

PROCEDURES AFTER EXPOSURE TO BIOLOGICAL MATERIAL IN A SPECIALIZED CANCER HOSPITAL

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ABSTRACT: Occupational accidents involving biological material are a concern for healthcare facilities due to the severe harm they may cause to healthcare workers. This cross-sectional study's aim was to identify the behavior reported by nursing professionals in response to biological material exposure in a cancer hospital located in São Paulo, Brazil. The population was composed of 441 professionals. The hospital's Institutional Review Board approved the project. Of the 441 interviewed subjects, 82 (18.6%) reported exposure in the last twelve months. Note that 47 (57.3%) workers officially reported the accident and sought specialized clinical care. The most frequently reported reason by those (72.1%) who did not follow the protocol was considering it unnecessary. Strategies intended to improve adherence of healthcare workers to the recommended protocol may improve occupational safety.

DESCRIPTORS: Exposure to biological agents. Accidents, occupational. Nursing, team. Occupational accidents registry. Therapeutical approaches.

CONDUTAS APÓS EXPOSIÇÃO OCUPACIONAL A MATERIAL BIOLÓGICO EM UM HOSPITAL ESPECIALIZADO EM ONCOLOGIA

RESUMO: Acidentes ocupacionais envolvendo material biológico são uma preocupação às instituições de saúde, uma vez que podem causar agravos à saúde dos profissionais. Realizou-se um estudo de corte transversal, que teve como objetivo adescrever as condutas relatadas pelos profissionais de enfermagem de um hospital especializado em oncologia do interior paulista após exposição a material biológico. A população do estudo foi composta por 441 profissionais. O projeto foi aprovado pelo Comitê de Ética em Pesquisa do referido hospital. Dos 441 sujeitos entrevistados, 82 (18,6%) referiram ter sofrido exposição nos últimos doze meses. Ressalta-se que 47 (57,3%) profissionais notificaram o acidente oficialmente e procuraram atendimento clínico especializado. O motivo mais frequentemente relatado pelos sujeitos que não adotaram nenhuma conduta (72,1%) foi considerá-la desnecessária. Estratégias direcionadas para aumentar a adesão dos profissionais às condutas preconizadas após exposição pode contribuir para melhoria na segurança profissional.

DESCRIPTORIOS: Exposição a agentes biológicos. Acidentes de trabalho. Equipe de enfermagem. Notificação de acidentes de trabalho. Condutas terapêuticas.

CONDUCTAS DESPUÉS DE LA EXPOSICIÓN A MATERIAL BIOLÓGICO EN UN HOSPITAL ESPECIALIZADO EN ONCOLOGÍA

RESUMEN Accidentes de trabajo con material biológico son una preocupación para las instituciones de salud. Es un estudio transversal, el objetivo fue evaluar las conductas reportadas por lo profesionales de enfermería en un hospital especializado en oncología de São Paulo después de la exposición a material biológico. La población fue compuesta por 441 profesionales. El proyecto fue aprobado por el Comité Ético de Investigación del hospital. De los 441 entrevistados, 82 (18.6%) reportaron la exposición en los últimos doce meses. Es de destacar que 47 (57,3%) profesionales reportaron oficialmente el accidente y buscaron atención clínica especializada. La razón dada con mayor frecuencia por los sujetos que no tomaron conducta (72,1%) fue considerar la notificación innecesaria. Las estrategias dirigidas a incrementar la adherencia a las prácticas profesionales recomendadas después de la exposición pueden contribuir a la mejora de la seguridad profesional.

DESCRIPTORIOS: Exposición a agentes biológicos. Accidentes ocupacionales. Grupo de enfermería. Notificación de accidentes del trabajo. Conductas terapêuticas.

INTRODUCTION

Healthcare providers are constantly exposed to biological material such as blood and other bodily fluids with the potential to transmit diverse pathogens and, consequently, severely harm their health¹⁻²

Occupational accidents with biological material may occur through a percutaneous route, i.e., needlesticks or other sharps-related injuries, and/or by direct contact with eye, mouth or nose mucosa, or by skin contact. Additionally, any contact with virus-concentrated material (research labs, virus culture, or viruses in great amounts) without proper protection is considered occupational exposure that requires assessment and follow-up.³

