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<https://periodicos.ufpe.br/revistas/revistaenfermagem/article/view/242224>

**DOI: 10.5205/1981-8963.2019.242224**

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ORIGINAL ARTICLE

**NURSING TECHNICIANS: LABOR CONDITIONS AND ACCIDENTS IN A SCHOOL HOSPITAL**  
**TÉCNICOS DE ENFERMAGEM: CONDIÇÕES LABORAIS E ACIDENTES EM HOSPITAL ESCOLA**

**TÉCNICOS DE ENFERMERÍA: CONDICIONES DE TRABAJO Y ACCIDENTES EN EL HOSPITAL ESCOLAR**

Katia Maria Rosa Vieira<sup>1</sup>, Francisco Ubaldo Vieira Júnior<sup>2</sup>, Zélia Zilda Lourenço de Camargo Bittencourt<sup>3</sup>

**ABSTRACT**




**Objective:** to analyze the working conditions perceived by nursing technicians and their relationship with accidents involving biological material. **Method:** this is a mixed, descriptive, cross-sectional study conducted in a public hospital. 275 professionals answered a questionnaire with questions related to the number of accidents, perception of working conditions and suggestions to minimize them. It is noted that the research was of simple random probability type, with proportional distribution in units and work shifts and the results presented from reports and tables. **Results:** 210 technicians claimed to have suffered an accident at work. It is revealed that the variables stressful work rhythm, monotony and influence of work on health were statistically significant, and the use of personal protective equipment and decreased overload were the measures most indicated by respondents. **Conclusion:** the analysis indicated a positive relationship between work overload and accidents with biological material. Although the institution makes personal protective equipment available to workers, there is strong evidence of non-use or partial use. It can be subsidized, by the instrument used in this research, managerial actions to readjust the work processes. **Descriptors:** Occupational Risks; Occupational Accidents; Public Hospitals; Workplace; Working Environment; Nursing.

**RESUMO**

**Objetivo:** analisar as condições de trabalho percebidas por técnicos de Enfermagem e sua relação com acidentes envolvendo material biológico. **Método:** trata-se de um estudo misto, descritivo, transversal, realizado em um hospital público. Elencaram-se 275 profissionais que responderam a um questionário com perguntas relacionadas ao número de acidentes, percepção das condições de trabalho e sugestões para minimizá-los. Detalha-se que a pesquisa foi do tipo probabilística aleatória simples, com distribuição proporcional nas unidades e turnos de trabalho e os resultados apresentados a partir de relatos e tabelas. **Resultados:** declarou-se, por 210 técnicos, ter sofrido acidente de trabalho. Revela-se que as variáveis ritmo de trabalho estressante, monotonia e influência do trabalho na saúde tiveram significância estatística, e o uso de equipamentos de proteção individual e diminuição da sobrecarga foram as medidas mais indicadas pelos respondentes. **Conclusão:** indicou-se, pela análise, relação positiva entre sobrecarga de trabalho e acidentes com material biológico. Percebe-se que, apesar de a instituição disponibilizar equipamentos de proteção individual aos trabalhadores, há forte indício do não uso ou uso parcial. Podem-se subsidiar, pelo instrumento utilizado nesta pesquisa, ações gerenciais para readequações dos processos de trabalho. **Descritores:** Riscos Ocupacionais; Acidentes de Trabalho; Hospitais Públicos; Ambiente de Trabalho; Condições de Trabalho; Enfermagem.

**RESUMEN**

**Objetivo:** analizar las condiciones de trabajo percibidas por los técnicos de Enfermería y su relación con los accidentes que involucran material biológico. **Método:** este es un estudio mixto, descriptivo, transversal realizado en un hospital público. Fueron listados 275 profesionales respondieron un cuestionario con preguntas relacionadas con el número de accidentes, la percepción de las condiciones de trabajo y sugerencias para minimizarlos. Se observa que la investigación fue de tipo de probabilidad aleatoria simple, con distribución proporcional en unidades y turnos de trabajo y los resultados presentados a partir de relatos y tablas. **Resultados:** 210 técnicos afirmaron haber sufrido un accidente en el trabajo. Se revela que las variables ritmo de trabajo estresante, monotonia e influencia del trabajo en la salud fueron estadísticamente significativas, y el uso de equipo de protección personal y la disminución de la sobrecarga fueron las medidas más indicadas por los encuestados. **Conclusión:** el análisis indicó una relación positiva entre sobrecarga de trabajo y accidentes con material biológico. Si bien la institución pone a disposición de los trabajadores equipos de protección personal, existe una fuerte evidencia de falta de uso o uso parcial. Puede ser subsidiado, por el instrumento utilizado en esta investigación, acciones de gestión para reajustes de los procesos de trabajo. **Descriptores:** Riesgos Laborales; Accidentes de Trabajo; Hospitales Públicos; Ambiente de Trabajo; Condiciones de Trabajo; Enfermería.

