

## OCCUPATIONAL ACCIDENTS WITH POTENTIALLY CONTAMINATED MATERIAL INVOLVING NURSING WORKERS\*

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**ABSTRACT:** The objective was to describe the occupational accidents involving biological material involving nursing team workers. Descriptive and retrospective study with a quantitative approach, undertaken at a hospital in the Central-West of the state of Minas Gerais. The data were collected by consulting the occupational accident reporting forms and histories, safeguarding all ethical aspects. Between October 2014 and May 2016, 61 workers were victims of 71 cases of exposure; 56 (91.8%) are women, 32 (52.5%) nursing technicians, 31 (50.8%) working in clinical nursing services. Percutaneous exposure 37(60.7%) during venipuncture 17(27.9%) was predominant. In conclusion, these cases of exposure could be avoided, which evidences the need for continuing education for these professionals and the implementation of devices with safety engineering.

**DESCRIPTORS:** Nursing; Occupational Exposure; Exposure to biological agents; Occupational risks; Occupational health.

### ACIDENTES OCUPACIONAIS COM MATERIAL POTENCIALMENTE CONTAMINADO ENVOLVENDO TRABALHADORES DE ENFERMAGEM

**RESUMO:** Objetivou-se descrever os acidentes ocupacionais envolvendo material biológico com trabalhadores da equipe de enfermagem. Estudo descritivo, retrospectivo, com abordagem quantitativa, realizado em um hospital do Centro-Oeste Mineiro. Os dados foram coletados por meio de consulta às fichas de comunicado de acidente de trabalho e prontuários, resguardando todos os aspectos éticos. No período de outubro de 2014 a maio de 2016, 61 trabalhadores sofreram 71 exposições; 56 (91,8%) são mulheres, 32 (52,5%) técnicos de enfermagem, 31 (50,8%) que atuavam nas enfermarias. Houve predomínio de exposições percutâneas 37 (60,7%), em punção venosa 17 (27,9%). Conclui-se que tais exposições poderiam ser evitadas, o que evidencia a necessidade de educação continuada para esses profissionais e a implantação de dispositivos com engenharia de segurança.

**DESCRIPTORIOS:** Enfermagem; Exposição ocupacional; Exposição a agentes biológicos; Riscos ocupacionais; Saúde do trabalhador.

### ACCIDENTES OCUPACIONALES CON MATERIAL POTENCIALMENTE CONTAMINADO INVOLUCRANDO TRABAJADORES DE ENFERMERÍA

**RESUMEN:** La finalidad fue describir los accidentes ocupacionales con material biológico involucrando trabajadores del equipo de enfermería. Estudio descriptivo, retrospectivo con aproximación cuantitativa, desarrollado en un hospital del Centro-Oeste del estado de Minas Gerais. Los datos fueron recolectados mediante consulta de las fichas de informe de accidente ocupacional y archivos, salvaguardando todos los aspectos éticos. En el período de octubre del 2014 a mayo del 2016, 61 trabajadores fueron víctimas de 71 exposiciones; 56 (91,8%) son mujeres, 32 (52,5%) técnicos de enfermería, 31 (50,8%) actuaban en las enfermarías. Predominaron exposiciones percutáneas 37(60,7%), en punción venosa 17(27,9%). Se concluye que tales exposiciones podrían ser evitadas, lo que evidencia la necesidad de educación continuada para esos profesionales y la implantación de dispositivos con ingeniería de seguridad.

**DESCRIPTORIOS:** Enfermería; Exposición ocupacional; Exposición a agentes biológicos; Riesgos ocupacionales; Salud del trabajador.

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## ● INTRODUCTION

Health workers (HW) are exposed to different occupational risks, among which the biological risk is highlighted, due to the constant performance of procedures involving bodily fluids<sup>(1-2)</sup>.

Occupational exposure involving potentially contaminated biological material (PCBM) are characterized as percutaneous (injuries due to sharps), muco-cutaneous (exposure of ocular, nasal, oral and genital mucosa and non-intact skin) accidents and human bites<sup>(3)</sup>.