The World Health Organization estimates that more than three million accidents with biological material occur among healthcare providers around the world. Of the three million accidents, two million involve exposure to the Hepatitis B virus (HBV); 900,000 involve exposure to Hepatitis C (HCV); and 170,000 involve exposure to the Human Immunodeficiency Virus (HIV). As a result, there are a possible 66,000 healthcare workers infected with HBV, 16,000 with HCV, and 1,000 with HIV after occupational percutaneous exposure.⁴

The nursing staff provides direct care and, therefore, is constantly in contact with patients in different healthcare settings, making these workers more vulnerable to biological material exposure.⁵⁻⁸

Pre-exposure preventive measures consist of implementing standard precautions, which is the main preventive measure to avoid exposure to biological material⁹, in addition to reducing the use of needles or using safety syringes, and immunization against hepatitis B.^{4,10-11}

After the occurrence of an occupational accident with biological material, pre-exposure measures establish that local care, clinical care in specialized services, is required to determine the risk of infection, and consequently, any prophylactic procedure necessary, in addition to reporting the accident through Occupational Accident Reporting (OAR) forms.² Studies have shown that despite the benefits of preventive measures, adherence of workers to such measures is still below the ideal level.¹²⁻¹³

Given the previous discussion, this study's aim was to describe the behavior reported by nursing workers in response to biological material exposure.

METHODS

This descriptive, cross-sectional study was conducted in the *Hospital de Câncer de Barretos* located in the state of São Paulo, Brazil. At the time of data collection, the hospital had 518 nursing workers distributed among nurses, nursing technicians and auxiliaries. The study population was composed of 441 individuals, 51 of whom refused to participate and 26 were either on sick or maternity leave. All the professionals were included in the study and individually interviewed because the services responsible for providing specialized clinical care and accident-reporting could not identify those who did not adopt the protocol.

One instrument addressing sociodemographic data, occupational aspects, characterizations of the accident(s), reporting-related factors and/or care received from the Hospital Infection Control Service (HICS), was applied to collect data after five experts performed content and apparent validation.

Data were collected from January 1st to June 30th 2011 after the researcher personally invited all the eligible participants.

The hospital's Nursing Management authorized interviews to be conducted during working hours provided that the workers' immediate supervisors agreed to the interviews and that interviews did not impede or prevent the activities of the study participants. Hence, data were collected through individual interviews in a room reserved for that purpose on the hospital premises.

The Human Resources Department provided a list with the names and work sectors of nursing workers in each unit and the monthly schedule was obtained from each sector to facilitate data collection.

The nursing workers were invited to participate in the study and immediately interviewed when they consented. When the interview was not possible at the time, a different time was scheduled for the interview. There were cases in which the researcher returned to the sector several times until the professional was available.

The researcher visited the hospital daily in the morning, afternoon and at night. Only exposures that took place in this specific facility were considered so that accidents that occurred in other working settings were not taken into account.

Data were recorded in a printed instrument and a number identified each interview. Data were entered twice in one Excel spreadsheet, Windows

2003, and then validated to avoid typing errors. The instrument's variables were coded and cataloged in a codebook.

Afterwards the spreadsheet was transferred to the Statistical Package for the Social Sciences (SPSS), version 17.0 for Windows, where the database was structured and final data management was performed, such as the creation of new variables, categorization of variables into intervals, and the grouping of variables and remaining operations included in the study. Descriptive statistics were used in the data analysis.

The Institutional Review Board at *Hospital de Câncer de Barretos* approved the study project (Process n°. 400-2010). The individuals who agreed to participate in the study received Free and Informed Consent Forms clarifying the study's objectives.

RESULTS

This study population was composed of 441 nursing workers: 72.3% were nursing technicians; 19.5% were nurses; and 8.2% were nursing auxiliaries; female workers were in the majority (83%). Most were aged from 19 to 29 years old (42.2%) or from 30 to 39 years old (37.2%). Among those who experienced an accident with biological material in the last year, 71 (86.6%) reported attending training programs addressing occupational accidents with biological material.

Of the 441 interviewed workers, 82 (18.6%) reported occupational exposure to biological material in the facility in the 12 months prior to the interview. The distribution of healthcare workers who experienced an occupational accident according to sex, occupation, education, and work shift, was similar to that of the population under study (Table 1).

In regard to the type of procedure adopted by the nursing workers after being exposed to biological material, 47 (57.3%) reported having followed the entire protocol, that is, they sought specialized care and filled in an accident reporting form.

Among those who did not report an accident: 29 (82.9%) were women; 18 (51.4%) were aged from 19 to 29 years old; 85.7% were nursing technicians; and 77.2% had completed high school. In regard to work shift, 32 (91.4%) individuals worked during the daytime. Most (60%) of these individuals had five or fewer years of professional experience in the nursing field and 71.3% had worked for five or fewer years in the facility.

