

# Care and specialized clinical follow-up of nursing professionals who have been victims of accidents with biological material\*

ATENDIMENTO E SEGUIMENTO CLÍNICO ESPECIALIZADO DE PROFISSIONAIS DE ENFERMAGEM ACIDENTADOS COM MATERIAL BIOLÓGICO

ATENCIÓN Y SEGUIMIENTO CLÍNICO ESPECIALIZADO DE PROFESIONALES DE ENFERMERÍA ACCIDENTADOS CON MATERIAL BIOLÓGICO

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## ABSTRACT

This cross-sectional study aimed to evaluate the conduct of nursing professionals who had been victims of accidents with biological material in a teaching hospital in the interior of the state of São Paulo, Brazil, regarding their care and specialized clinical follow-up. The study population consisted of 1,215 nursing professionals, who were interviewed individually between 2010 and 2011. Of the 1,215 nursing professionals interviewed, 636 (52.3%) reported having experienced accidents with biological material; of this population, 182 (28.6%) didn't sought specialized care. The most frequent reason reported for not seeking care was believing that it was a low-risk accident. The reasons professionals do not seek care and do not complete treatment and the clinical follow-up can contribute to strategies to increase professionals' adherence to prophylaxis measures after occupational exposure to biological material.

## DESCRIPTORS

Exposure to biological agents  
Accidents, occupational  
Nursing, team  
Occupational health

## RESUMO

O presente trabalho trata-se de estudo de corte transversal, com objetivo de avaliar a conduta dos profissionais de enfermagem vítimas de acidentes com material biológico, do Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto da Universidade de São Paulo, no estado de São Paulo, referente ao atendimento e ao seguimento clínico especializado. A população foi composta por 1.215 profissionais de enfermagem, entrevistados entre os anos de 2010 e 2011, dos quais 636 (52,3%) sofreram acidentes com material biológico e 182 (28,6%) não procuraram atendimento no serviço especializado. O motivo mais frequentemente relatado foi atribuir pouco risco ao acidente. Assim, acredita-se que os motivos alegados pelos profissionais para não procurarem o atendimento, para não completarem a terapêutica e nem o seguimento clínico podem contribuir para a proposição de estratégias capazes de aumentar a adesão às medidas profiláticas após exposição ocupacional a material biológico.

## DESCRITORES

Exposição a agentes biológicos  
Acidentes de trabalho  
Equipe de enfermagem  
Saúde do trabalhador

## RESUMEN

Estudio de corte transversal, apuntando a evaluar la conducta de profesionales de enfermería víctimas de accidentes con material biológico, del Hospital de Clínicas de la Facultad de Medicina de Ribeirão Preto, Universidad de São Paulo, en el estado de São Paulo; referente a la atención y seguimiento clínico especializado. La población estuvo integrada por 1215 profesionales de enfermería, entrevistados entre 2010 y 2011, de los cuales 636 (52,3%) sufrieron accidentes con material biológico y 182 (28,6%) no solicitaron atención en el servicio especializado. El motivo relatado con mayor frecuencia fue atribuir escaso riesgo al accidente. De tal modo, se cree que los motivos alegados por los profesionales para no solicitar atención, para no completar la terapéutica ni el seguimiento clínico pueden ser facilitar la propuesta de estrategias capaces de aumentar su adhesión a las medidas profiláticas luego de exposición laboral a materiales biológicos.

## DESCRIPTORES

Exposición a agentes biológicos  
Acidentes de trabajo  
Equipo de enfermería  
Salud laboral

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## INTRODUCTION

The risk of exposure to bloodborne pathogens, especially to the Human Immunodeficiency Virus (HIV), the hepatitis B virus (HBV), and hepatitis C (HCV), is proportional to the extent to which sharps and body fluids are handled. Nursing professionals constitute the largest group of health workers. Because they provide direct and uninterrupted care to patients, they are exposed to biological agents and sharps daily, which leads to the highest rates of HIV seroconversion<sup>(1)</sup>.

