

Epidemiological profile of work-related accidents with biological exposure among medical students in a surgical emergency room

Perfil epidemiológico de acidentes com material biológico entre estudantes de medicina em um pronto-socorro cirúrgico

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A B S T R A C T

Objective: To evaluate the accidents with biological material among medical interns interning in a trauma emergency room and identify key related situations, attributed causes and prevention. **Methods:** we conducted a study with a quantitative approach. Data were collected through a questionnaire applied via internet, with closed, multiple-choice questions regarding accidents with biological material. The sample comprised 100 interns. **Results:** thirty-two had accidents with biological material. Higher-risk activities were local anesthesia (39.47%), suture (18.42%) and needle recapping (15.79%). The main routes of exposure to biological material were the eyes or mucosa, with 34%, and syringe needle puncture, with 45%. After contamination, only 52% reported the accident to the responsible department. **Conclusion:** The main causes of accidents and routes of exposure found may be attributed to several factors, such as lack of training and failure to use personal protective equipment. Educational and preventive actions are extremely important to reduce the incidence of accidents with biological materials and improve the conduct of post-exposure. It is important to understand the main causes attributed and situations related, so as general and effective measures can be applied.

Key words: Health profile. Accidents, occupational. Students. Biohazard release. Risk.

INTRODUCTION

Since the first occupational contamination by the HIV virus in 1984¹, occupational accidents involving biological material have been a prominent issue in public health. Exposure to biological material in professional healthcare can occur either by percutaneous inoculation or by direct contact through skin and mucosa. Accidental percutaneous inoculation through sharp-edged material are considered at higher risk because they can transmit more than 20 different pathogens, AIDS (HIV), hepatitis B (HBV) and hepatitis C (HCV) virus being the most frequent². The transmission of these pathogens between patients and members of the health team is related to the frequency of exposures with potential transmission, to the prevalence of disease in the population, to the risk of transmission given the exposure to a source of infection, and to the effectiveness of post-exposure management³.

The risk of HIV infection through needlestick injuries with contaminated blood is estimated to range from 0.3% to 0.4%; in mucocutaneous accidents, the risk is

0.09%⁴. The risk of contamination by HBV varies from 6% to 30%, according to the serologic status of the source of contamination and the vaccination status of the member of the healthcare team. The combination of gamma globulin and vaccine can reduce the risk by 90% to 95%. Moreover, the average risk of acquiring hepatitis C after sharp-edged injury is 1.8%².

Given the growing number of occupational accidents and the potential risk of infection, preventive measures emerged, especially the Universal Precautions, instituted by the Centers for Disease Control and Prevention (CDC) in 1996⁵. Currently, they are so-called standard precautions and must be used for all patients. Preventive measures are considered: hand hygiene, use of personal protective equipment (PPE), glove and mask, careful handling of sharp instruments and proper disposal². Specifically for HBV, prevention is also accomplished through the vaccination schedule recommended for all interns and health professionals, whose efficacy in preventing infection or clinical disease is 80-100% after the third dose⁶. Post-exposure prevention may be performed by specific hyperimmune globulin for HBV, which is 75% effective in

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preventing the infection, or by prophylaxis with antiretroviral agents in the case of HIV⁷.

Despite prevention recommendations, the incidence of occupational accidents involving biological material is alarming and members of the nursing staff are most involved^{3,8}. However, there is an emphasis on the growing number of accidents among healthcare interns. According to data from SINABIO⁹, of the 14,096 accidents with biological material recorded between January 1999 and September 2006, 1067 (7.6%) occurred among students⁷.

The present study aimed to evaluate accidents with biological material among medical interns who work as interns at an emergency room trauma, thereby identifying the key related situations, attributed causes and prevention control. We also assessed the preventive measures to avoid exposure to biological materials, as well as action to be taken after an accident.

METHODS

We carried out a quantitative research approach in order to collect data relating to accidents with biological material involving medical interns interning in an emergency room trauma during the month of March 2012.

Data were collected through a questionnaire (Appendix 1) with closed multiple choice questions in which addressed issues related to student involvement in accidents with biological material, type of accident, procedure being performed, use of protective equipment, prior immunization and conduct after an accident. The questionnaire was administered through the software tool Google Docs®, which offers the questionnaire over the internet. The data were automatically archived and made available to the research team.

The study included all medical interns from the fourth period (second year) on, who were interns in the emergency room of the Workers Hospital. The sample comprised 100 interns. All received instructions on the proper use of personal protection equipment before starting the internship through a class taught by the internship coordination.

The collected data were analyzed by Descriptive analysis and the chi-square test.

The study was approved by the Ethics in Research Committee of the Workers Hospital - Emergency and General Surgery Department of the Federal University of Paraná under CEP-SESA/HT number 508/2012.

RESULTS

Epidemiological data regarding the questionnaire answered by 100 medical interns are summarized in table 1.

Of the 100 respondents, 32 have had accidents with biological materials, of whom 66% were exposed only once, and the remaining 34%, two or three times.

