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Clinical treatment adherence of health care workers and students exposed to potentially infectious biological material*

Seguimento clínico de profissionais e estudantes da área da saúde expostos a material biológico potencialmente contaminado

Seguimiento clínico de profesionales y estudiantes del área de la salud expuestos a material biológico potencialmente contaminado

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ABSTRACT

Objective: To assess adherence to clinical appointments by health care workers (HCW) and students who suffered accidents with potentially infectious biological material. **Method:** A retrospective cross-sectional study that assessed clinical records of accidents involving biological material between 2005 and 2010 in a specialized unit. **Results**: A total of 461 individuals exposed to biological material were treated, of which 389 (84.4%) were HCWs and 72 (15.6%) students. Of the 461 exposed individuals, 307 (66.6%) attended a follow-up appointment. Individuals who had suffered an accident with a known source patient were 29 times more likely to show up to their scheduled follow-up appointments (OR: 29.98; CI95%: 16.09-55.83). **Conclusion:** The predictor in both univariate and multivariate analyses for adherence to clinical follow-up appointment was having a known source patient with nonreactive serology for the human immunodeficiency virus and/or hepatitis B and C.

DESCRIPTORS

Exposure to Biological Agents; Occupational Exposure; Accidents, Occupational; Health Personnel; Students, Health Occupations.

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INTRODUCTION

Health care workers (HCW) and students are exposed to potentially infectious biological material during procedures that involve possible contact with body fluids[1-3].

After such exposure, professionals and students must seek treatment in a specialized service in order to assess the risk for infection with the human immunodeficiency virus (HIV), the hepatitis B virus (HBV) and hepatitis C (HCV)[4-5].

Knowing the serological status of the source patient is of fundamental importance for indicating chemoprophylaxis, as well as for assessing the severity of exposure and the potential benefit of antiretroviral therapy. Blood samples should be collected from exposed individuals and from source patients, upon their consent. When serological conditions are unknown, source patients must undergo rapid HIV antibody tests as frequently as possible. Professionals must also notify the accident by filling out an official and mandatory form provided by the Brazilian Ministry of Labor and Employment[4-5].

For each type of virus there are specific conducts. In the case of risk for HBV seroconversion, post-exposure recommendations are determined based on the serological status of the source patient and the acquired immunity of the exposed individual. Thus, people whose vaccination schedule are complete and who present adequate levels of antibodies against hepatitis B surface antigens (anti-HBsAg) do not require any prophylactic measures. Those without all the proper vaccinations must receive anti-hepatitis B human immunoglobulin and a vaccination assessment[4-5].

In situations of HCV exposure, there are no effective measures for reducing the risk of seroconversion. Regarding HIV, antiretroviral therapy is recommended[5].

In the case of severe exposure, clinical follow-up must be conducted at four points in time, i.e., immediately after the accident and then six weeks, twelve weeks, and six months following the accident. When the source patient tests positive for HCV, follow-up treatment must be extended to up to a year after exposure[5].

Studies show that many times, workers do not seek specialized medical treatment after an accident or do not adhere to follow-up treatment[6-7]. Much in the same way, students in the field of health care have also been shown to underreport accidents and to display inadequate conduct after exposure, as well as lack of communication[8].

In light of the above, the objective of the present study was to identify the percentage of nonadherence to follow-up treatment and associated factors of HCWs and students who suffered an accident involving potentially infectious biological material.

METHOD

This was a retrospective cross-sectional study conducted in a reference care center (RC) for individuals exposed to risk situations with potentially infectious biological material located in a municipality in the state of São Paulo, Brazil. This health service treats individuals from the municipality and neighboring regions that do not possess specialized care in their workplace. These include self-employed professionals affiliated with public and/or private institutions. Reference centers began treating occupational exposure in 2003, and in 2005, a specific instrument was implemented for this service. In 2011, follow-ups were transferred to another location.

The present study analyzed all reports of exposure that took place between January 2005 and December 2010. Cases involving HCWs and students exposed to potentially infectious biological material were selected for data analysis.

A semi-structured form was used for data collection, adapted from the document produced by the Brazilian Ministry of Health for reporting workplace accidents involving exposure to biological material. This form was submitted to face and content validation by three experts on the theme. The research instrument contemplated the following variables: age; gender; education level; professional category; mechanisms involved in the accident (needlestick and sharp injuries, blood on mucous membranes and intact or non-intact skin); action and material; and adherence to clinical follow-up.

