

Training-related accidents during teacher-student-assistance activities of medical students

Acidentes relacionados ao treinamento durante a atividade docente-discente-assistencial de estudantes de medicina

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ABSTRACT

A survey was done to determine the most common hospital accidents with biologically contaminated material among students at the Medical College of the Federal University of Minas Gerais. Six hundred and ninety-four students (between fifth and twelfth semesters of the college course) answered the questionnaire individually. Three-hundred and forty-nine accidents were reported. The accident rate was found to be 33.9% in the third semester of the course, and increased over time, reaching 52.3% in the last semester. Sixty-three percent of the accidents were needlestick or sharp object injuries; 18.3% mucous membrane exposure; 16.6% were on the skin, and 1.7% were simultaneously on the skin and mucous membrane exposure. The contaminating substances were: blood (88.3%), vaginal secretion (1.7%), and others (9.1%). The parts of the body most frequently affected were: hands (67%), eyes (18.9%), mouth (1.7%), and others (6.3%). The procedures being performed when the accidents occurred were: suture (34.1%), applying anesthesia (16.6%), assisting surgery (8.9%), disposing of needles (8.6%), assisting delivery (6.3%), and others (25.9%). Forty-nine percent of those involved reported the accident to the accident control department. Of these 29.2% did not receive adequate medical assistance. Eight percent of those involved used antiretroviral drugs and of these 86% discontinued the treatment on receiving the ELISA method applied to the patient (HIV-negative); 6.4% discontinued the treatment due to its side-effects; and 16% completed the treatment.

Key-words: Human Immunodeficiency Virus. Medical students. Needlestick injuries. Aids.

RESUMO

Este estudo transversal foi realizado para avaliar acidentes com material biologicamente contaminado entre estudantes de medicina da Universidade Federal de Minas Gerais. Foi aplicado um questionário individual de resposta espontânea e sigilosa, em 694 (43,4%) estudantes do quinto ao décimo segundo semestres do curso médico. Foram relatados 349 acidentes, com aumento progressivo de 33,9 até 52,3% entre os estudantes do quinto ao décimo primeiro períodos, respectivamente. Cerca de 63% dos acidentes foram com agulha ou objeto cortante; 18,3% afetando mucosas; 16,6% a pele; 1,7% simultaneamente a pele e a mucosa. Os contaminantes principais foram sangue (88,3%) e secreção vaginal (1,7%). As regiões do corpo mais frequentemente afetadas foram as mãos (67%), olhos (18,9%), boca (1,7%) e outras (6,3%). Os procedimentos realizados no momento em que o acidente ocorreu foram sutura (34,1%), administração de anestesia (16,6%), participação em cirurgia como observador (8,9%), punção de veia com agulha (8,6%), observação de parto (6,3%) e outros (25,9%). O setor de biossegurança da instituição foi procurado por 49% dos acidentados para a busca de providências pertinentes à cada caso. Destes estudantes, 29,2% não receberam assistência médica considerada adequada e esclarecedora para sua situação. Cerca de 8% dos estudantes receberam antiretrovirais, destes 86% descontinuaram o tratamento com o resultado do exame ELISA rápido feito no paciente fonte (VIH-negativo); 6,4% descontinuaram o tratamento devido aos efeitos colaterais das drogas usadas e 16% completaram corretamente o tratamento.

Palavras-chaves: Virus da Imunodeficiência Humana. Estudantes de medicina. Lesões provocadas por agulhas. Sida.

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Circumstances in Brazil oblige medical students to participate in activities that ordinarily only professionals would do in many countries. In their eagerness to learn more, students may also get involved in extracurricular activities too early. Such cases are poorly supervised. Some Brazilian researchers have investigated HIV infection among hospital workers, but none specifically deal with students⁵⁻⁸. These peculiarities highlight the need to evaluate the risk of medical students contracting diseases from patients in the hospital during their teacher-student-assistance work.

The risk of transmitting human immunodeficiency virus (HIV) as a result of a single percutaneous exposure to contaminated material is considered low. The Centers for Disease Control estimated this risk to be 0.4%⁹. The fact that every health professional is continuously exposed increases the risk factor. Based on previously published seroconversion rates, estimated numbers of accidents, and estimated number of HIV-positive patients, it is possible to calculate the annual contamination index for students. This fluctuates between 27 and 46 per 100,000 individuals¹⁰. Personal accidents, the leading cause of death in this age group, has an equivalent death toll.