Table 1 - Characterization of individuals according to the occurrence or non-occurrence of occupational accidents involving biological material and study variables. *Hospital de Câncer de Barretos, Barretos, São Paulo, Brazil, 2011*

Variables	Exposure to biological material					
	Yes (n=82)		No (n=359)		Total (n=441)	
	n	%	n	%	n	%
Sex						
Female	68	82.9	298	83.0	366	83.0
Male	14	17.1	61	17.0	75	17.0
Age (years)						
19 - 29	39	47.6	147	40.9	186	42.2
30 - 39	28	34.1	136	37.9	164	37.2
40 - 49	11	13.4	50	13.9	61	13.8
≥ 50	4	4.9	26	7.2	30	6.8
Occupation						
Nurse	11	13.4	75	20.9	86	19.5
Nursing technician	68	82.9	251	69.9	319	72.3
Nursing auxiliary	3	3.7	33	9.2	36	8.2
Education						
Complete high school	58	70.8	225	62.7	283	64.2
Incomplete undergraduate studies	12	14.6	47	13.1	59	13.4
Bachelor's degree	12	14.6	87	24.2	99	22.4
Work shift						
Daytime shift	71	86.6	289	80.5	360	81.6
Nighttime shift	6	7.3	39	10.9	45	10.2
Flex	5	6.1	31	8.6	36	8.2
Nursing experience (years)						
≤ 05	41	50.0	147	40.9	188	42.6
05 - 10	22	26.8	139	38.7	161	36.5
10 - 20	14	17.1	44	12.3	58	13.1
> 20	5	6.1	29	8.1	34	7.7
Experience in this facility (years)						
≤ 05	52	63.4	218	60.7	270	61.2
05 - 10	20	24.4	113	31.5	133	30.2
10 - 20	9	11.0	25	7.0	34	7.7
> 20	1	1.2	3	0.8	4	0.9
Training						
Yes	71	86.6	292	81.3	363	82.3
No	11	13.4	67	18.7	78	17.7

Note that 28 (80%) workers who did not adopt any procedure after the accident reported attending training programs addressing occupational accidents with biological material and standard precautions after exposure (Table 2).

Table 2 – Characterization of individuals who experienced occupational accidents with biological material according to the variables under study and type of procedure adopted. Hospital de Câncer de Barretos, Barretos, São Paulo, Brazil, 2011

Variables	Type of conduct adopted				Total (n=82)	
	HICS/OAR (n=47)		None (n=35)		n°	%
	n	%	n°	%		
Sex						
Female	39	83.0	29	82.9	68	82.9
Male	08	17.0	6	17.1	14	17.1
Age (years)						
19 – 29	21	44.7	18	51.4	39	47.6
30 – 39	20	42.5	8	22.9	28	34.1
40 – 49	4	8.5	7	20.0	11	13.4
≥ 50	2	4.3	2	5.7	04	4.9
Occupation						
Nurse	7	14.9	4	11.4	11	13.4
Nursing technician	38	80.8	30	85.7	68	82.9
Nursing auxiliary	2	4.3	1	2.9	3	3.7
Education						
Complete high school	31	66.0	27	77.2	58	70.8
Incomplete undergraduate studies	08	17.0	4	11.4	12	14.6
Bachelor's degree	08	17.0	4	11.4	12	14.6
Work shift						
Daytime shift	39	83.0	32	91.4	71	86.6
Nighttime shift	4	8.5	2	5.7	6	7.3
Flex	4	8.5	1	2.9	5	6.1
Nursing experience (years)						
≤ 05	20	42.5	21	60.0	41	50.0
05 – 10	12	25.5	10	28.6	22	26.8
10 – 20	12	25.5	2	5.7	14	17.1
> 20	3	6.5	2	5.7	5	6.1
Experience in the facility (years)						
≤ 05	27	57.4	25	71.3	52	63.4
05 – 10	12	25.5	8	22.9	20	24.4
10 – 20	8	17.1	1	2.9	9	11.0
> 20	-	-	1	2.9	1	1.2
Training						
Yes	43	91.5	28	80.0	71	86.6
No	4	8.5	7	20.0	11	13.4

Exposures took place in all the hospital's sectors, with the exception of the Laborator, Nuclear Medicine and Clinical Oncology. The analysis of type of procedure adopted showed that those working in the Central Sterilizing Services (100%) and Surgical Clinic (55.6%) most

frequently failed to report occupational accidents. Note that all the individuals working in the Center of Intercurrences, Surgical Hospitalization, Prevention, Radiology, Radiotherapy and Palliative Care adopted the entire protocol after exposure (Table 3).