<sup>1,3</sup>State University of Campinas / UNICAMP Campinas (SP), Brazil. <sup>1</sup><https://orcid.org/0000-0003-2988-7437> <sup>3</sup><https://orcid.org/0000-0003-6796-5515> <sup>2</sup>Federal Institute of Education, Science and Technology of São Paulo / IFSP. Campinas (SP), Brazil. <sup>2</sup><https://orcid.org/0000-0003-0419-6971>

**How to cite this article**

Vieira KMR, Vieira Junior FU, Bittencourt ZZLC. Nursing technicians: working conditions and accidents in a school hospital. J Nurs UFPE on line. 2019;13:e242224 DOI: <https://doi.org/10.5205/1981-8963.2019.242224>

INTRODUCTION

The health area, due to its complexity, requires the performance of several professional categories with specificities of knowledge and practices to meet the needs of the population. Professional practice can be influenced by working environment conditions that often lead to work accidents (WA) and worker illness.<sup>1</sup>

The International Labor Organization (ILO) estimates that there are 317 million WA in the world each year and 160 million individuals with work-related illnesses, with 321,000 deaths from these accidents. It is estimated that every 15 seconds 115 workers have an occupational accident.<sup>2</sup>

It is known that health institutions, due to the nature of their activities, present several risks to the health of workers who work in them. Special biological risk is worth mentioning due to the possibility of transmission of diseases caused by the human immunodeficiency virus (HIV), hepatitis B virus (HBV) and C (HCV), among others.<sup>3</sup>

In Brazil, 612,632 WAs were registered by Social Security in 2015, of which 69,245 were related to health and social workers.<sup>4</sup>

Currently, the health system has been permeated by the expansion in the use of medicines, equipment and incorporation of new technologies that enable various medical procedures and may generate undesirable repercussions on the human resources of these institutions.<sup>5</sup>

Among health professionals, nursing workers perform activities of close physical proximity to the patient as providers of direct and indirect assistance, handling various materials and equipment, which makes them a category of great vulnerability to WA.<sup>6</sup>

Occupational exposure to biological material is characterized by the accidental contact of the worker with potentially contaminated fluids resulting from injuries caused by piercing and / or cutting materials; accidental splashing of mouth, nose, eyes or contact with unhealthy skin (with dermatitis) or open wounds.<sup>7</sup>

The Centers for Disease Control and Prevention established guidelines called “Standard Precautions” that were adopted internationally to minimize the exposure of health professionals to biological risk.<sup>8</sup>

It is understood that health institutions should provide personal protective equipment (PPE) and collective (CPE), perform in-service training, provide resistant collectors for disposal of sharps, as well as adopt standards and institutional routines for protection and health promotion of the workers.<sup>9</sup>

In addition, many health institutions do not adopt effective policies to promote worker safety

and, when associated with unfavorable conditions, contribute to the occurrence of WA.<sup>10</sup>

The reasons for low or non-adherence to Standard Precautions (SP) may be related to the precariousness of institutions' investments, exposing professionals and patients to risks that interfere with their health, as well as causing dissatisfaction and demotivation at work.<sup>11</sup>

Studies show that there are several barriers that interfere with adherence to PPE, such as: inadequate physical structure; unavailability or inaccessibility of equipment; lack of routines; haste in procedures; failure to perceive individual and collective risk; resistance, disability in use; ignorance of legislation and forgetfulness.<sup>12-3</sup>

The management of health services plays a fundamental role in maintaining the working environment. It is possible, through actions that favor the individual and collective perception of occupational risks and the moral and legal support, to recover the valorization of the worker and lead to self-protection. It is pointed out that accusing the worker for not using the equipment is an improper practice and understanding the work context, their beliefs, intrinsic and extrinsic factors can positively contribute to increase adherence to PPE.<sup>13</sup>

It is warned that the scarcity of financial resources and organizational planning failures can lead to a shortage of Nursing staff, causing work overload, stressful environment and inadequacies in SP, which may favor the occurrence of WA with biological material.<sup>14-5</sup>

It is believed that knowing the work environment of Nursing is important because it provides situational diagnosis, allowing the planning of actions for the improvement and health promotion of workers.