Despite the existence of pre-exposure measures, scientific, evidence-based practices recommended by Brazilian and international agencies are often not incorporated into clinical practice because professionals do not acknowledge their vulnerability to infection and occupational risks<sup>(2)</sup>.

The estimated risk of HIV transmission after needlestick injuries and source patients known to be HIV positive is 0.3% to 0.5%; after mucous membrane exposure, it is 0.09%. The risk of acquiring HBV after percutaneous exposure may reach 62.0% in situations in which the source patient is seropositive and no prophylactic measures were adopted<sup>(3)</sup>. The estimated risk of infection for HCV after an occupational accident is 1.8%, though it may vary from 1.0% to 10.0%<sup>(4)</sup>.

In the event of an occupational accident with biological agents, workers should immediately seek specialized clinical care (up to the first two hours after exposure) so that the risk of acquiring HIV, HBC and HCV can be assessed and measures can be taken concerning guidance, serology blood tests, the chemoprophylaxis to adopt, and follow-up. Workers should subsequently identify the agency responsible for reporting the accident according to the standards established by the labor regulation<sup>(3)</sup>.

Although health workers benefit from clinical follow-up and the use of antiretroviral medication, studies have shown high levels of therapy abandonment and the interruption of clinical follow-up<sup>(5-6)</sup>.

We deemed it opportune to conduct this study given the scarcity of studies addressing adherence to clinical follow-up after exposure to biological agents.

## OBJECTIVES

To identify nursing workers from a university hospital in the interior of the state of São Paulo, Brazil, who were involved in accidents with biological agents and who

sought specialized medical services; to identify the time elapsed since the accident and the search for a specialized service, the antiretroviral scheme used and the reason it was employed among health workers involved in occupational accidents with biological agents; and, finally, to identify nursing workers who abandoned therapy and specialized clinical follow-up and to report the reasons for this abandonment.

## METHODS

This cross-sectional study was conducted by searching for cases in the *Hospital das Clínicas*, University of São Paulo at Ribeirão Preto, Medical School (HCFMRP-USP) in the city of Ribeirão Preto, SP, Brazil. The activities of this facility are focused on teaching, care delivery and research.

A total of 1,355 nursing workers were eligible, including all those providing direct care to patients or handling objects used by patients in all sectors of the HCFMRP-USP. A total of 140 (10.3%) workers did not participate in the study (92 refused, and 48 were on sick leave). Hence, the study population was composed of 1,215 individuals who voluntarily consented to participate and signed free and informed consent forms.

Data were collected from June 2010 to May 2011 using an interview script that was validated in terms of its form and content by three experts in the field. It addressed socio-demographic data, aspects related to the individual's function, characterization of the accident(s), and whether care was sought in the outpatient service providing care to health workers involved in occupational accidents (AOPS) located in the studied facility. The nursing workers were individually

interviewed in their workplace in a private room by two researchers and five research assistants who were appropriately trained by the study's researchers.

For internal consistency, the collected data were double-entered in a spreadsheet, Excel for Windows 2003. After corrections, the spreadsheet was stored in the Statistical Package for Social Science (SPSS) version 17.0 for Windows, and the final database was then formatted, including the inclusion of new variables, the final characterization of variables in intervals, the grouping of variables and the remaining operations included in the study.

The study project was approved by the Ethics Research Committee at the HCFMRP-USP (Process No. 2379/2010) and at the College of Nursing (Process No. 254/2011) following standards established for research with human subjects.

## RESULTS

Of the 1,215 professionals interviewed, 579 (47.7%) reported no occupational exposure to biological agents in the course of their work in the studied facility, whereas 636 (52.3%) workers reported accidents. These exposures were experienced by the nursing professionals while in contact with patients in hospitalization units, diagnostic exams, surgical centers, and outpatient clinics and with bodily fluids in the material-processing department.