The activities of greatest risk for contamination were the procedures local anesthesia (39.47%), suture (18.42%) and needle recapping (15.79%) (Figure 1). The main routes of contamination, corresponding to 79%, were the syringe needle and direct contact with eye or mucosa (Figure 2). After contamination, 70% of interns performed the proper cleaning of the site, but only 52% reported the accident to the responsible department.

The PPE were often dismissed by interns, and the lack of use of goggles and mask were the most reported related to hospital accidents.

From the interns who sustained accidents, 82% had prior immunization against hepatitis B, 47% with serological confirmation. After the accidents, 24% of the interns had access to the serological status of the patient. No patient had positive serology.

DISCUSSION

In this study, 32% of the interns have experienced some kind of accident with biological material during their internship period, a value comparable to those described in the literature^{3,10,11}. The use of young labor force contributes to the high number of accidents¹².

The ratio between the number of accidents and number of hours of training provided in the emergency room, which shows a difference of 9% when comparing interns with over 500 hours of training to those with up to 200 hours, probably reflects the longer time of internship

Table 1 - Epidemiological data collected from the questionnaire.

| Institution of Origin | | |
|------------------------------|----|-----|
| UFPR | 49 | 49% |
| PUCPR | 16 | 16% |
| FEPAR | 9 | 9% |
| UP | 26 | 26% |
| Gender | | |
| Female | 61 | 61% |
| Male | 39 | 39% |
| Age | | |
| 18-21 | 32 | 32% |
| 22-25 | 59 | 59% |
| 26-30 | 9 | 9% |
| >30 | 0 | 0% |
| Number of hours in ER | | |
| 0-200 | 27 | 27% |
| 201-300 | 25 | 25% |
| 301-500 | 36 | 36% |
| >500 | 12 | 12% |

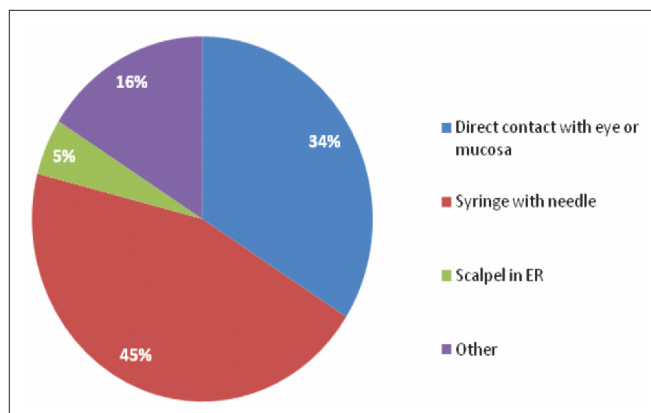


Figure 1 - Distribution of the procedure in which there was the first contamination with biological material.

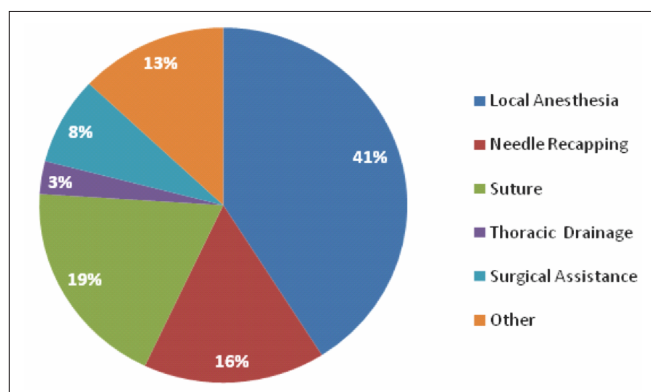


Figure 2 - Distribution of route of exposure to biological material.

and exposure to biological materials, since it is believed in the possibility of achieving greater dexterity and technical skill during the training period^{1,7,13}. Negligence, recklessness, inadequate lighting, pace of work, long journey, lack of PPE, anxiety, nervousness and lack of training are considered determining factors^{8,13-15}. The type

of activity, however, appears to be more important than the level of training¹⁶.

The main causes of accidents found were local anesthesia, recapping of needles and suture, adding nearly 80%, and the most common routes of exposure were direct contact with eyes and mucous and manipulation of needles, equivalent to data from other hospitals^{12,16-18}. Some PPE, such as goggles and mask, are little used, probably due to non-availability and no incentive¹⁰⁻¹².

According to the literature, the risk of exposure to HBV after an accident with biological material ranges from 6% to 30%, depending on the conditions of infection, disease activity in the host and prophylactic measures adopted. For HCV, the risk is 1.8%, and for HIV, from 0.1% to 0.3%. Vaccination against hepatitis B is one of the main measures to prevent accidents with biological material^{2,5} and it is expected around 95% of professionals^{8,19}. Of the interns assessed, 82% had prior immunization against hepatitis B, which reflects the non-obligation and lack of incentive to the vaccine at internship start.