Table 3 - Distribution of individuals who experienced occupational accidents with biological material (n=82), according to the type of procedure adopted and working sector. Hospital de Câncer de Barretos, Barretos, São Paulo, Brazil, 2011

Sector	Type of procedure adopted				Total (n=82)	
	HICS/OAR (n=47)		None (n=35)			
	n	%	n	%	n	%
Surgical clinic	4	44.4	5	55.6	9	100
Surgical center	16	53.3	14	46.7	30	100
Outpatient surgical center	1	50.0	1	50.0	2	100
Intercurrences center	2	100	-	-	2	100
Sterilization center	-	-	4	100	4	100
Endoscopy	1	50.0	1	50.0	2	100
Hematology and Transplantation Transplante de Medula Óssea	2	50.0	2	50.0	4	100
Surgical hospitalization	4	100	-	-	4	100
Clinical hospitalization	3	75.0	1	25.0	4	100
Pediatrics	1	50.0	1	50.0	2	100
Prevention	1	100	-	-	1	100
Radiology	2	100	-	-	2	100
Radiotherapy	1	100	-	-	1	100
Palliative care	2	100	-	-	2	100
Intensive Care Unit	7	53.8	6	46.2	13	100

Note there are individuals who experienced more than one incidence of exposure, totaling 127 accidents.

In regard to the type of exposure, of the 68 individuals who did not follow the protocol after

an accident, 51 (75%) experienced skin exposure, 13 (19.1%) skin and mucosa exposure, and 4 (5.9%) experienced percutaneous exposure; blood was the fluid most frequently involved in the accidents, i.e., in 36 (52.9%) exposures (Table 4).

Table 4 - Distribution of occupational accidents with biological material (n=127) among nursing workers according to the type of exposure, body fluid, and type of procedure adopted, Hospital de Câncer de Barretos, Barretos, São Paulo, Brazil, 2011

Variables	Type of procedure adopted				Total (n=127)	
	HICS/OAR (n=59)		None (n=68)			
	n	%	n	%	n	%
Type of exposure						
Percutaneous	48	81.4	04	5.9	52	100
Skin and mucosa	4	6.8	13	19.1	17	100
Skin	7	11.8	51	75.0	58	100
Fluid involved in the exposure						
Blood	52	88.1	36	52.9	88	100
Other bodily fluid with blood	3	5.1	12	17.7	15	100
Other bodily fluid without blood	4	6.8	20	29.4	24	100

The reasons presented by the nursing workers for not having reported the accidents and not having sought specialized care were grouped into: a) did not consider reporting to be necessary; and b) lack of knowledge.

The following were included in the category "did not consider reporting to be necessary": "low-risk accident" and "source-patient was HIV negative." The following were grouped under "lack of

knowledge": "I did not know how to do it", "I did not know I should report and/or seek specialized care", and "I did not know it was considered an accident." Considering it unnecessary to report the accident and seek specialized clinical care was the reason most frequently reported by the 49 (72.1%) professionals who experienced occupational accidents.

There was an open question at the end of the instrument for the workers to describe the proce-

ture that should be adopted after an accident and only 33 (40.2%) individuals who experienced occupational accidents described the correct protocol; 21 (25.7%) mentioned that only seeking specialized care was necessary, while 17 (20.7%) mentioned that only completing the OAR form was necessary. Nine (11.0%) participants said that the supervisor should be notified and two (2.4%) were not able to report the correct protocol.

DISCUSSION

This study reinforces the fact that accidents with biological material affecting nursing workers are a severe problem faced in healthcare facilities, both due to the frequency with which they occur and their severity. A similar result, a rate of 17.5% of accidents with biological material, is reported by one study conducted with nursing workers from a general hospital in the state of Paraná, Brazil¹⁴, while one study conducted in a regional hospital in Thailand reported a rate of 23.8%.¹⁵

Many factors impact the rate of accidents with biological material, among them the type of healthcare facility and type of patients under care, so that careful judgment should be used when comparing rates among facilities.

