Accidents with sharp objects involving biological material: what Dentistry undergraduate students say and what they do

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ABSTRACT

Considering the importance of adopting biosafety measures since the initial training of dental surgeons, this study aimed to describe the prevalence, the distribution and to verify the attitudes of Dentistry students in relation to prevention and management of accidents with sharp cutting objects. This was a quantitative-qualitative observational study with 58 undergraduates from a Dentistry course in Rio Grande do Sul. Questionnaires and participant observations were used. We verified a 31% prevalence of accidents involving biological material. The most frequent sites were the periodontics clinic and the sterilization center. Periodontal probes, ultrasonic tips and endodontic files were the most involved instruments. We identified failures in the notification process and limitations in the proper use of PPE, especially in the sterilization lab. Aspects such as vaccination, hand washing and disinfection routines require follow-up. Disrespect for biosafety standards and the lack of attention were important risk factors observed. The findings demand investments in ongoing education to raise awareness of the academic community, which is indispensable for accidents' prevention and preservation of the future dental surgeons' health.

Descriptors: Occupational Accidents. Dentistry Students. Knowledge. Attitude. Exposure to Biological Agents.

1 INTRODUCTION

Accidents with sharp edge instruments often involve biological materials and it can result in the transmission of diseases[1], depending on the presence of bacteria, viruses, protozoa and fungi[2]. The high prevalence of these accidents with students in dental clinics is of concern and has been discussed in national studies[3-6]. It is possible to observe the increase in the number of cases with the students advancing to the activities in a clinical environment[7].

Acute injuries can be caused during or after the procedure[1] and have as factors the time in the provision of care, inexperience[7], inadequate positioning of the professional and carelessness in the handling of contaminated instruments[8]. Many occur during the disinfection and washing of the instruments, showing that inattention and neglect in the use of complete PPE is an important factor for contamination[7].

Accordingly, dental activities require the adoption of specific preventive measures[9], such as vaccination against hepatitis B, influenza, triple viral and adult type[2,9-11]; the use of complete PPE[2,7,10,12]; careful hand washing; and care in the disinfection and sterilization of objects[2,10]. The adoption of biosafety measures is essential for the maintenance of the dental team health and should be encouraged since the beginning of the training[10,11]. The application of knowledge, techniques and equipment allows minimizing occupational risks, avoiding the transmission of diseases and favoring health and well-being[10,12,13].

Although the courses of Dental Medicine offer contents and/or disciplines of Biosafety and Ergonomics, they aren't always translated into attitudes in practical activities. In the case of such situations, in addition to the immediate care, it's necessary to do a notification through the Work Accident Communication (WAC) and verification of the need for chemoprophylaxis (against hepatitis B and human immunodeficiency virus) and serological follow-up[2, 9.14].

Even though this is a subject of great importance in the training of dental surgeons, there is limited level of student information about the management after accidents, negligence in the use of personal protective equipment (PPE) and lack of notification of accidents, which make it difficult to diagnose the current situation in educational institutions and limit the development of preventive measures[3,4,15,16.]

Considering what was demonstrated, this study aimed to describe the prevalence of accidents with sharp objects, where and how they occur, as well as to verify the attitudes of dental students in relation to their prevention and management, proposing a counterpoint between saying and doing in the daily life of an undergraduate course.

2 MATERIALS AND METHODS

It was a cross-sectional observational study with a quantitative-qualitative approach in a Dental course of Rio Grande do Sul. The research followed the recommendations of Resolution CNS N °. 466/2012 and it was approved by the Institutional Research Ethics Committee (Report No. 1,273,458). It was included students of the last year of the undergraduate course, duly enrolled in the Pediatric Odontology Clinics and Integrated Odontology Clinics disciplines, who agreed to participate by signing the Free and Informed Consent Term (FICT). Students not located in the classroom were excluded after three attempts.

As a quantitative method, a questionnaire was used with 16 multiple choice questions[17,18] to raise the prevalence of sharps injuries and verify students' attitudes regarding their prevention and management. This method was previously tested, in relation to the clarity of the questions, with three newly graduated dental surgeons of the same course. The data collected were tabulated and analyzed quantitatively, using frequency and percentage measures, in the BioEstat 5.0 Program.

As a qualitative approach, it was used the participant observation technique[19], applied

during 12 shifts, lasting approximately four hours each, on random and intercalated days, eight of them in the dependencies of the dental clinics and four in the sterilization center. An observation script was used to guide the aspects to be observed. The observations, each hour, were interspersed with periods for remarks in a field diary, which were later transcribed in a database. The collected information was analyzed qualitatively according to the precepts of Dialectical hermeneutics[19]. General categories were constructed, involving information on the observed attitudes (use of PPE, hand washing, use of protective barriers in the equipment, disinfection of the clinics, organization of the clinical environment, possible risk situations for accidents with sharps injuries, and handling of instruments in the sterilization room). These categories were analyzed separately. With this material, a synthesis of the findings of the observations was made.