Table 1 presents socio-demographic and professional data and the results that characterize the study's participants involved in accidents with biological agents, those who sought specialized care and those who did not. Of the 636 workers who reported exposure, 454 (71.4%) sought specialized care. There was a predominance of women (403, 88.8%); workers between 30 and 39 years old (156, 34.4%) and between 40 and 49 years old (149, 32.8%); nursing auxiliaries (320, 70.5%); individuals who completed high school (258, 56.8%); those with a single job (377, 83.0%); rotating shifts (206, 45.4%); workload of ≤36 hours a week (227, 50.0%); 11 to 20 years of experience in the nursing field (181, 39.9%) and between 11 and 20 years working in the studied facility (168, 37.0%). Most of the professionals involved in accidents who sought specialized services (382, 84.1%) reported specific training in the prevention of accidents with biological agents and the use of standard precautions.

Of the 454 workers who sought specialized clinical services, seven (100.0%) worked in the neurosurgery unit and 25 (92.6%) worked in the Infectious Diseases Treatment Special Unit (UETDI) at the time of their exposure. Workers from the hemodialysis service (9, 47.4%) and from the material-processing department (22, 47.8%) were those who least frequently sought specialized services.

We note that the search for specialized services was more frequent among professionals who reported attendance at more than ten training programs (2, 100.0%), followed by those who attended from six to ten training programs (20, 90.9%).

The number of exposures to biological material among the studied professionals ranged from zero to ten, with a total of 1,036 accidents over the course of their time working in the facility. Most of the participants (579, 47.7%) reported no accidents, and 350 (28.8%) reported only one accident. The highest number of accidents (10) was reported by 16 (1.3%) professionals (Table 2). We observed that the search for specialized clinical services decreased as the number of exposures increased.

A search for specialized clinical care was most frequent among professionals who experienced percutaneous exposures (372, 81.9%) and exposure to body fluids with blood (391, 73.5%) (Table 3).

**Table 1** – Characterization of nursing professionals working at the HCFMRP-USP who became involved in accidents with biological agents according to specialized care – Ribeirão Preto, SP, Brazil 2010/2011

Variables	Specialized Care					
	Yes (n=454)		No (n=182)		Total (n=636)	
	n°	%	n°	%	n°	%
<b>Gender</b>						
Female	403	88.8	151	83.0	554	87.1
Male	51	11.2	31	17.0	82	12.9
<b>Age (years)</b>						
20  —  29	57	12.6	29	15.9	86	13.5
30  —  39	156	34.4	50	27.5	206	32.4
40  —  49	149	32.8	50	27.5	199	31.3
≥50	92	20.2	53	29.1	145	22.8
<b>Function</b>						
Nurse	105	23.1	32	17.6	137	21.5
Nursing technician	29	6.4	17	9.3	46	7.3
Nursing auxiliary	320	70.5	133	73.1	453	71.2
<b>Educational Level</b>						
Incomplete elementary school	02	0.4	00	0.0	02	0.3
Complete elementary school	08	1.8	09	4.9	17	2.7
Incomplete high school	10	2.2	05	2.8	15	2.3
Complete high school	258	56.8	109	59.9	367	57.7
Incomplete college	38	8.4	12	6.6	50	7.9
Complete college	138	30.4	47	25.8	185	29.1
<b>Number of jobs</b>						
One	377	83.0	154	84.6	531	83.5
Two	77	17.0	28	15.4	105	16.5
<b>Shift of work at the hospital</b>						
Day shift (fixed)	144	31.7	65	35.7	209	32.9
Night shift (fixed)	104	22.9	41	22.5	145	22.8
Rotating shift	206	45.4	76	41.8	282	44.3
<b>Workload (hours/week)</b>						
≤36	227	50.0	97	53.3	324	50.9
37 to 48	116	25.6	50	27.5	166	26.1
≥49	111	24.4	35	19.2	146	23.0
<b>Nursing experience (years)</b>						
≤05	52	11.5	27	14.8	79	12.5
06  —  10	101	22.2	30	16.5	131	20.6
11  —  20	181	39.9	47	25.8	228	35.8
>20	120	26.4	78	42.9	198	31.1
<b>Time working in the facility (years)</b>						
≤05	105	23.1	41	22.5	146	23.0
06  —  10	98	21.6	35	19.2	133	20.9
11  —  20	168	37.0	44	24.2	212	33.3
>20	83	18.3	62	34.1	145	22.8
<b>Training</b>						
Yes	382	84.1	150	82.4	532	83.6
No	72	15.9	32	17.6	104	16.4