Considering that the risk of contamination with biological material occurs due to care, the study of the category of Nursing technicians who daily provides continuous direct assistance to patients and is often exposed to blood and/or other fluids from procedures with varying degrees of complexity.

OBJECTIVE

- To analyze the working conditions from the perspective of nursing technicians and their relationship with the WA with biological material, as well as the suggested measures to minimize them.

METHOD

This is a mixed, descriptive, cross-sectional study conducted in a tertiary-level public university hospital in a city in the interior of the state of São Paulo.

At the time of the research, the institution had 1,022 nursing technicians distributed in various <https://periodicos.ufpe.br/revistas/revistaenfermagem/index>



sectors and work shifts, according to data obtained directly from the Human Resources Division.

Participating units of the study were: Adult (AIU) and Pediatric Inpatient Unit (PIU), Adult Intensive Care (ICU-ADU) and Pediatric Intensive Care (ICU-PIU), Referenced Emergency (RUE), Surgical Center (SC), Sterile Material Center (SMC), Imaging (IMA) and Outpatient Service and Specialized Procedures (SEAMPE).

As inclusion criteria, Nursing technicians who worked in direct or indirect assistance to patients in the morning, afternoon, evening and administrative hours were raised. Workers on leave, vacation, sick leave, pregnant leave, sick leave and those who only transported patients were excluded.

The sample proportion of 25%, consisting of 275 workers, was used. It is detailed that the research was of simple random probability type, with proportional distribution in the units and work shifts.

Nursing technicians working in the nine units and their work shifts participated in the research: morning, afternoon, evening and administrative hours.

A semi-structured questionnaire containing three axes was developed:

1 - Occurrence of WA with biological material, consisting of an objective question about the occurrence or not of WA with biological material.

2 - Working conditions, comprising a set of eight multiple choice objective questions distributed in: always; sometimes; rarely and never, being transformed into indices of zero (rarely and never) and one (always and sometimes) for the purpose of statistical analysis. Aspects such as: autonomy; stressful pace; repetitive work; presence of material resources (PPE); collection boxes for disposal of sharps; security devices); monotony; job satisfaction and influence of work on health.

3 - Measures to be taken to reduce accidents, with a subjective (open) question with suggestions from participants to minimize the occurrence of WA in the institution. He asked himself: "With your professional experience, what measures could be taken to reduce WA with biological material?".

The results of the open-ended question were analyzed and individualized into categories, which consisted of words, expressions and phrases of

participants and grouped by similarities according to the most representative meaning for the reduction of accidents in professional practice. For the analysis, Bardin's theoretical framework<sup>16</sup> was used, and pre-analysis, exploration and treatment of results, inference and interpretation of data were performed.

The research was conducted in the period between September and December 2017 and the professionals were informed about the voluntary nature of participation, research objectives and repercussions.

They were invited, considering Resolution n. 196 of the National Health Council, the subjects to participate and those who agreed signed the Free and Informed Consent Term (FICT). The research was submitted to the Research Ethics Committee of the University, approving it by opinion n. 2,242,789 / 2017, ensuring anonymity and confidentiality of participants.

Data was collected after collection in an Excel 2016 spreadsheet (Microsoft).

For quantitative data, the statistical analysis was performed with the aid of the BioEstat 5.3 program, using the Fischer exact test and the OR test for the contingency table analysis. The comparison between two proportions was performed with the aid of the binomial test. For all results, a level of statistical significance of 5% (p <0.05) was considered).

RESULTS

The sample consisted of female nursing technicians (83.6%), with a predominance of age between 30 to 40 years (40.0%), most of them married or in a stable union (65.5%) , working in the institution for up to ten years (58.2%), in fixed shifts and working 30 hours per week, with monthly income between three and four minimum wages (80.5%).

Among the participants, 210 professionals reported having suffered WA with biological material and 65 reported not having suffered any accidents during their working time at the institution.

Table 1 shows the distribution of nursing technicians and WA with biological material according to the variables: autonomy; stressful work rate; repetitive work; availability of material resources (PPE, sharps disposal box, safety devices); monotony at work; job satisfaction and influence of work on health.