Adherence was defined as the attendance to all scheduled follow-up appointments at the reference center by HCWs or students exposed to potentially infectious biological material until medical discharge, as per the protocol established by the Brazilian Ministry of Health[3]. Nonadherence to clinical follow-up was defined as the interruption or non-attendance to ambulatory/scheduled appointments.

The data were digitalized and organized using Microsoft Excel 2010 spreadsheets and statistically analyzed with the help of the Statistical Package for the Social Sciences (SPSS) software, version 15.0. Descriptive statistics was employed to characterize the subjects according to the collected variables.

A chi-square test was employed to verify associations between the studied variables and adherence to clinical follow-up. Associations were then measured using univariate and multivariate logistic regression models[9], in which the raw odds ratio and/or adjusted odds ratio (OR) were calculated with their respective confidence intervals. *P*-values less than 0.05 were considered statistically significant.

The study was analyzed and approved by the City Health Department and by the research ethics committee of the University of São Paulo at Ribeirão Preto College of Nursing (Protocol no. 0957/2008). Regarding access to care records, the request for informed consent form waiver was approved, as these consisted of secondary data. The present research abided by the norms set forth in Resolution 466/2012 of the Brazilian National Health Council regarding research involving human subjects and all participants were assured anonymity and the confidentiality of all information obtained.

RESULTS

Of the 461 individuals exposed to potentially infectious biological material and who were treated at the reference center, 389 (84.4%) were HCWs and 72 (15.6%) were students.

Most of the occupational exposure situations involved nursing professionals, accounting for 218 (47.3%) records. Of these, 146 (31.7%) involved nursing aides, 36 (7.8%), nursing technicians and 36 (7.8%), nurses. Another category that stood out due to the number of accidents was the dental team, with 103 (22.3%) accidents, of which 66 (14.3%) involved dentists and 37 (8.0%), dental assistants. Less frequent occurrences involved students, with 72 (15.6%) cases; followed by physicians 39 (8.5%); pharmacists 15 (3.3%); biomedical scientists 7 (1.5%); pharmacy assistants 3 (0.7%); physical therapists 3 (0.7%); and a radiology technician 1 (0.2%).

The large majority of the sample was female (375, 81.3%). Age varied from 16 to 63 years, with most of the subjects falling within the 20 to 29 year old age group. Mean sample age was 35 years and median age, 33.

Needlestick injury accounted for most of the accidents, representing 326 (70.7%) cases, both among HCWs and students. Within this category, the hollow-bore needle was largely involved, with 292 (63.3%) cases.

Of the 461 exposed individuals, 400 (86.8%) were able to identify the source patient. Of these, 43 sources presented reactive results: 28 (67.4%) presented reactive serology in one test, 10 (23.3%) displayed reactive results in two tests, 3 (7.0%) in three tests, and 1 (2.3%) in four tests. The serological condition of the source patients whose results were not identified or were inconclusive were grouped in the *other* category (Table 1).

Table 1 – Serological results of source patients involved in exposure of potentially infectious biological material - Ribeirão Preto, São Paulo, Brazil, 2005-2010.

Type of test	Reactive serology		Nonreactive serology		Other*		Total	
	n	%	n	%	n	%	n	%
Rapid HIV antibody test	12	3.0	337	84.2	51	12.7	400	100.0
Anti-HIV	25	6.2	311	77.7	64	16.0	400	100.0
HbsAg	04	1.0	324	81.0	72	18.0	400	100.0
Anti-HCV	21	5.2	313	78.2	66	16.5	400	100.0

* Unidentified or inconclusive serology results
Note: (N=400)

There was no statistically significant difference when analyzing accident mechanisms and adherence to clinical follow-up according to professional and academic categories. Most workers who suffered an accident involving a sharp instrument adhered to clinical follow-up and showed up to appointments until medical discharge, as recommended by the Brazilian Ministry of Health. However, there was a significant abandonment rate after exposure to sharp instruments (injury with needlesticks or other sharps) among students (22, 36.7%) and among the medical team (12, 42.8%) (Table 2).

Table 2 – Association between mechanism of accident and adherence to clinical follow-up by professional or academic category - Ribeirão Preto, São Paulo, Brazil, 2005-2010.