**Table 2** - Distribution of nursing professionals according to the number of exposures – Ribeirão Preto, SP, Brazil 2010/2011

Number of exposures by individual	Total of individuals		Total of exposures	
	n	%	n	%
None	579	47.7	0	0
One	350	28.8	350	26.8
Two	145	11.9	290	22.2
Three	55	4.5	165	12.6
Four	18	1.5	72	5.5
Five	47	3.9	235	18.0
Six	03	0.2	18	1.4
Seven	00	0.0	00	0.0
Eight	02	0.2	16	1.2
Nine	00	0.0	00	0.0
Ten	16	1.3	160	12.3
<b>Total</b>	<b>1.215</b>	<b>100.00</b>	<b>1.306</b>	<b>100.00</b>

Note: (n=1.306)

**Table 3** – Distribution of nursing professionals from the HCFMRP-USP involved in accidents with biological agents according to type of exposure, bodily fluids, and specialized care – Ribeirão Preto, SP, Brazil 2010/2011

Variables	Specialized care					
	Yes (n=454)		No (n=182)		Total (n=636)	
	n°	%	n°	%	n°	%
<b>Time of exposure</b>						
Percutaneous	372	81.9	82	18.1	454	100.0
Mucocutaneous	64	68.8	29	31.2	93	100.0
Cutaneous	18	20.2	71	79.8	89	100.0
<b>Bodily fluids</b>						
Blood	391	73.5	141	26.5	532	100.0
Fluids with visible blood	15	83.3	03	16.7	18	100.0
Fluids without visible blood	48	55.8	38	44.2	86	100.0

Of the 454 professionals who sought specialized clinical care in the outpatient service, most (421, 92.7%) did so less than one hour after exposure; 168 (37.0%) were prescribed antiretroviral treatment (ARV), 99 (58.9%) were prescribed prophylaxis, and 69 (41.1%) due to a lack of rapid test; 52 (31.0%) abandoned the medication therapy before the 28<sup>th</sup> day; 26 (5.7%) abandoned specialized clinical follow-up that consisted of medical and nursing consultations, blood collection and monitoring of exam results; and 109 (64.9%) presented adverse effects (Table 4 and 5).

Among the 109 (64.9%) nursing workers who presented adverse effects in relation to ARV, the most common were nausea (23, 21.1%); nausea and vomiting (12, 11.0%); nausea, vomiting, myalgia and epigastric pain (10, 9.2%); epigastralgia (10, 9.2%); only vomiting (08, 7.3%); and nausea and sickness (08, 7.3%).

**Table 4** – Distribution of nursing professionals from the HCFMRP-USP who sought specialized care (N=454) according to time elapsed in the search for specialized care, prescription of antiviral treatment and follow-up abandonment – Ribeirão Preto, SP, Brazil 2010/2011

Variables	n°	%
<b>Time elapsed in the search for specialized care (hours)</b>		
< 1	421	92.7
1 to 2	13	2.9
3 to 72	20	4.4
<b>Antiretroviral prescribed?</b>		
Yes	168	37.0
No	286	63.0
<b>Follow-up abandonment</b>		
Yes	26	5.7
No	428	94.3

Note: (n=454)

**Table 5** – Distribution of nursing professionals from the HCFMRP-USP with a prescription of antiretroviral treatment (N=168) according to motive, presence or absence of adverse effects, and therapy abandonment – Ribeirão Preto, SP, Brazil 2010/2011