Several reports evaluate accidental HIV exposure^{7 8 10 11 12 14}. The research difficulties include recall bias, the limited scope of the survey, the chance of obtaining inaccurate information, and the subjective nature of the responses. Some retrospective studies have been conducted, interviewing students that reported exposure to potentially contaminated material^{8 11}. Others used a daily questionnaire to overcome recall bias¹⁴. Still others, including this study, distributed questionnaires to a sample number of students^{7 10 12}. In spite of the difficulties involved in each research method they can all provide valuable information.

This study had the objective of evaluating the risk of medical students to accidental exposure to potentially infected material in a hospital setting during their undergraduate training activities and their access to biosafety measures whenever necessary.

MATERIAL AND METHODS

Students were studied at the Medical College/UFMG (between fifth and twelve semesters). Multiple-choice questionnaires were used, distributed individually by the researchers just before theoretical classes for each level. The form was completed spontaneously and handed back at the end of the class period. All the research was done from October to December, 1999. To prevent anyone from participating twice, one of the opening questions asked whether the student had already answered the questionnaire, in which case it was excluded.

The questionnaire was made up of two parts: the first consisted of a question about whether the student had already suffered an accident with biologically contaminated material; the second part was only answered by students who had in fact been involved in such an accident.

In the second part, students were asked to answer a specific questionnaire about each accident they recalled,

regarding the type of accident, contaminating material, body part affected, hospital setting where the accident occurred, and subsequent procedures that were undertaken. It was possible to mark more than one option as an answer to the questions about the use of personal protection equipment (barrier use) and about the factors that contributed to the accidental exposure. It was asked if the student reported the accident to the medical center and what procedures they followed.

The sample calculated was based on an estimate of the accident rate. Each semester of the medical course required its own estimate. These estimates, set by a previous study¹³. Calculations were done using Epi Info program² to determine the minimum sample necessary to establish statistical significance for each semester. The 8% margin of error was adopted. This information is shown in Table 1.

The sample obtained was analyzed by the Epi Info program². Those interviewed as well as those who declined to participate were guaranteed their identities would not be disclosed.

RESULTS

The total number interviewed represented a significant sample of the population.

The rate at which students between fifth and twelve semesters of the medical course suffered accidents with potentially blood-contaminated material was found to be 34.2% (236/691) (Table 1). The rates according to each semester are given in Table 2.

The total number of accidents reported by 236 students was 349: 63.3% (221/349) were needlestick or sharp object injuries; 18.3% (64/349) mucous membrane exposure; 16.6% (58/349) on the skin; and 1.7% (6/349) simultaneously on the skin and mucous membrane.

The hospital setting which presented the highest number of accidents was the small wounds sector, with 42.1% of the cases (Table 3). The contaminating materials were: blood, 88.3% (308/349) of the accidents; vaginal secretion, 1.7% (6/349); nasal

Table 1 - The calculated sample of students for each semester of the medical course at the Medical College of the Federal University of Minas Gerais showing the estimated of the accident rate with potentially contaminated material in hospital setting during 1999.

Semester of the medical course	Total number of students	Estimated accident rate (%)	Necessary sample	Total of those interviewed
Fifth	172	3	16	58
Sixth	172	3	16	66
Seventh	156	15	51	87
Eighth	164	25	67	107
Ninth	166	45	78	113
Tenth	162	50	78	113
Eleventh	82*	60	53	61
Twelfth	169	65	78	86
Total	1,243	-	437	691

*80 students were participating in health related rural area programs and did not participate in this study

Table 2 - Accident rate by semester of the medical course with potentially blood-contaminated material in hospital setting at the Medical College of the Federal University of Minas Gerais during 1999.

Semester of the medical course	Number of accidents/ students (NA)		Number of students interviewed (NI)	Accident Rate (NA/NI X 100)
	absolute	%		
Fifth	2	0.8	58	3.4
Sixth	6	2.5	66	9.1
Seventh	12	5.1	87	13.8
Eighth	27	11.4	107	25.2
Ninth	49	20.9	113	43.4
Tenth	60	25.4	113	53.1
Eleventh	35	14.8	61	57.4
Twelfth	45	19.1	86	52.3

Table 3 - The hospital settings which presented the highest number of accidents with potentially blood-contaminated material at the Medical College of the Federal University of Minas Gerais during 1999.