According to research, the main exposure route involved in occupational accidents is percutaneous<sup>(4-6)</sup>, mainly due to the inappropriate disposal of sharps, venipuncture procedures and needle recapping<sup>(2,7)</sup>, mainly involving blood<sup>(8-11)</sup>.

Particularly the nursing team is more susceptible to these cases of exposure due to the large number of workers in this category, the constant handling of sharps and the intense direct care for clients with different illnesses<sup>(12-13)</sup>.

The HW should be alert to the execution of their tasks, in which compliance with standard precautions (SP) and hand washing are fundamental, among other prophylactic measures, independently of the diagnosis of the patient they are attending<sup>(14)</sup>.

Despite the great advances observed in the scientific production on occupational exposure involving PCBM in HW, mainly nursing professionals<sup>(7,12)</sup>, few studies have been developed in the interior of the state of Minas Gerais.

Therefore, the objective in this study is to describe the occupational accidents involving PCBM, considering the professional, demographic, individual aspects, as well as exposure-related aspects in nursing workers from a philanthropic hospital in the Central-West of the state of Minas Gerais.

## ● METHOD

Descriptive and retrospective study with a quantitative approach, developed at a medium-sized philanthropic hospital in the Central-West of the state of Minas Gerais, with approval from the Research Ethics Committee of the proponent institution (Protocol 1.349.749/2015) and the Co-Participant institution (Protocol 1.392.976/2015). The professionals' anonymity was safeguarded and the guidelines and regulatory standards for research involving human beings were complied with.

The data were collected by consulting the Occupational Accident Reporting (OAR) forms and the patient histories from the Occupational Engineering, Safety and Medicine

Service (SESMT) of nursing workers who were victims of accidents involving biological material between October 2014 and May 2016. Then, an active search of these workers was undertaken to invite them to participate in this research. They answered a structured tool, elaborated by one of the researchers, with closed questions on the occupational exposure to PCBM.

All nursing workers who had been victims of accidents involving PCBM during that period were included, while workers who had been dismissed or were on leave at the time of the data collection were excluded. The following exclusion criteria were adopted: workers who had been dismissed or were on leave when the data were collected.

The data were coded and typed in worksheets in Excel for Windows, and later transferred to the Social Package for Social Science IBM (SPSS)<sup>®</sup>, version 22.0 and analyzed using descriptive statistics.

## ● RESULTS

In total, 73 (100%) nursing workers were victims of accidents involving biological material between October 2014 and May 2016, seven of whom were excluded due to dismissal and five due to leave.

Thus, 61 (83.5%) workers were analyzed who were victims of 71 (100%) cases of exposure involving PCBM during that period.

Among the 71 cases of exposure, a heterogeneous distribution was observed, the highest frequencies being found in January and March 2016 (Figure 1).