Professional Category	Mechanism	Adherence		p-value*
		High (%)	Abandonment (%)	
Nursing team	Sharps	132(73.7)	47(26.3)	0.0995
	Others	21(60.0)	14(40.0)	
Dental team	Sharps	53(71.6)	21(28.4)	0.644
	Others	16(66.7)	8(33.3)	
Doctors	Sharps	16(57.2)	12(42.8)	0.883
	Others	6(54.5)	5(45.5)	
Students	Sharps	38(63.3)	22(36.7)	0.744
	Others	7(58.3)	5(41.7)	
Others	Sharps	14(50.0)	14(50.0)	0.3486
	Others	1(25.0)	3(75.0)	

*p-value in reference to the chi-square test.

Analysis of logistic regression between adherence to clinical follow-up and source patient indicated that the probability of exposed individuals with a known source and negative serology adhering to treatment was 29 times greater than those whose source was positive or unknown (p<0.01; OR= 29.98; CI=95%: 16.09-55.83). Gender, age, professional category and type of mechanism involved in the accident were statistically insignificant variables (p>0.01).

There was no statistically significant difference (p=0.147) between workers who adhered to clinical follow-up (n=234) and those who did not (n=116) (Table 3) in terms of time in position.

Table 3 – Association between adherence to clinical follow-up among workers exposed to occupational accidents involving biological material and time in position - Ribeirão Preto, São Paulo, Brazil, 2005-2010.

Adherence	No. Obs.*	Mean Time in Position	Standard Deviation	Minimum	Median	Maximum	p-value**
Yes	234	143.4	112.2	1	120	420	0.147
No	116	126.4	114.1	3	84	456	

*No. Obs = Number of workers observed with regards to adherence.
**p-value regarding the Mann-Whitney test.

Adherence to scheduled clinical appointments up to the moment of medical discharge occurred in 307 (66.6%) accidents. Treatment abandonment or interruption was identified in 151 (32.8%) cases. Three patient records (0.7%) lacked such information.

DISCUSSION

Most of the cases of exposure to potentially infectious biological material involved nursing professionals. Similar results have been found in other studies[1-3,10-11].

Studies investigating exposure to biological material have found that students in the health care field represented a significant portion of the data. A survey conducted in the state of São Paulo, Brazil, which analyzed records of accidents involving biological material, found that 52.0% of the accidents involved nursing aides and technicians, followed by physicians (10.8%), nurses (6.7%) and students (6.3%)[12]. Another research developed in the Regional Worker's Health Reference Center in the city of Florianópolis, Brazil, identified that 49.5% of the accidents involved nursing professionals[10].

Considering the occurrence of exposure among students, the results of the present study demonstrate the need for approaching this topic at the start of nursing coursework to ensure knowledge on the topic before their exposure to risk situations. Low adherence to preventive measures among nursing and medical students reflect insufficient knowledge on current recommendations[13].

Furthermore, it is recommended that health care institutions notify accidents, provide the exposed worker with correct prophylaxis and provide information about vaccination schedules and its importance in clinical practice[14].

Regarding the gender of patients who suffered accidents, most were female. Other studies have found similar percentages[15-16]. In the Brazilian state of São Paulo, between 2007 and 2010, 33,856 accidents were reported, of which 25,788 (76.2%) involved women[12].

The most frequent mechanism of exposure in the current study was puncturing involving needlesticks or sharps. A study developed with HCWs in South Korea found that among the occupational exposures investigated, 71.3% involved hollow-bore needles and 27.9, cutting materials[17]. Inadequate disposal of sharps was the main predictor for the occurrence of accidents in a study conducted in 50 municipalities in the south of the state of Minas Gerais, Brazil[15].

In the case of most exposed patients, the source patient was known. A study regarding epidemiological surveillance of occupational accidents involving exposure to biological fluids in the State of São Paulo found that source patients were identified in 73.6% of the notified accidents[12].

Regarding serological status of source patients, most were non-reactive to the HIV antibody test. Research developed in the city of Goiânia, Brazil, found similar results with nonreactive HIV antibody test results for 72% of source patients[18]. Another study conducted with nursing professionals in a teaching hospital in the state of São Paulo identified that 23.1% of source patients presented negative serology. Study participants indicated this fact as an aspect that influenced nonadherence to clinical follow-up[7].

Regarding clinical follow-up, most cases resulted in medical discharge. Similar results were found in a study developed with nursing professionals who suffered occupational accidents in a teaching hospital in the city of Ribeirão Preto[19]. However, the rate of follow-up abandonment or interruption was 32.8%. According to data from the São Paulo Epidemiological Survey[12], published in 2011, the rate of abandonment in the state of São Paulo was 8.8%, however, such percentage among students was not investigated.