**Table 1. Distribution of participants according to the occurrence or not of WA with biological material according to investigated variables. Campinas (SP), Brazil, 2017.**

Variables	WA with biological material						P†	OR‡
	Yes (n=210)		No (n=65)		Total (n=275)			
	n	%	n	%	n	%		
Autonomy for work								
Always and sometimes	203	96.7	65	100.0	268	97.5	0.20	-
Rarely and never	7	3.3	0	0.0	7	2.5	0.20	-
Stressful Work Pace								
Always and sometimes	201	95.7	57	87.7	258	93.8	0.03	3.1
Rarely and never	9	4.3	8	12.3	17	6.2	0.03	3.1
Repetitive work								
Always and sometimes	171	81.4	54	83.1	225	81.8	0.85	-
Rarely and never	39	18.6	11	16.9	50	18.2	0.85	-
Working material to avoid WA								
Always and sometimes	207	98.6	65	100.0	272	98.9	0.58	-
Rarely and never	3	1.4	0	0.0	3	1.1	0.58	-
Monotonous work								
Always and sometimes	51	24.3	6	9.2	57	20.7	0.008	3.1
Rarely and never	159	75.7	59	90.8	218	79.3	0.008	3.1
Satisfied in their role								
Always and sometimes	210	100.0	64	98.5	274	99.6	0.24	-
Rarely and never	0	0.0	1	1.5	1	0.4	0.24	-
Influence of work on health								
Always and sometimes	146	69.5	30	46.2	176	64.0	0.001	2.7
Rarely and never	64	30.5	35	53.8	99	36.0	0.001	2.7

Note: (†) Fischer's exact test, (‡) Odds Ratio (OR), 95% CI: 95% confidence interval (CI).

Statistical significance was presented for the variables stressful work rhythm (p = 0.03), monotonous work (p = 0.008) and influence of work on health (p = 0.001).

It is noteworthy that the variables autonomy, repetitive work, job satisfaction and work material to avoid WA were not statistically significant (p>0.05).

It is emphasized that Nursing technicians who stated that the work rhythm is stressful “always” and “sometimes” presented higher proportions of WA with biological material (95.7%), with 3.1 more chances of having accidents in the workplace relation to those who declared “rarely” or “never”.

Professionals who stated that work is monotonous “rarely” or “never” presented higher proportions of WA with biological material (75.7%), with 3.1 more chances of suffering accidents than those who declared “always” or “sometimes”.

It is pointed out that workers who stated that working conditions influence their health “always” and “sometimes” had higher proportions of WA with biological material (69.5%) and 2.7 more chances of suffering accidents in relation to

to nursing technicians who declared “rarely” or “never”.

In addition, the variables monthly worker income (p = 0.99) and marital status (p = 0.47) did not show statistical significance in relation to professionals who reported having suffered WA.

In the open question “With your professional experience, what measures could be taken to reduce the WA with biological material?”, The categories based on words, expressions and phrases of the participants and grouped by similarity according to the most representative meaning those related to professional practice and workers' experience to reduce WA.

164 workers with valid answers were considered, categorized from the prevalent data.

Table 2 shows the distribution of nursing technician responses grouped by categories.

**Table 2. Distribution of responses on measures for decreasing WAs with biological material (n = 196). Campinas (SP), Brazil, 2017.**

Categories	Total	Participation(%)
Use of PPE	71	36.2
Decrease overhead	65	33.2
Sharps disposal	26	13.3
Material quality	15	7.7
Disposal of body fluids	7	3.6
Automation	4	2.0
Security devices	3	1.5
Infrastructure	3	1.5
Environment organization	2	1.0
Total	196	100

Responses where no meanings related to WA reduction were disregarded, such as worker complaints and dissatisfaction about non-pertinent issues.

The following categories prevailed, respectively:

PPE use (36.2%) - characterized by the expressions: correct use of PPE; emphasize use of PPE; raise awareness; police yourself more; more incentive to use PPE; higher charge for PPE; PPE deficit; PPE replacement; focus more; attention and tranquility; negligence of the rules; extra care; be alert; work calmly and clearly; attentive professional; lack of attention.

Nursing technicians' excerpts related to the use of PPE category reflect the relevance of the theme.

- [...]The practitioner should be aware of the activities and standard precautions, with the use of appropriate PPE, and be aware of how much prevents us from possible WA. (ID55)
- [...]use PPE and charge superiors for use, because professionals who regularly use PPE is nicknamed “neurotic”. (ID70)
- Awareness of all professionals regarding the proper use of PPE. (ID83)
- We have all the necessary PPE provided by the institution, but some technicians do not use. (ID158)
- The professional should be more police and use the PPE that the institution offers ... I believe that should be more charged and supervised the use of them. (ID191)

Most nursing technicians (98.6%) stated that there is work material available to prevent accidents in the institution (Table 1); In contrast, when asked what measures they suggest for reducing WA with biological material, 36.2% of participants had their answers related to the use of PPE category.

