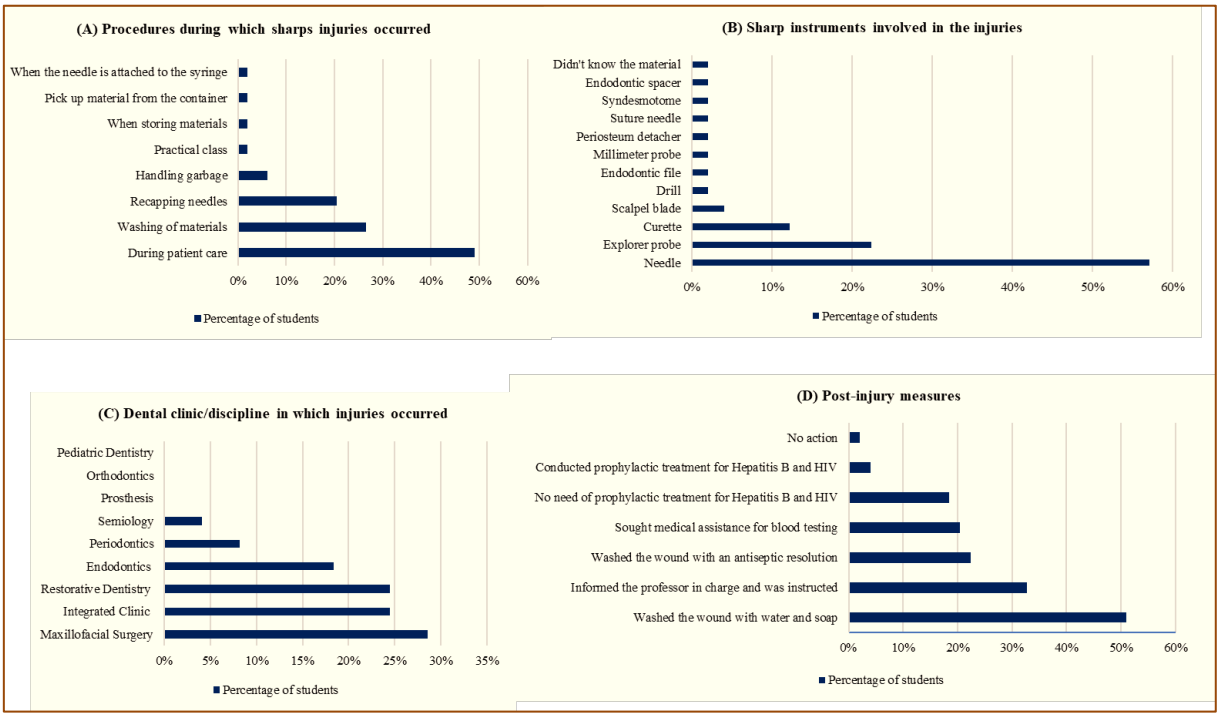

Figure 1. Distribution of procedures during which dental students experienced sharps injuries (A); sharp instruments involved in the injuries (B); dental clinic/discipline in which injuries occurred (C); and post-injury measures adopted by the students (D).

All participating dental students who had not experienced any sharps accident were surveyed about their knowledge of biosafety (n=259). Students in all course semesters (4th to 10th) claimed to have a good knowledge of biosafety (Figure 2A). Those who claimed to know the biological risks to which they were exposed in the dental clinic were in the 5th and 8th course semesters (Figure 2B). Our data revealed that last-year dental students (10th semester) did not wear PPE appropriately in all procedures (Figure 2C). More alarmingly, 4.2% of the participants (n=11) reported they did not sterilize materials before dental care (Figure 2D).

When asked whether they used to wash materials before the sterilization step, 72.6% (n=188) of the dental students responded "yes," 26.6% (n=69) "sometimes," and 0.8% (n=2) "never." As for the use of PPE during the washing of materials, 55.6% (n=143) of the dental students responded "always," 42.8% (n=110) "sometimes," and 1.6% (n=4) "never." When asked about the type of gloves they used for washing, 85.2% (n=219) of the dental students indicated rubber gloves, 11.3% (n=29) disposable gloves, and 2.3% (n=6) reported they did not use any gloves.