3 RESULTS

What students are saying

Fifty-eight students participated in the study, 30 (51.7%) from the penultimate and 28 (48.3%) from the last semester. As for sex, 37 (63.8%) were women. The ages ranged from 20 to 56 years, with an average of 26 years.

Eighteen students (31.0%) reported having suffered accidents involving biological material throughout the course of Dentistry. Of these, one student (5.6%) reported having suffered three accidents. When questioned about the location of the first accident, there was a greater number of occurrences in the Periodontia clinics and in the sterilization center, reported by 38.9% of them. There was a higher prevalence during dental procedures (55.6%), followed by the washing of instruments (27.7%). The instruments most involved in the first accident were the exploratory catheter and the ultrasound edges, referred to by 33.3%. The hand's fingers were the most affected parts (66.7%) and the percutaneous lesions were the most prevalent (77.8%) (table 1).

Twelve students (66.7%) made some kind of communication about the accident. Half of the injured (n = 9) reported having reported the first accident to the teacher in charge of the clinic. Only two students (11.1%) duly made to WAC. One student reported that he had informed a colleague about the accident and was therefore framed as others (table 1). All the accident victims reported that they were immunized against hepatitis B at the time of the accident.

Regarding the vaccination situation against hepatitis B, 50 students (86.2%) were immunized in three doses (table 2). At the clinic, all students reported wearing glove and cap, even if combined with other items; 70.2% reported using disposable overalls gloves and 12.3% disposable aprons, which is an optional item, due to the use of a lab coat. The use of complete PPE was reported by 93.0% of the students, and 68.4% used disposable overalls gloves. The use of incomplete PPE (missing one or more items) was reported by 7.0% (table 2).

In the sterilization center, it was verified the underutilization of PPE items. The least used items, even when combined with others, were: cap and mask (50.0%); goggles (36.2%) and rubber apron (17.2%). It was verified that only four students (6.9%) used the complete EPI for the washing, drying and packaging of dental instruments in the sterilization center (table 2). Regarding hand hygiene, 82.5% reported hand washing before and after each dental care (table 2).

Table 1. Characteristics of accidents with biological material

Variable	n	%
Have you ever had an accident involving biological material?		
No	40	69.0
Yes	18	31.0
If there were any accidents, how many were there?		
One accident	11	61.1
Two accident	6	33.3
Three accident	1	5.6
Where did the first accident happen?		
Periodontics Clinic	7	38.9
Sterilization Center	7	38.9
Surgery Clinic	2	11.1
Fixed Prosthesis Clinic	1	5.6
Integrated Dental Clinic	1	5.6
In which situation did it happen?		
During the procedure	10	55.6
In the washing of instruments	5	27.7
In the handling of instruments after service	2	11.1
In needle resurfacing	1	5.6
What material or instrumental happened?		
Exploratory probe	6	33.3
Ultrasound edges	6	33.3
Endodontic files	3	16.7
Anesthetic needle	2	11.1
Drills	1	5.6
Where in the body did the injury occur?		
Finger	12	66.7
Palm/back of the hand	6	33.3
What was the type of exposure?		
Percutaneous (punctate, excoriative, short-contusional, etc.)	14	77.8
Skin (only skin-to-skin contact)	4	22.2
Was a statement issued about the accident?		
No	6	33.3
Yes	12	66.7
Whom was the statement addressed to? *		
Teacher responsible for the clinic	9	50.0
Teacher responsible for care	2	11.1
Municipal Health Department - Worker Health Reference	2	11.1
Others	1	5.6
Not issued	4	22.2

* The number exceeds 12 accident reports, since students have communicated to more than one person.

Table 2. Student attitudes: vaccination against hepatitis B, use of PPE and hand washing

Variable	n	%
Vaccination against hepatitis B		
Complete Immunization (3 doses)	50	86.2
Incomplete immunization (1 or 2 doses)	3	5.2
Do not know/Do not remember	5	8.6
Use of PPE in care*		
Glove	57	100.0
Cap	57	100.0
Mask	56	98.2
Protective goggles	56	98.2
Cloth knit	56	98.2
Closed shoe	56	98.2
Disposable overalls gloves	40	70.2
Disposable apron	7	12.3
Complete PPE with overlapping gloves	39	68.4
Complete PPE without overlapping gloves	14	24.6
Incomplete PPE	4	7.0
Use of PPE in the sterilization center		
Rubber glove	54	93.1
Cloth knit	51	87.9
Closed shoes	49	84.5
Cap	48	82.6
Mask	29	50.0
Procedure glove	29	50.0
Protective goggles	21	36.2
Rubber apron	10	17.2
Complete PPE	4	6.9
Incomplete PPE	54	93.1
The moment when you wash your hands*		
Before and after care	47	82.5
At the beginning of the shift	6	10.5
At the end of the shift	4	7.0

*A deleted answer due to inadequate filling.