It is observed that professionals who strictly follow safety standards are considered neurotic, highlighting the deficit in safety culture.

Decreasing overload (33.2%) was characterized by terms such as: supplying staff shortages; staff deficit; workload; heavy sector; provide help; excess of work; material agility; staffing; safety for professionals; collection; time; rush; tiredness;

stress; overbooking; fast pace; production line; Fordism; dignity; rush; streamline; exhaustion; employee limit; quality; number of patients per employee; expose less; work process; better distribution of patients; improve working conditions; increased responsibilities; degree of complexity; subject to errors and accidents; decrease flow of critically ill patients; proper sizing; continuous relocation; decrease tasks; do things running; employee replacement.

It is revealed that some answers were representative for this category.

- [...] [provide] healthy environment and respect for all professionals; do not pressure staff to address staff shortages or patient overbooking. (ID69)
- Less rapid pace of work to provide quality patient care and less exposure to the professional; we work lives and not production lines ... less Fordism and more dignity. (ID79)
- [...] the importance and recognition by the bosses, recognize the exhaustion and limits of the employeeo [...]. (ID124)
- Improve staff so there is no work overload and time to develop quality care activities. (ID204)
- Increased staff to ease employee overload and stress. (ID211)

In this aspect, it is emphasized that the technicians had the perception of work overload and how much this condition is detrimental to the safety of workers and patients, revealing that they yearn for changes in organizational practices.

Sharps disposal (13.3%) - This category was represented by the terms: disregard (discard) sharps; fate of sharps; current legislation; needles with surgical materials; sharpening boxes; transiting with needles; precautions; removal of “perforations”; discard correct place; causes risks; support in the rooms.

In this category, some statements by nursing technicians that deserve.

- [...] more attention is generally needed from the nursing staff, as we often find needles along with surgical materials [...]. (ID15)
- In some activities, the perpetrators should be aware of and dispose of them to avoid problems; many do not care and usually feel that they have no obligation to discard. (ID64)

*Having sharps containers in all rooms often [...] use the "perforations" and do not neglect in the rooms containing the boxes. (ID99)*  
*More attention, especially by those who do not discard materials used, exposing the other to the risk of WA. (ID162)*

It was found that professionals are aware of the low importance given by other professional categories regarding the disposal of sharps.

Improve Material Quality (7.7%) - represented here by terms such as: lack of material in good condition; material with good quality; gloves that do not tear; piercing gloves; Quality PPE; improve needle quality and aspiration probes; locking safety devices; do not escape the piercing tip; difficult needles; improvement of sharps boxes; breach of protection; protection device.

In this category, some statements by Nursing technicians deserve to be highlighted.

*[...][need to have] better quality of aspiration needles and probes. (ID194)*  
*Improve material safety devices that often lock, not covering the piercing part. (ID212)*  
*Improvement of the gloves we have ... sometimes have to wear two pairs [...]. (ID 151)*  
*[...] ensure good quality material eg gloves that do not tear [...]. (ID 161)*  
*[...] safety devices such as needle guard, scalp, breakages of protective needle. (ID 247)*  
*I think at the moment here ... the quality of the materials is improved, for example: procedure glove tears very easily [...]. (ID172)*

Although participants mentioned the existence of materials to protect against accidents, they acknowledged that many inputs were not of the necessary quality for the development of the activities and pointed to the need to replace them.

**DISCUSSION**

In this study, it was found that nursing technicians who stated that the work rhythm is always stressful and sometimes presented higher proportions of WA with biological material (p = 0.03) and higher chances of accidents (OR=3,1).

Stress is determined by the accumulation of activities, demand for greater productivity in a shorter period of time, complexity of care associated with staff deficit, triggering tension, exhaustion and even physical and / or mental illness of the worker.<sup>1,17-8</sup> This situation can reduce their ability to concentrate, increase their vulnerability and contribute to the occurrence of WA with biological material.

It is noteworthy that participants who stated that work is never and rarely monotonous had higher proportions of accidents (p = 0.008), indicating that workers who experience daily life with high demand and diversity of activities may have mental fatigue and fatigue, This situation

can invariably lead to decreased attention and distraction, which is a risk factor for WA.<sup>19-20</sup>

Although nursing practice is based on repetitive activities, the dynamics of a tertiary hospital are permeated by the heterogeneity of procedures with variability in the degree of complexity, exposing professionals to greater occupational risks.