Lastly, the dental students who had not experienced sharps injuries were asked whether they knew how to proceed in an accident with sharps. A total of 67.2% (n=174) of the students responded "yes," 28.6% (n=74) "more or less," and 4.2% (n=11) "no."

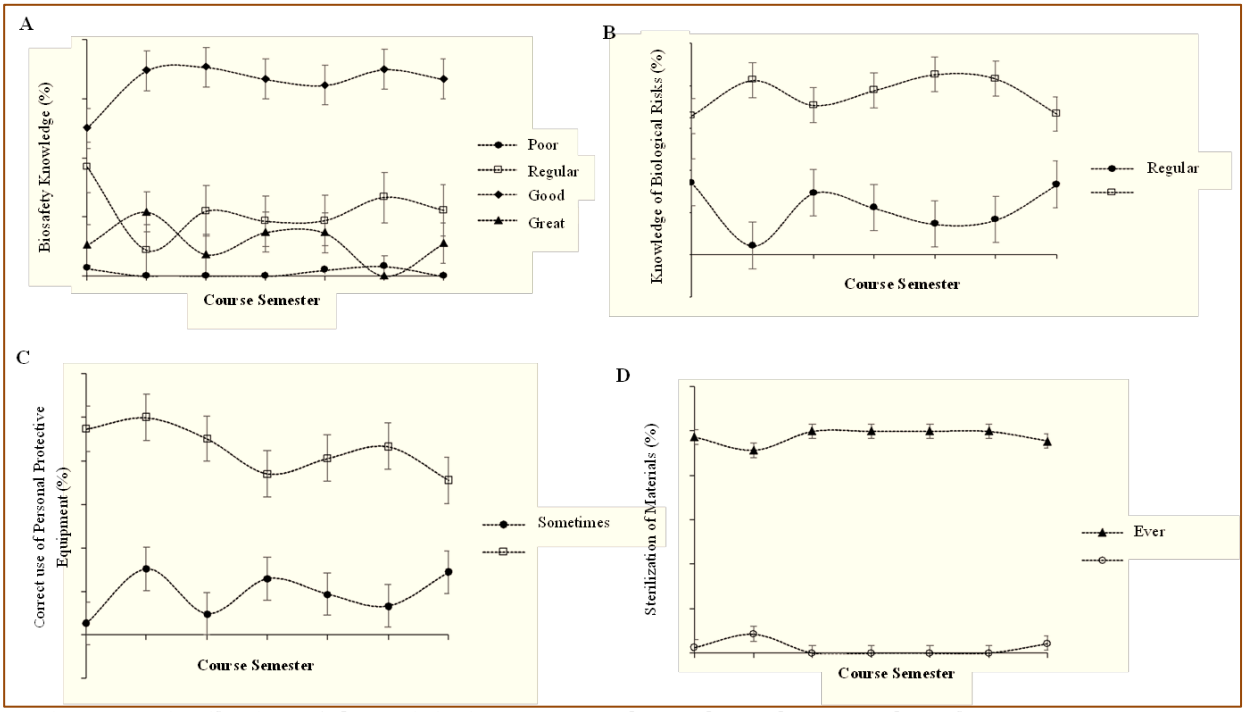

Figure 2. Distribution of sharps injuries among undergraduate dental students by course semester. Knowledge of biosafety measures (A); knowledge of biological risks (B); the correct use of personal protective equipment (C); sterilization of materials before dental care (D).

Discussion

This study investigated the occurrence of sharps accidents among dental students and their behaviors after exposure. The data indicated that although the dental students had been previously trained to handle sharp materials, a relevant percentage of them (15.9%) experienced an accident with sharps at some point throughout the course. Yet, these figures are below those reported in other studies, in which percutaneous exposure to potentially infectious biological material was found to be as high as 35.6% to 58.8% among dental students [6,17].

Our results also suggest that the dental students involved in a sharps injury had difficulties taking adequate post-injury measures compared to those who had not experienced it. Therefore, the student's knowledge on this topic should be assessed thoroughly by dental schools so that the occurrence of cases remains as low as possible.