Underreporting of hospital accidents occurs in most medical centers, the Workers Hospital not being an exception, since the responsible sector was notified in 52.63% of the accidents¹². Medical interns do not seek specialized medical care possibly because they do not perceive the work environment as a potential place of contamination^{13,14}, since their daily practice involves manual handling of perforating-cutting objects and secretions such as blood and other bodily fluids⁸.

The main causes of accidents and routes of exposure found may be attributed to several factors, such as lack of training and failure to use personal protective equipment. Educational and preventive actions are extremely important to reduce the incidence of accidents with biological materials and improve the post-exposure conduct. Isolated care is considered ineffective. Therefore, we must seek to understand the main attributed causes and related situations in order to general apply effective measures^{7,10-12,17,18}.

R E S U M O

Objetivo: avaliar os acidentes com material biológico entre estudantes de medicina estagiando em um pronto-socorro de trauma e identificar as principais situações relacionadas, causas atribuídas e prevenção. **Métodos:** estudo com abordagem quantitativa. Os dados foram coletados através de um questionário, aplicado via internet, contendo perguntas fechadas de escolha múltipla, referentes a acidentes com material biológico. A amostra obtida foi 100 estudantes. **Resultados:** trinta e dois se acidentaram com materiais biológicos. As atividades de maior risco foram anestesia local (39,47%), sutura (18,42%) e recapeamento de agulha (15,79%). As principais vias de exposição ao material biológico foram contato com olho ou mucosa, com 34%, através de seringa com agulha com 45%. Após a contaminação, apenas 52% notificaram o acidente ao setor responsável. **Conclusão:** as principais causas de acidente encontradas e vias de exposição podem ser atribuídas a diversos fatores, como falta de treinamento e ao não uso de equipamentos de proteção individual. Ações preventivas e educativas são de extrema importância para diminuir a incidência dos acidentes com materiais biológicos e melhorar a conduta pós-exposição. É preciso entender as principais causas atribuídas e situações relacionadas a fim de implantar medidas gerais e eficazes.

Descritores: Perfil de saúde. Acidentes de trabalho. Estudantes. Vazamento de risco biológico. Risco.

APPENDIX 1

Analysis of accidents with biological material in the Emergency Room of the Workers Hospital – ER-WH

Name : _____ Team: _____

Gender : () Male () Female

1. age:

- (1) () 18-21
- (2) () 22-25
- (3) () 25-30
- (4) () aged> 30 years

2. Ever had an accident with biological material during the internship at the ER-WH?

Biological fluids that must be considered risky are the following materials: blood, organic liquid containing blood and potentially infectious body fluids (semen, vaginal secretions, cerebrospinal, synovial, peritoneal, pericardial and amniotic fluids).

- (1) () Yes
- (2) () No

3. If yes, how often:

- (1) () once .
- (2) () 2 to 3 times .
- (3) () More than 3 times .
- (9) () Ignored
- (0) () Not applicable

4. What was the route of exposure to biological material?

- (1) () Direct contact with eye or mucosa
- (2) () Syringe with needle
- (3) () scalpel in the operating room
- (4) () scalpel in the ER
- (5) () Broken Glass
- (0) () Other sharp-edged material : _____
- (9) () Ignored

5. What procedure was being performed in the first exposure?

- (1) () Local anesthesia
- (2) () Needle Recapping
- (3) () Suture
- (4) () Injection
- (5) () peripheral venous access
- (6) () Central Venous Access
- (7) () Oro- tracheal intubation
- (8) () Thoracic Drainage
- (9) () Surgical instrumentation (scrub)
- (10) () Surgical Assistance
- (0) () Other
- (9) () Ignored

6. What protective equipment was NOT being used?

- (1) () Gloves
- (2) () Mask
- (3) () Glasses
- (4) () White Coat
- (5) () Closed Shoe
- (0) () Not applicable, was wearing all required equipment.
- (9) () Ignored

7. Did you have complete vaccine schedule for hepatitis B before the accident?

- (1) Yes
(2) No
(9) Ignored

8. Do you have a confirmed immunization status against hepatitis B?

- (1) Yes
(2) No
(9) Ignored

9. After exposure, did you wash the site with soap and water or antiseptic solution (povidone, Chlorhexidine)?

- (1) Yes
(2) No
(9) Ignored

10. Did you report the accident to the responsible department?

- (1) Yes
(2) No
(9) Ignored

11. Did you have access to the results of serological tests for HIV, HBV and HCV of the patient?

- (1) Yes
(2) No

12. If so, did the patient had some positive serology for HIV, HBV or HCV?

- (1) Yes
(2) No
(0) Not applicable

13. If yes, which virus was the serum positive for?

- (1) HIV
(2) HBV
(3) HCV
(0) Not applicable

14. If HIV was positive, was prophylaxis with antiretrovirals carried out?

- (1) Yes
(2) No
(0) Not applicable

15. If HBV was positive, was hyperimmune globulin administered?

- (1) Yes
(2) No
(0) Not applicable