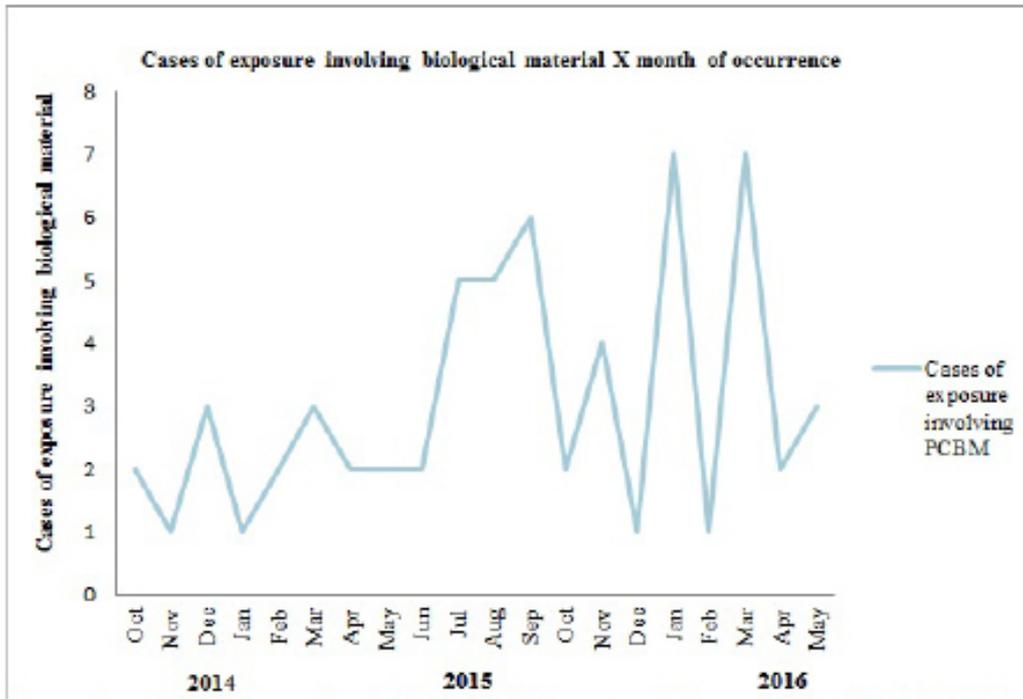


Figure 1 – Distribution of accidents involving potentially contaminated biological material between October 2014 and May 2016. Minas Gerais, 2016

The analysis of the participating workers’ demographic, individual and professional characteristics showed that the cases of occupational exposure prevailed among nursing technicians (n=32; 52.5%), female (n= 56; 91.8%), with an average age of 31.4 years and standard deviation of 7.5.

As for the work sector, most accidents (n=31; 50.8%) happened at the nursing ward/surgical clinic; others at the Intensive Care Unit (ICU) (n=10; 16.4%) and at the Surgical Unit (n=9; 14.8%).

It was identified that more than half of the workers had less than five years of experience on the job (n=40; 65.6%) and at the institution (n=40; 65.6%). The majority (n=49; 80.3%) affirmed working at a single location.

As for the number of cases of exposure to PCBM, the large majority (n=49; 80.3%) reported none or one case of exposure to PCBM in the past year; they also answered having received training on how to prevent occupational exposure (n=39; 63.9%). All participants (n=61; 100%) possessed a complete vaccination scheme against hepatitis B (Table 1).

Table 1- Demographic, individual and professional characteristics of HW victims of accidents involving biological material between October 2014 and May 2016. Divinópolis, MG, Brazil, 2016 (continues)

Variable	n	%	
Sex	Female	56	91.8
	Male	5	8.2
Age	20   30	31	50.8
	30   40	21	34.4

Age	40   50	6	9.8
	≥ 50	3	4.9
Professional Category	Nurse	22	36.4
	Auxiliary nurse	7	11.5
	Nursing technician	32	52.5
Work Sector	Nursing ward/surgical clinic	31	50.8
	Adult/Child ICU	10	16.4
	Surgical Unit	9	14.8
	Maternity/ Nursery	4	6.6
	Oncology	2	3.3
	Nephrology	1	1.6
	Emergency care	4	6.6
Length of experience on the job (in years)	0   5	40	65.6
	5   10	13	21.3
	10   15	3	4.9
	15   20	4	6.6
	20   25	1	1.6
Length of experience (in years at the institution)	0   5	40	65.6
	5   10	12	19.7
	10   15	5	8.2
	15   20	2	3.3
	20   25	2	3.3
Affiliation with other institution	Yes	12	19.7
	No	49	80.3
No. of cases of exposure in past year of work	0 – 1	51	83.6
	≥ 2	10	16.4
Training after occupational exposure	Yes	39	63.9
	No	22	36.1
Vaccination against hepatitis B	Yes	61	100
	No	0	0

As regards the characteristics of the occupational accident (Table 2), cases of percutaneous exposure were predominant (n=37; 60.7%). Venipuncture (n=17; 27.9%) was cited as the most frequent procedure, while the intravenous catheter (n=18; 29.5%) was the causal object in most accidents, as well as blood (n=43; 70.5%). The most affected region were the fingers (n=34; 55.7%).