The students' work in the dental clinics and in the sterilization center: the participant observations

It was verified that a good part of the students used a mask, gloves, cap, apron and closed shoe in the clinic. Many, however, did not wear protective goggles.

It was often observed in the clinical setting that students did not adequately perform hand washing. This deficiency occurred either because it did not perform (before and/or after the procedures) or because it did not respect the sterile technique. However, it was verified that before surgeries all students followed the hand washing protocol.

It was found that the use of protective

barriers (such as PVC films and plastic packaging) in the chair, owl and other equipment was common in clinical routines. However, regarding the disinfection of the equipment and dental chair, with the use of 70º alcohol, they were rarely performed. The service room spaces were clean and organized at the start of activities, but over time contaminated materials and instruments were overlaid on the clinic table.

During all the observations, a number of risk situations for sharps injuries were identified. It was detected that the students did not usually remove the drills from the high and low rotation pens nor the ultrasound edges after their use. Thus, often these pointed instruments were very close to the perimeter of work and the movements performed by the students.

It was found that some students did anesthesia with the help of the fingers to move away the oral tissues, being susceptible to pikes due to any inattention or movement of the patients. There were situations that students could have been punctured with contaminated material.

At the sterilization center, it was found that most of the students did not use containers with rigid walls to transport the contaminated instruments.

During washing, drying and packaging, there was no adequate use of PPE. In no shift was observed the complete use of this equipment by the students. Students often wore only a lab coat and rubber glove. In some cases they wore caps.

Students were observed not using a rubber glove to wash the contaminated material, replacing it with the procedure glove. There were many parallel conversations among the students, causing distractions. It was found that the instrument washing protocol was not always followed adequately.

Although there were plaques and adhesives in the environment of the sterilization center advising on washing care and requesting the use of protective equipment, they were not respected.

4 DISCUSSION

The contact with contaminated biological materials in the training of dental students happens more frequently due to their inexperience[20]. It is of great importance to know the risks of infection involved after accidents involving sharp objects, the most common in dental practice[9], especially after exposure to blood and secretions, in order to adopt conduits for their prevention and minimization.

In this study, it was found a prevalence of 31.0% of accidents involving exposure to biological material among the 58 students of the last year of an undergraduate course in Dental Medicine. Of these, seven (38.9%) reported having suffered more than one accident. The prevalence found was higher than that of other studies (17.3%[3], 27.5%[4] and 23.6%[6]), but lower than that reported by Pinelli, Neri and Loffredo[5], with 40% occupational exposure to biological material. It should be noted, however, that in the present investigation only students in the two last semesters were included.

It was identified that the most significant number of accidents occurred in the periodontics clinic and in the sterilization center, in a way different from the literature, that points to places of greater frequency of accidents as Surgery[3], Dentistry[3,4] and Clinical Restorative Dentistry, Integrated Clinic of Primary Care, Endodontics and Clinical Prosthesis[6].

The type of instruments most involved in accidents was the exploratory/periodontal

probe and ultrasonic edges. In the literature, the most mentioned are the periodontal curettes, anesthetic needle, exploratory/periodontal probe[15], and the anesthetic needle[3]. However, Paiva et al.[6] also reported a higher occurrence of accidents with exploratory probes. In the present study, the fingers were the most affected sites of the body (66.7%) and the percutaneous injuries were the most frequent (77.8%), with results similar to those found in Paiva et al.[6]. As a result, it is important to reinforce with the students the appropriate use of PPE and the attention to the procedure that is being performed.

The frequent lack of notification of accidents in health services makes it difficult to diagnose and propose preventive actions[21]. This finding was confirmed in this research, since 66.7% of the injured people made some statement and only 11.1% did WAC. The others, because they informed only the responsible teachers, showed important failures in the notifications in the course researched. It has been identified that there is no clear understanding of what the notification means, as one student reported having reported a colleague about the accident. These facts suggest misinformation and/or disregard of the obligation to notify. In this sense, it is observed that, often, dentistry students do not give due importance to accidents, failing to make the notification and looking for the necessary guidance and help[7,22]. Considering these situations, more intensive informative and control measures, including in a clinical teaching environment, are encouraged.

Among the various vaccines recommended for health professionals, the one against hepatitis B is especially important to the dental surgeon, considering the risks in the dental work environment[9-11]. The data found in this research point out that it is necessary to improve vaccination programs, since 13.8% of the students were not immunized with the three doses of the vaccine. It is essential to adopt mechanisms to restrict that students in this situation develop clinical activities.