In this research, participants who stated that working conditions always and sometimes interfere with their health showed higher proportions of WA with biological material (p = 0.001), ie, nursing technicians had the perception of that the work environment affects your occupational life and therefore your health.

The working conditions of nursing can cause physical and mental overload, causing illness and increasing the percentage of absenteeism that invariably incur additional workload for professionals who remain in the units.<sup>1,21-2</sup>

In the evaluation of measures to reduce WA, it was found that the category reduce overload was the second most mentioned by workers of the units (33.2%). Professionals stated that staff overload and deficit affect working conditions and interfere with their safety and care outcomes.

It is noticed that the analysis of the statements suggests that participants recognize that the performance of nursing activities requires responsibility and that the fast pace of work is a determining condition for stress.

Studies show that workers are more exposed to sharps accidents when working in places with patients with a high degree of dependence and complexity.<sup>20</sup>

Based on the findings of this study, it can be inferred that workers live daily with stressors that can affect the quality of nursing care and predispose to WA. It is expected, by these, that the managers are aware of their unsatisfactory working condition and perform the sizing of the staff compatible with the care profile.

In this research, it was found that most nursing technicians (98.6%) stated that there is work material available to prevent accidents in the institution. In addition, when asked about measures to reduce WA with biological material, 36.2% of participants had answers related to the use of PPE category, suggesting that they are not using the equipment or only partially.

The participants expressed the desire for greater supervision and charging of management regarding the use of equipment. It is clear that the role of leadership is fundamental and that actions should be directed towards the safety of workers.

Poor adherence to PPE can be related to the occupational risk perception deficit, low accountability and insufficient feedback from leaders regarding the importance of safety practices.<sup>23-4</sup>



It was evident from the data that the institution has complied with the labor regulations related to the supply of PPE,<sup>9</sup> however, the participants pointed to the lack of commitment and neglect regarding the use of PPE.

The safety climate can interfere with the adherence to SP, consisting in the perception shared by workers about the value attributed to work safety in the organization, through institutional practices, which may be affected by the involvement of the manager with the theme.<sup>25</sup>

This study reveals that there is evidence that workers' perceptions of the safety climate are unfavorable, requiring further studies.

It is urgent to articulate educational practices by leaders that favor the perception of vulnerability in the workplace and the benefit of the use of PPE by professionals<sup>13</sup> and contribute to the adoption of consistent and lasting behaviors.

The participants' statements about objects that are inadvertently left in various places expose the fragility of institutional culture in the face of biological risk.

In a previous study conducted at the same institution, neglect regarding the abandonment of disposable material in inappropriate places such as counters, beds and trays was also pointed out.<sup>27</sup> Despite the time elapsed, there was no perception of improvement by the workers, suggesting a lack of knowledge of health professionals about SP regarding the disposal of sharps. The occurrence of this fact was also identified in the literature in other countries.<sup>27</sup>

It is important to invest in training as recommended in NR32, but not only aimed at obtaining numerical indices for auditing purposes. It is necessary to review content in training, with approaches that provide the perception of occupational risk, with the awareness of professionals and students about the importance of maintaining safe environments in health institutions.<sup>28</sup>

It was revealed, by analyzing the results of this research, that there is critical sensitivity of nursing technicians regarding the non-compliance of hospital products that often did not meet the necessary requirements for their safety.

It is believed that while the health sector faces resource scarcity, institutions' efforts to qualify material resources and post-market monitoring are critical. Due to the low quality, the professional wear and tear<sup>29</sup> leads to increased vulnerability to WA.

CONCLUSION

It was noticed that the nursing technicians who declared that there is work overload presented higher proportions of accidents with biological material.

It is noted that professionals who stated that work is stressful and not always boring and sometimes had higher risks of suffering WA.

Nursing technicians stated that the institution provides working material to prevent WA, however, the use of PPE was pointed as the main factor for reducing WA, indicating non-adherence or only partial.

It is emphasized that there is strong evidence of unfavorable safety climate perception by Nursing technicians, who recognize the importance of working conditions and the role of leaders for safer professional practice.

It is concluded that the results obtained from the instrument used in this research can contribute to a better understanding of workers' perception of environmental conditions, as well as to subsidize managerial actions for readjustment of work processes.

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#### Corresponding author

Katia Maria Rosa Vieira

Email: [katia\\_rosa@terra.com.br](mailto:katia_rosa@terra.com.br)

Submission: 2019/08/08

Accepted: 2019/09/12

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