

Overview of National Publications on Accidents with Cutting and Piercing Objects Associated to Exposure to Biological Material

Panorama das Publicações Nacionais Sobre Acidentes com Perfurocortantes Associado a Exposição a Material Biológico

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ABSTRACT

Objective to relate the handling and disposal of sharp and piercing objects with accidents with biological material, according to national scientific literature. Method: Qualitative research of type integrative review, with content analysis. Results: The following units of significance emerged from the analysis of 27 articles: inadequate disposal (46%), inadequate environment (43%), recklessness (43%), manually recapping and disconnecting the needle (32%), risky handling (29%) and lack of training (43%). These were grouped and analyzed under the categories "Inadequate work processes" and "Absence of technical training of employees". Conclusion: It is concluded that there are factors related to the worker, the work process and the institution in which they operate, both individually and not, significantly influencing the worker's exposure to risk of contamination by biological material, especially associated with handling sharp instruments

Keywords: Occupational Exposure, Exposure to Biological Agents, Health Professionals

RESUMO

O objetivo é relacionar o manuseio e o descarte de material perfurocortante com os acidentes com material biológico, de acordo com a literatura científica nacional. Pesquisa qualitativa do tipo revisão integrativa, com realização de análise de conteúdo. A partir da análise de 27 artigos, emergiram as seguintes unidades de significação: o descarte inadequado (46%), inadequação do ambiente (43%), imprudência (43%), reencape e desconexão de agulha manualmente (32%), manipulação de risco (29%) e falta de treinamento (43%). Estas foram agrupadas e analisadas nas categorias "Processos de trabalho inadequados" e "Ausência de capacitação técnica dos funcionários". Conclui-se que há fatores relacionados ao trabalhador, ao processo de trabalho e à própria instituição em que atuam, tanto isoladamente como articulados entre si, influenciando significativamente a exposição do trabalhador às situações de risco de contaminação por material biológico, sobretudo associado ao manuseio de instrumentos perfurocortante.

Palavras-chaves: Exposição Ocupacional; Exposição a Agentes Biológicos; Pessoal de Saúde.

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INTRODUCTION

Health Service Waste is a generator of great environmental impact caused by inadequate management and disposal, related to contaminations, high hospital infection rates and even epidemics due to groundwater contamination⁽¹⁾. This demonstrates the importance of the elaboration, implementation and development of the Health Services Waste Management Program (originally called Programa de Gestão de Resíduos de Serviços de Saúde, or PGRSS).

Health waste management (SSR) is understood as a set of management procedures that are planned and implemented on scientific and technical grounds, with normative and legal bases. Its objective is to minimize the production of waste and effectively provide the waste that was generated a safe discarding. The procedures in question seek the protection of workers, and the preservation of public health, natural resources and the environment⁽²⁾.

In this sense, it is perceived that the work routine in health facilities requires that workers are aware of biosafety standards in order to ensure the protection of their health, especially when handling sharp objects. In this case, precautions are required in the handling and disposal of these devices⁽³⁾.

According to the Ministry of Health⁽⁴⁾, among the specific recommendations that must be followed during procedures involving the handling of piercing equipment, it is important to pay the utmost attention during procedures, never use fingers as a shield during procedures involving sharp-cutting materials, do not re-enclose, bend, break needles, or withdraw them from the syringe by hand. All sharp material (needles, scalp, scalpel blades, glassware, etc.). Even if sterilized, they should be discarded in puncture resistant containers and with lids. Specific collectors for sharps disposal should not be filled above 2/3 of their total capacity and should always be placed near the place where the procedure is performed.

The study is justified by the importance of the propagation of information about exposure to biological material from improper handling and disposal of residues, mainly related to the piercing and sharp objects. Proper disposal of sharps should be a priority in the continuing education of workers, as it is not only a way of preventing disease but also promoting health⁽⁵⁾.

It is known that healthcare practitioners have a great vulnerability regarding the handling of these instruments of work and the risks caused for themselves, the patient, and for the environment. In this sense, improper waste management can influence a whole chain of possible events.

In this context, the following guiding question emerged: what is the association between the exposure of health professionals to biological material and accidents with sharp instruments, according to the national literature?

Thus, the study aimed to relate the handling and disposal of sharps with accidents with biological material, according to national scientific literature.