The need to use complete PPE (apron/cloth or disposable waistcoat, cap, mask, protective goggles and gloves), plus the use of white clothing and closed shoes, both during dental care and in the handling of dental instruments, is well regulated at the governmental level[2,10] and is part of the standard care recommended by the Health Department[9]. It was found, in this study, that 93.0% of the students reported such care. In addition, it is recommended the addition of the rubber glove to disinfect, dry and pack contaminated materials[10,12], due to the great possibility of accidents in this process[7]. The results of the present study point to a very delicate situation in the process of washing and sterilization of materials, since only 6.9% of the students reported using full PPE in the sterilization center.

It is very important that hand washing be performed at the beginning and end of the work shift, as well as before and after each patient's care, which is one of the most critical measures for the prevention and control of the spread of infections[10, 17.] In this research, it was identified that 17.5% of the students reported doing hand washing only at the beginning or end of the shift, evidencing carelessness in adopting this measure.

In the participant observations performed at dental clinics, it was confirmed that most of the students used full PPE. However, misuse of protective goggles and mask has been found in many situations. Although students reported using PPE, the way they were used was inadequate, potentializing risks of transmission of biological agents and infections.

In the case of the sterilization center, the inadequate use of PPE revealed students' carelessness in the prevention of accidents. In addition, negligence was observed in the handling of ultrasonic edges, drills and endodontic files, which may justify the number of accidents with sharp instruments in the course investigated. Although the use of barriers in dental equipment has been observed, disinfection routines have been lacking. To ensure the safety of students and patients, it is necessary to use chemical substances such as 70° alcohol, peracetic acid or sodium hypochlorite, provided their concentrations and indications are observed[2]. As a result, the teachers and the staff of the sterilization center are encouraged to follow up more closely, informing and guiding students about procedures.

Although the study limits its scope, the findings are worrying and require educational, preventive and corrective measures. It is believed that constant investments in continuing/ permanent education and campaigns for positive behavior change can contribute to the improvement of individual and collective training and awareness, which is so necessary for the minimization of accidents with sharps in Dentistry.

Finally, it is understood that the method of the participant observations was adequate to counteract the questionnaire responses. As the researcher was part of the routines, both at the clinics and the sterilization center, his presence went unnoticed, enabling the apprehension of reality without interference.

5 CONCLUSIONS

It was observed a high prevalence of accidents involving biological material among the student of the Dentistry course, with great potential to cause damages to their health and well-being. The characteristics of accidents, reporting failures, inadequate use of PPE especially in the sterilization center, lack of attention to procedures and instrumental processing, as well as gaps in vaccination coverage, hand washing and disinfection routines significant shortcomings in accident prevention.

The quantitative-qualitative approach followed with the combination of questionnaire and participant observation made it possible to understand disagreements between the saying and the doing of future dental surgeons: even if biosafety concepts and norms integrate training, they are not always transformed into day-to-day attitude. These aspects suggest that the offering of Biosafety contents and/or disciplines, although essential, is insufficient for the incorporation of practices.

RESUMO

Acidentes perfurocortantes envolvendo material biológico: o dizer e o fazer de estudantes de um curso de graduação em Odontologia

Considerando a importância da adoção de medidas de biossegurança desde a formação dos cirurgiões-dentistas, este estudo teve como objetivo descrever a prevalência de acidentes com perfurocortantes, onde e como ocorrem, assim como verificar as atitudes de estudantes de Odontologia em relação à sua prevenção e manejo. Tratou-se de estudo observacional quanti-qualitativo com 58 concluintes de um curso de graduação do Rio Grande do Sul. Foram utilizados um questionário e um roteiro de observação participante. Constatou-se prevalência de 31% de acidentes envolvendo material biológico. Os locais de maior ocorrência foram a clínica de periodontia e a central de esterilização. Sondas periodontais, pontas ultrassônicas e limas endodônticas foram os instrumentais mais envolvidos. Identificaram-se falhas no processo de notificação e limitações no

uso adequado de EPI, especialmente na central de esterilização. Aspectos como cobertura vacinal, lavagem das mãos e rotinas de desinfecção necessitam acompanhamento. O desrespeito às normas de biossegurança e a desatenção figuraram como importantes fatores de risco observados. Os achados demandam investimentos em educação continuada com vistas à conscientização da comunidade acadêmica, indispensável para a prevenção de acidentes e preservação da saúde dos futuros cirurgiões-dentistas.

Palavras-chave: Acidentes de Trabalho. Estudantes de Odontologia. Conhecimento. Atitude. Exposição a Agentes Biológicos.

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