Variables	n°	%
<b>Reason the antiretroviral was prescribed</b>		
Prophylaxis	99	58.9
Lack of rapid test	69	41.1
<b>Presence of adverse events</b>		
Yes	109	64.9
No	59	35.1
<b>Therapy abandonment</b>		
Yes	52	31.0
No	116	69.0

Note: (n=168)

Of the 52 (31.0%) who abandoned their therapy, 49 (94.3%) reported that the main reason was the adverse event caused by the use of ARV. With regard to the abandonment of specialized clinical care reported by the nursing workers, the main reasons included lengthy service (26.9%); the source patient presented negative serology (23.1%); forgetfulness (15.4%); deemed unnecessary (7.8%); and lack of time (7.8%).

There were many reasons given by the 182 workers involved in accidents who did not seek specialized care. Most (115, 63.2%) reported that the exposure was of low risk, and 21 (11.5%) reported that the source patient presented negative serology.

## DISCUSSION

More than half of the nursing workers reported at least one accident with biological agents over the course of their career at the hospital (exposure that occurred in another facility was not taken into account). There was a predominance of accidents among women. This characteristic is inherent to nursing work, which is historically performed by women, and is reported in both the Brazilian and international literature<sup>(7-10)</sup>. With regard to nursing workers involved in accidents with biological agents, we verified that most were between 30 and 49 years old; this information was also corroborated by the literature<sup>(9)</sup>.

Nursing auxiliaries were the workers who were most frequently involved in accidents with biological agents. We note that these professionals in Brazil constitute the largest group of individuals within the nursing staff and, consequently, are the workers who are most affected by this type of accident<sup>(8,10)</sup>.

Most individuals reporting accidents had only one job with a weekly workload of 36 hours. A study conducted in the same facility revealed that for each hour added to the workload, the chance of experiencing a percutaneous accident increases 1.03 times (OR=1.03, CI=95%=1.01-1.05)<sup>(11)</sup>.

With regard to the length of experience in the nursing profession, most of the injured workers reported working for more than ten years in the institution. There is no consensus in the literature regarding the role of professional experience in the occurrence of accidents with biological agents. More experienced professionals may be more resistant to changes in their behavior<sup>(12)</sup>. An investigation conducted in a hospital in the interior of São Paulo, Brazil verified that the chance of suffering an accident increased four times for each year worked<sup>(13)</sup>. Another study<sup>(8)</sup>, however, reported divergent results, in which most of the accidents occurred among nursing professionals with five years of experience or less.

In this study, most of the professionals reporting accidents attended training programs addressing the prevention of accidents with biological agents, the use of standard precautions, and post-exposure procedures. The higher the number of training programs attended, the lower the number of exposures. One study conducted in Thailand reports that training increased the rate of adherence to standard precautions during the time of interventions, but the levels of adherence decreased after the interventions, indicating that the effect of the intervention was temporary<sup>(14)</sup>. There has been a considerable investment in the studied facility to prevent this type of accident by means of continued training.

Professionals working in the HCFMRP-USP who become involved in accidents with biological agents must

adopt the occupational post-exposure measures established by the Ministry of Health and by the institution. These measures include immediately seeking clinical care in the hospital's specialized outpatient service and reporting the accident to the service that specializes in safety engineering and occupational medicine (SESMT) to issue an occupational accident report (CAT).

Approximately 30% of the individuals involved in accidents with biological agents did not seek the specialized service, and the rate of searching for care varied by hospital unit. Workers from neurosurgery and the infectious diseases unit most frequently sought specialized care, whereas those working in hemodialysis and the material-reprocessing department least frequently sought specialized care. This is an alarming finding because there are no efficient measures to prevent seroconversion to HCV. Studies report a prevalence of anti-HCV in 20% of patients undergoing hemodialysis<sup>(15-16)</sup>.

Percutaneous exposure involving blood was the most frequently reported incident by nursing workers. Similar data have been reported by other studies<sup>(10,17-18)</sup>. A total of 18.1% of this study's professionals experiencing percutaneous exposure and 26.5% of those exposed to blood did not seek specialized clinical care. These are considered extremely severe exposures with a high risk of infection by bloodborne pathogens. Hence, professionals who did not seek clinical care did not receive measures to minimize the risk of HIV and HBV seroconversion.