Hospital Setting	Number of accidents	Percentage
Small wounds sector	147	42.1
Maternity	78	22.3
Surgery unit	46	13.2
Out-patient surgery unit	36	10.4
Intensive care unit	13	3.7
Patient ward	12	3.4
First aid unit	6	1.7
Others	11	3.2
Total	349	100.0

secretion, 1.1% (4/349); bloodless pus, 1.1% (4/349); others, 6.9% (24/349). The most affected body parts were: hands, 67% (234/349); eyes, 18.9% (66/349); mouth, 1.7% (6/349); eyes and mouth, 2% (7/349); others 6.3% (22/349).

Four percent (14/349) of the accidents occurred while the student was not using personal protection equipment. The frequency with which gloves, gowns, masks, and goggles were used is shown in Table 4.

Table 4: Use of personal protection equipment during 349 accidents with potentially blood-contaminated material in hospital setting at the Medical College of the Federal University of Minas Gerais during 1999.

Equipment	Frequency of the use of personal protection	Percentage
Gloves	313	89.7
Gowns	226	64.8
Masks	172	49.3
Goggles	115	33.0
None	14	4.0

Suturing accounted for 34% (119/349) of the accidents and was the most frequent form of exposure to accidents. The rate at which other procedures resulted in accidents is given in Table 5.

Table 6 shows that the greatest factor contributing to accidents was carelessness, with 44.7% (156/349).

Forty-nine percent (173/349) of the accidents were reported to the health center. Of these, 57% considered they did not receive adequate assistance.

Nine percent (31/349) of those involved in accidents used a antiretroviral drugs. Seventy seven percent (24/31)

Table 5 - Procedures which involved the most frequent accidental exposures with potentially blood-contaminated material in hospital setting at the Medical College of the Federal University of Minas Gerais during 1999.

Procedures	Number of accidents	Procedure rate (%)
Suturing	119	33.8
Applying local anesthesia	58	16.6
Assisting surgery	31	8.9
Recapping needle	30	8.6
Assisting delivery	22	6.3
Handling needle case	12	3.4
Handling knife	6	1.7
Others	69	19.8
Did not respond	2	0.6
Total	349	19.7

Table 6 - Factors contributing to 349 accidents with potentially blood-contaminated material in hospital setting at the Medical College of the Federal University of Minas Gerais during 1999 as reported by the students.

Factors contributing to accidents	Number of accidents	Percentage
Carelessness	156	45.3
Lack of experience	108	30.9
Carelessness of others	101	28.9
Lack of personal protection equipment	49	14.4
Long work hours	43	12.3
Poor instructions	31	8.9
Inadequate facilities	19	5.4
Other factors	17	4.9

discontinued the treatment after receiving the blood test results of the patient involved; 6.4% (2/31) discontinued the treatment due to its side effects; 16% (5/31) complied with the treatment completely.

DISCUSSION

The accident rate for medical students with potentially contaminated material is high, although it is lower than that of medical interns¹⁰. About one third of the population surveyed were involved in accidents. During the final semesters of the course, more than half of the students suffered some kind of accident involving blood. The data collected here are similar to those observed at the University of California, USA, where 65% of the medical students had been involved in some kind of accident by the end of the course¹¹. Blood transmitted viruses, such as HIV, hepatitis B, and hepatitis C, are not uncommon in such cases. This demonstrates the great ethical responsibility of medical teaching institutions.

The impact of training, awareness programs, and supervision to reduce accident risk has been analyzed by some studies^{11 14}. In spite of determined effort by the institution to train students to avoid accidents during teacher-student activities, the University of California continued to have a high accident rate among students^{3 11}, due to factors that are inherent to medical learning. Natural student anxiety as they treat patients is one of the factors that goes beyond the control of precautionary training. Extensive training on mannequins, emotional support, and extra teacher attention during teacher-

student assistance activities could play a decisive role in reducing the risk of accidental HIV exposure.

Despite these questions, the medical curriculum should prepare students without exposing them to unacceptable risks. The medical teaching institution should guarantee adequate instruction to the pupils as well as working toward this objective in other ways. Forbidding students to have contact with HIV positive patients is considered unethical and a poor teaching method³. Post-accident prophylaxis, however has been proven to reduce the risk of HIV contamination^{1, 4}, and should, in such circumstances, be considered a priority and made easily available, including technical and emotional support, as well as medical follow up.

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