Table 2 – Characteristics related to occupational exposure involving potentially contaminated biological material between October 2014 and May 2016. Divinópolis, MG, Brazil, 2016 (continues)

Variable		n	%
Type of exposure	Muco-cutaneous	24	39.3
	Percutaneous	37	60.7
Activity performed	Clearing of venous access	3	4.9
	Venipuncture	17	27.9
	Disposal of sharps	9	14.8
	Intramuscular medication administration	10	16.4
	Surgical procedure	4	6.6
	Discarding	1	1.6

Activity performed	Needle recapping	2	3.3
	Others	15	24.6
Object involved	Intravenous catheter	18	29.5
	Scalpel	4	6.5
	Needle	11	18
	Scalp	1	1.6
	Unidentified sharp	2	3.2
	None	25	40.9
	Fluid involved	Unspecified secretion	7
Unspecified secretion + Blood		6	9.8
Blood		43	70.5
Vomit		1	1.6
Urine		1	1.6
Amniotic fluid		1	1.6
Endovenous chemotherapeutic drug		1	1.6
Region affected	Eye	13	21.3
	Face	3	4.9
	Mouth	3	4.9
	Finger	34	55.7
	Upper limb	4	6.6
	Mouth + eyes + face	1	1.6
	Eye + face	2	3.3
	Face+ nasal mucosa	1	1.6

Concerning the characteristics involving the source-patient's serum status and post-occupational exposure conducts, most clients were negative for HIV and VHC (n=47; 77.0%), more than half of the workers involved did not receive antiretroviral drugs (n=53; 86.9%), all workers reported the accident to the SESMT (n=61; 100%) and the majority (n=48; 78.7%) was not assessed by a specialized infectology service (Table 3).

Table 3 – Characteristics of occupational exposure involving biological material concerning serum status of source patient at the moment of the accident, search for specialized medical care and use of antiretroviral drugs. Divinópolis, MG, Brazil, 2016

Variable		n	%
Serum status of source-patient	HIV - VHC -	47	77
	HIV+ VHC +	1	1.6
	HIV + VHC -	2	3.2
	HIV - VHC +	4	6.5
	HIV - VHC s/i*	1	1.6
	HIV + VHC s/i*	1	1.6
	s/i	5	8.1
Received antiretroviral drugs	Yes	8	13.1
	No	53	86.9
Assessment by specialized infectology service	Yes	13	21.3
	No	48	78.7

\* no information

## ● DISCUSSION

In this study, cases of occupational exposure involving nursing technicians were predominant, similar to the findings in another study<sup>(9)</sup>. That is justified by the larger volume of nursing workers at health institutions, being 80% technicians and auxiliary nurses and 20% nurses<sup>(15)</sup>.

Most cases occurred in the female sex. That is due to the historical characteristics of the nursing team, which mostly consists of women<sup>(8)</sup>, thus justifying its higher prevalence, in accordance with other studies in the Brazilian and international literature<sup>(4,11,13)</sup>.

In Brazil, in a study undertaken by the Oswaldo Cruz Foundation (FIOCRUZ), on the initiative of the Federal Nursing Council (COFEN), it was estimated that the nursing team consists of 84.6% women and that, although this number is much higher than that of men, a trend towards the masculinization of this professional group has been ongoing since the 1990's<sup>(15)</sup>.

The age range between 20 and 30 years was the most frequent in terms of cases of exposure among the interviewees, in line with other studies<sup>(6,11)</sup>. The young age range was also more frequent in another study<sup>(16)</sup>, justified by the fact that workers over 40 years of age execute more administrative tasks and less actions related to blood collection or other situations associated with higher risk for occupational exposure. On the opposite, another author<sup>(17)</sup> reveals concern with this age range, which in such little time has already been exposed to PCBM.

As regards the sector where these accidents happened, the nursing ward/surgical clinic represented more than half of the cases, differently from the literature findings, in which the surgery service is appointed as the sector with the highest frequency of occupational accidents<sup>(18-19)</sup>.