Several factors have been found to be related to the abandonment of specialized clinical follow-up, including long wait time, knowledge of negative source patient serology, forgetting appointments, deeming them unnecessary and lack of time[7]. Other aspects that can favor the abandonment of clinical follow-up include adverse drug effects, lack of awareness and knowledge of recommended conduct[1,20].

Two studies conducted at different moments in a large-scale hospital in the state of São Paulo demonstrated reduced abandonment rates of clinical follow-up by the exposed worker working in the institution. The study associated this reduction to increased investment by part of the health institution in divulging information on the importance of post-accident precautions[7,19].

The high risk of exposure and positive serology of source patient are risk factors for seroconversion. The low risk of exposure and negative serology of source patient were factors that led to exposed individuals not seeking specialized care.[7]

However, it is important to emphasize that the risk for HIV, HCV and HBV transmission still exists, even with negative serology, as the source patient could be in the immunological window period. Thus, clinical follow-up until the moment of medical discharge is of great importance, taking into account the characteristics of each accident.

CONCLUSION

Adherence to scheduled clinical appointments until medical discharge occurred in most exposure cases. However, abandonment rates for clinical follow-up by workers and students were also identified.

Health care workers whose accidents involved source patients with nonreactive serology presented greater chances of adhering to the post-exposure treatment protocol for biological material when compared to those involving a known source with positive serology.

The abandonment rates found in the present study reaffirm the need for directing strategies to increase adherence to clinical follow-up. Thus, it is necessary to bring awareness to workers and students about the importance of clinical follow-up after exposure to biological material up to medical discharge, regardless of the nonreactive serology of the source patient.

RESUMO

Objetivo: Avaliar o comparecimento aos agendamentos clínicos de profissionais e estudantes da área de saúde que sofreram acidente com material biológico potencialmente contaminado. **Método:** Estudo de corte transversal, de caráter retrospectivo, que avaliou as fichas de atendimentos, referentes aos acidentes com material biológico ocorridos de 2005 a 2010, em uma unidade especializada.

Resultado: Foram atendidas 461 pessoas, sendo 389 (84,4%) profissionais e 72 (15,6%) estudantes da área da saúde que sofreram exposição a material biológico. O comparecimento ao seguimento clínico foi realizado por 307 (66,6%) acidentados. Os sujeitos vítimas de acidente com paciente-fonte identificado tiveram 29 vezes mais chance de comparecer aos retornos agendados (OR: 29,98; IC95%: 16,09-55,83). **Conclusão:** Tanto na análise univariada quanto na multivariada, o preditor para o comparecimento ao seguimento clínico foi ter o paciente-fonte conhecido e com sorologia não reagente para os vírus da imunodeficiência humana e ou das hepatites B e C.

DESCRITORES
Exposição a Agentes Biológicos; Exposição Ocupacional; Acidentes de Trabalho; Pessoal de Saúde; Estudantes de Ciências da Saúde.

RESUMEN
Objetivo: Evaluar la asistencia a las consultas clínicas de profesionales y estudiantes del área de salud que sufrieron accidente con material biológico potencialmente contaminado. **Método:** Estudio de corte transversal, de carácter retrospectivo, que evaluó las fichas de atenciones referentes a los accidentes con material biológico ocurridos de 2005 a 2010, en una unidad especializada. **Resultado:** Fueron atendidas 461 personas, siendo 389 (84,4%) profesionales y 72 (15,6%) estudiantes del área de la salud que sufrieron exposición a material biológico. La asistencia al seguimiento clínico fue realizada por 307 (66,6%) de los accidentados. Los sujetos víctimas de accidente con paciente fuente identificado tuvieron 29 veces más probabilidad de acudir a los retornos citados (OR: 29,98; IC95%: 16,09-55,83). **Conclusión:** Tanto en el análisis univariado como en el multivariado el pronosticador para la asistencia al seguimiento clínico fue ser el paciente fuente conocido y con serología no reactiva para los virus de la inmunodeficiencia humana y/o las hepatitis B y C.

DESCRIPTORES
Exposición a Agentes Biológicos; Exposición Profesional; Accidentes de Trabajo; Personal de salud; Estudiantes del Área de la Salud.

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