Injuries often occur in dental offices due to small workspace, abrupt movements of the patient during dental care, and a wide variety of sharp dental instruments used in the procedures, among other factors [18,19]. Some students in the academic environment often feel unprepared and insecure and lack the necessary training to handle sharps, which may expose them to cuts and perforations.

In our study, most participants were females, and the number of occurrences was higher (37/49, 76%). This can be explained by the increasing number of female students admitted to dental schools [20,21]. Consistent with our data, a previous study found a predominance of women among the victims of accidents with biological materials [21]. In contrast, another study showed that male students were mostly involved in sharps injuries (62%). These authors did not specify the number of male and female students answering the questionnaire. Other than those, 168 responses were obtained. The authors reasoned that the more significant occurrence of accidents among male students can be explained by the fact that women are often more cautious

and careful during dental care [22]. Our findings showed an accident coefficient of 0.15 for females and 0.16 for males, suggesting that sex was unrelated to the occurrence of sharps injuries in the study sample.

Dental students must be careful when handling sharp objects, especially while caring for patients and washing instruments [23]. Our results showed that these were the moments with the highest sharps injuries among the dental students. These data are in line with those reported elsewhere by different authors. The literature pointed out that an anesthetic needle is a sharp material mostly involved in accidents [24,25]. Thus, the coordinators of disciplines dealing with local anesthesia should monitor students more carefully to reduce the risks of needlestick injuries. Our findings indicated a more significant occurrence of injuries in Maxillofacial Surgery, Integrated Clinic, Restorative Dentistry, and Endodontics, where sharps are commonly needed. Although our work showed a greater occurrence in these clinics, we believe that all specialized clinics pose a risk of cross-infection by sharps. Therefore, professors of all disciplines in the dental training program should reinforce the care instructions necessary to minimize these risks.

A study investigating the profile of accidents with biological materials highlighted that the knowledge of occupational safety and compliance with infection control practices contributes to a lower risk of injuries and infections [26]. Thus, the dental students' inappropriate behavior may be related to a lack of knowledge of the risks to which they were exposed or because they do not give enough importance to low-risk injuries involving a low blood volume. Undergraduate dental students must comply with the biosafety instructions for preventive care, particularly regarding microbiological aspects and the risk of cross-infection. PPE should always be used, especially because some students reportedly neglected to wear protective equipment at the time of injury.

Consistent with interview-based studies with university students, our findings showed that participants claimed to be aware of biosafety instructions. However, in contrast with our data, previous reports showed that dental students experienced difficulties answering questions about how to act correctly in the event of an accident with sharps [27,28]. Therefore, students should be encouraged to familiarize themselves with biosafety protocols for handling dental materials to avoid or minimize the occurrence of biological hazards.

Another aspect addressed in the questionnaire was the care of the sterilization of instruments. While there were cases of dental students who overlooked the sterilization step, our data showed that most of them used to sterilize materials before dental care (98% to 99.1%), which aligns with previous reports [27,28].

Educational interventions (e.g., lectures, videos, classes, banners, and pamphlets, among others) can successfully assist dental educators in transmitting concepts and increase dental students' adherence to biosafety protocols [29,30]. Measures must be taken to make the information accessible and facilitate the notification and management of all accidental exposures [17].

As a limitation, this study could not consistently assess the level of knowledge in biosafety of dental students, as the data were obtained through a self-administered questionnaire. Therefore, new studies are encouraged so that these data can be measured objectively.

Collectively, our findings provide relevant insights to understand better the behavior of students who do not adhere to biosafety standards and encourage professors and other faculty staff to apply rigorous measures accordingly. Further investments in education could optimize the training of undergraduate dental students for specific methods or procedures to prevent the occurrence of work-related biohazards.

Conclusion

A low prevalence of sharps accidents was reported, and dental students considered they had good knowledge about biosafety. However, although students know how to proceed in post-injury care management,

there is still a significant lack of adherence to biosafety protocols in the academic environment. Therefore, it is essential that teachers evaluate teaching behaviors and analyze the ability to assimilate the taught biosafety contents.

Authors' Contributions

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All authors declare that they contributed to a critical review of intellectual content and approval of the final version to be published.

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Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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