We verified that the greater the number of exposures to biological agents, the less frequently individuals sought specialized care. One study conducted in a university hospital in Germany verified that under-reporting was lower in the first accident (35.3%), but it increased to 59.3% in the second event and to 66.7% the third time an accident occurred<sup>(19)</sup>.

In an attempt to analyze the adherence of nursing workers to clinical follow-up after exposure to biological agents, two hospital units were studied. Most of the individuals involved in accidents sought specialized care up to two hours after exposure; 30.4% of the individuals received ARV, 31.3% of whom presented adverse effects. Clinical follow-up was abandoned by 14 individuals (25.0%)<sup>(8)</sup>.

One of the units addressed by the previously mentioned study was at the hospital in which this study was conducted. According to the study's results, there was a reduced rate of abandonment of clinical follow-up, from 25.0% to 5.7%. These findings lead to the conclusion that the investment made by the facility to disseminate information concerning accidents with biological agents is contributing to the improvement of treatment adherence.

Surveillance of accidents in a university hospital in Treichville, Ivory Coast revealed that only 60 (39.7%) of 151 professionals who were exposed to blood and prescribed

prophylaxis with AVR completed the proposed therapy scheme<sup>(20)</sup>. The reported results show that the rate of abandonment of AVR therapy and clinical follow-up is relatively high considering its benefit for the health of workers involved in occupational accidents with biological agents.

The reason most frequently reported by the professionals for the interruption of their therapy was the adverse effects of ARV. The reasons for abandonment of clinical follow-up included the length of service, the source patient presenting negative serology or the professional forgetting the return visit. A literature review showed that the most frequent reasons for not completing post-exposure follow-up of the prophylactic scheme include the drug's adverse effects, lack of sensitization, and lack of knowledge concerning the recommended procedure<sup>(21)</sup>.

The most frequently reported adverse effects were gastrointestinal symptoms, such as nausea, diarrhea and epigastralgia, which have also been reported by other authors<sup>(8)</sup>.

Despite the possibility of infection by HIV, HCV and HBV, approximately 30.0% of the individuals did not seek specialized care, alleging that the accident was of low risk and that the source patient presented a negative serology.

It is very common among health workers to consider this type of accident low risk and to justify their failure to seek specialized care or report the accident. Studies have shown that low risk is frequently self-assessed and is used as an explanation for not reporting accidents<sup>(22)</sup>.

## CONCLUSION

Of the 1,215 nursing professionals from HCFMRP-USP included in this study, 52.3% reported at least one

accident with biological material over the course of their career in the institution; 28.6% of these professionals did not seek specialized care, whereas most of those who did seek care did so less than one hour after the accident.

The most frequently reported reason for abandoning prophylaxis with antiretroviral was the presence of adverse effects. This finding indicates the need to emphasize potential adverse effects and, in the event they occur, to return to the service because many of the symptoms can be treated with continued therapy.

Only 5.7% of the professionals interrupted their specialized clinical follow-up. The reasons for this abandonment included the results of the source patient's serology, forgetfulness and the time required to attend return visits.

Among those who did not seek specialized clinical care, most alleged that the accident was of low risk. Although this assessment is subjective, the assessment of risk in the work environment is useful for workers making decisions concerning the adoption of safe practices. One strategy that can be implemented in health institutions is to increase workers' perception of their own vulnerability.

We note that this study was conducted in a large university hospital that has heavily invested in training programs addressing both the prevention of accidents with biological agents and post-exposure procedures, which may have favored the low rate of follow-up abandonment.

Identifying the factors that prevent professionals from seeking specialized care as well as the reasons that lead them to abandon therapy and clinical follow-up can contribute to the adoption of measures designed to encourage workers to seek care and maintain adherence to clinical follow-up and treatment.

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