Results of other investigations also indicate that units such as surgical centers, emergency rooms, and intensive care units are the sectors with a greater predominance of exposure to biological material.¹⁶⁻¹⁸ One study conducted in Pelotas, state of Rio Grande do Sul, Brazil reports that high levels of stress accruing from heavy workloads may favor accidents with biological material among nursing professionals working in surgical centers.¹⁹

Even though the reporting of accidents with biological material is legally mandatory, in practice not all workers do so. Studies have shown varied rates of underreporting depending on the type of exposure, profession, and policies established by healthcare facilities concerning accident reporting.²⁰⁻²¹

Underreporting is a significant challenge to be faced because it hinders knowledge of the real incidence rates of occupational accidents, a factor that may reflect lack of knowledge or lack of attention on the part of healthcare workers in regard to the severity of accidents.¹⁰

One study, conducted in a university hospital in the interior of São Paulo, verified the rate of underreporting of accidents with biological material by comparing two databases. That study

reports a rate 29.92%.⁶ Researchers analyzed two American databases in 1997 and 1998 and estimated that 384,325 percutaneous accidents occur every year among healthcare providers working in hospitals, only 43.4% of which are reported.²²

Therefore, even though clinical follow-up after accidents with biological material is considered an important measure to protect the victim, not reporting the accident or abandoning treatment have been found in various studies and reached considerable rates of occurrence.^{8,13,17}

In this study, skin exposure was the exposure for which most professionals did not adopt any procedure. Even though chemoprophylaxis is not recommended when exposure involves intact skin, there is still the need to complete an OAR form.³ Studies have shown that workers have a greater inclination to dismiss or ignore protocol in cases of accidents involving the skin or mucosa.²³⁻²⁴

Despite the fact that accidents involving skin and mucosa are considered of low risk for the transmission of bloodborne pathogens, there is a report of one worker from the nursing staff who acquired HIV after having contact with blood through her eye mucosa during a venous puncture procedure.²

Assessing accidents to be of low risk was the reason alleged by the workers for not reporting exposure to biological material and not seeking specialized clinical care; other investigations corroborated these findings.^{13,25-26}

One study conducted in the United States and addressing accidents with biological material also reinforces these results. It reports that the most common reason for the underreporting of accidents with biological material among healthcare workers and students was considering the exposure to be unimportant.²³

Other reasons presented by healthcare workers for the underreporting of accidents were lack of knowledge regarding the reporting procedures and lack of knowledge regarding exposure to biological material protocols; these were also identified by other authors.²⁷⁻²⁸

These results lead to reflection and raise questions concerning lack of knowledge or lack of awareness among workers regarding the risk of occupational exposure and the importance of specialized medical follow-up as a protective measure.

Hence, healthcare facilities need to implement strategies to sensitize healthcare workers regarding the importance of injured professionals

adhering to protocols concerning occupational exposure to biological material and avoiding making erroneous assessments of the situation.

CONCLUSION

The transmission of blood-borne pathogens to healthcare workers is a public health problem worldwide. Becoming infected by HIV, HBV, or HCV through an occupational accident with biological material is a real possibility.

Underestimating risk is an important variable both for underreporting and for not seeking specialized clinical care and should be better investigated.

This study showed that the main reason for workers not completing Occupational Accident Reporting forms and for not seeking specialized care was considering that the exposure posed low or no risk. Most professionals who experienced accidents and did not report them had received training addressing prevention and protocols concerning occupational exposure to biological material. These findings show that training does not promote reporting since knowledge *per se* is not enough to encourage healthcare workers to adopt safe behavior at work.

Many workers did not pay proper attention to the risks related to accidents involving biological material, often incorporating occupational accidents as components of the work routine. Therefore, working in an unhealthy or risk-laden environment may reduce the perception of workers concerning the need to adopt preventive measures for their own protection.

This study presents some limitations. The participants were asked during the individual interview to report their exposure to biological material in the last year. It is possible that some events were not mentioned due to forgetfulness so that there is a potential bias related to a possible underestimation of underreporting. Another potential limitation involves the fact that data were not compared to official records of both the Hospital Infection Control Service and Specialized Safety Engineering and Occupational Medicine.

This study enabled the identification of the procedures adopted by the nursing workers in response to occupational exposure to biological material and the reasons presented for not adopting the recommended procedures.

The results indicate the need for further studies that address the behavior of workers in

response to occupational accidents that expose them to the risk of being infected with blood-borne pathogens and consequent harm to health. Additionally, future studies may support the development and implementation of measures for facilities to improve nursing professionals' adherence to protocols, conferring greater safety to these professionals.

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