What the length of experience on the job and at the institution is concerned, most interviewees indicated less than five years of experience, in line with other findings<sup>(20)</sup>. Differently from these results, in another study, high accident rates were found involving workers with more than 10 years of experience at the institution<sup>(8)</sup>, which does not permit a consensus on the role of professional experience in the occurrence of exposure involving PCBM.

With regard to the victims' vaccination, all of them had a complete vaccination scheme for hepatitis B when they were hired, according to data in their histories, as evidenced in another study<sup>(21)</sup>. In a research involving workers from Rio Grande do Norte, more than half of the professionals exposed to PCBM had been vaccinated against hepatitis B, but no information was available on the vaccination response. Therefore, the risk of a lower immunity protection rate cannot be discarded when assessed based on anti-HB antibodies<sup>(9)</sup>.

Another finding evidenced that, among the workers exposed to PCBM, the highest percentage of non-vaccinated professionals referred to nursing technicians and auxiliary nurses, followed by washing and cleaning professionals, representing 4.3% and 2.2%, respectively<sup>(2)</sup>. That shows the need to raise the HWs' awareness on the vaccination, as hepatitis B is a vaccine-preventable disease.

As regards the type of exposure, more than half was percutaneous. These data were similar to a Polish study<sup>(4)</sup> in which accidents involving sharps predominated in 92.5% of the cases and in other findings<sup>(5-6,10,22)</sup>.

The accidents happened in different care situations, but venipuncture was the most mentioned. A similar result was found at a hospital in the interior of the state of São Paulo, when 29.1% of the cases happened during this activity<sup>(23)</sup>. In a study in 50 cities in Southern Minas Gerais, the main predictor of occupational exposure was inadequate material discarding<sup>(2)</sup>.

The most used object during the accidents was the intravenous catheter, differently from some studies where the hollow needle was the main material involved in occupational exposure<sup>(22,24)</sup>.

As an alternative to minimize risks involving accidents with sharps, safe devices with safety engineering need to be available to reduce HWs' exposure to different transmissible pathogens<sup>(25-27)</sup>. These devices were recommended and became mandatory at all Brazilian health services.

Blood was the most involved body fluid, in line with another study<sup>(10)</sup> that evidenced this biological material in 78.9% of the accidents. Other findings also indicated this fluid as the most present in exposure cases<sup>(9,11,22)</sup>. As for the region, the most affected was the finger, followed by the eyes, similar to other findings<sup>(28)</sup> in which 56.4% of the accidents involved fingers and 32.5% eyes.

As for the serum status, in most cases, the source patient was identified, in line with another study<sup>(2)</sup>.

What the post-exposure conduct is concerned, the large majority of the interviewees did not consult a specialized infectology service as, according to the participants' reports, the possibility of infection was discarded after a consult at the hospital; a minority of the victims used antiretroviral drugs. A study found in the literature evidenced that no medical care was sought and the abandonment of clinical monitoring<sup>(8)</sup>.

In a study using logistic regression analysis, it was identified that, in cases of exposure with a known source and negative serum status, the professionals had a 29 times higher chance of complying with the treatment when compared to cases whose source patient was unknown or had a positive serum status<sup>(6)</sup>.

## ● CONCLUSION

It was concluded that most accidents involved female nursing technicians with a mean age of 31.4 years, at the nursing wards/surgical clinic. Cases of percutaneous exposure were predominant, during the practice of venipuncture procedures. Blood was the body fluid present in more than half of the cases and the finger region was the most affected. A majority of the victims were not attended at a specialized service and all workers had a complete vaccination scheme for hepatitis B.

Based on the results found, it can be observed that, despite the existence of different biosafety measures, the number of cases of occupational exposure involving PCBM among nursing workers remains a source of concern. Due to the characteristics of their work, they are more susceptible to these events. Therefore, continuing education of these professionals is needed, as well as the implementation of safe devices with safety engineering by the health services, with a view to minimizing these occurrences.

This study is limited by the blanks left in the completion of the accident forms, with variables related to the exposure to biological material, as well as the fact that the data refer to a specific hospital and cannot be generalized.

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