METHOD

It is a qualitative research, of the type integrative review of literature, whose method allows to make a summary about the information about a certain subject, unifying it afterwards. To this end, it is essential that some methodological steps are taken.

Firstly, the previously mentioned guiding question was elaborated, which guided the search of the studies included in the subsequent analysis. In the second stage, the literature search was started, with a database search⁽⁶⁾. In this study, the databases Virtual Health Library (VHL), Latin American and Caribbean Literature in Health Sciences (LILACS), Nursing Database (BDENF) and International Literature in Health Sciences (MEDLINE) were used.

The data collection in the literature was planned by means of simultaneous search of the

following descriptors: "Occupational Exposure", "Exposure to Biological Agents", and "Health Professionals", using the Boolean operator "AND".

Inclusion criteria were: 1. To be a scientific article; 2. Have the full text available in the database; 3. To have been published after 2006, since that year was the year of the first publication of the Health Service Waste Management Plan, published by the Ministry of Health; 4. Have the complete text online; 5. Be in the Portuguese language. The selection of the publications was initially done by reading the titles, followed by the abstracts, and later, the texts in full.

In the third stage of the integrative review, the characterization of the studies was carried out, using a data collection instrument so that the necessary information was taken ⁽⁶⁾. Such instrument developed in this research for data collection included the following variables: title, year of publication, place of study, type of study, professional category of the main author, main findings and study sites.

In the fourth stage, the studies were categorized according to the gathering of meanings ⁽⁶⁾. Such grouping took place through the analysis of content in which there is no numerical concern, but rather the analysis of the social group in which the collected data belongs to.

The fifth step addressed the discussion of the results, these being interpreted and synthesized, making a comparison with the theoretical reference ⁽⁶⁾.

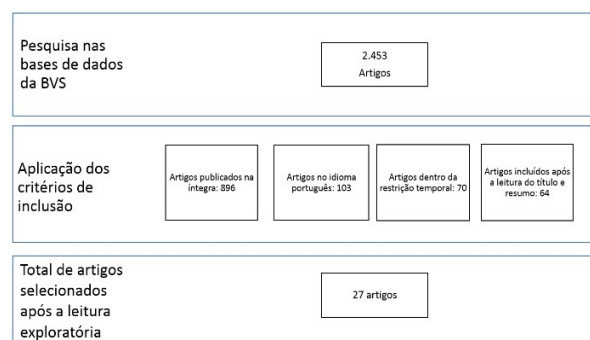
The sixth and last stage, the presentation of the integrative review, which is broad and can provide enough information so that the reader can have a critical evaluation of the results presented ⁽⁶⁾.

RESULTS

From the descriptors, 2,453 scientific productions were found, of which only 70 included the inclusion and exclusion criteria. In the face of the productions found, the titles and abstracts were read and the exploratory reading of the

publications followed, selecting only those that had a direct relation with the research object. Thus, 27 publications were analyzed in this review. The others were excluded because of the inconsistency with the object of this study. Image 1 demonstrates the flow of this selection.

Image 1. Flow of productions found.



Source: Research data

The selected studies were classified and discussed according to the following criteria: year of publication, place of study, professional category of the main author and type of methodology. At the same time, a summary and discussion were carried out regarding the main results obtained by these studies. Table 1 summarizes the main elements of the analyzed publications.

Table 1. Summary of articles found in the Integrative Review.

Title/Site/Year	Professional Category	Method	Periodical
Prevalence of occupational exposures of dental surgeons and dental assistants to biological material (Santa Catarina, 2006) (8)	Odontologist	Quantitative	Public Health Journals

Study on work accidents with exposure to human body fluids in health workers of a university hospital (São Paulo, 2006) ⁽⁹⁾	Nurse	Quantitative	Latin American Nursing Journal
Occupational risk in Basic and Advanced Life Support Units in Emergencies (São Paulo, 2006) ⁽¹⁰⁾	Nurse	Quantitative	Brazilian Nursing Journal
Nurses in management positions and preventive measures to occupational exposure: facilities and barriers (São Paulo, 2008) ⁽¹¹⁾	Nurse	Qualitative	Nursing School Journal of USP
Epidemiological analysis of accidents with biological material registered at the Reference Center on Occupational Health - Londrina-PR (Paraná, 2008) ⁽¹²⁾	Nurse	Quantitative	Brazilian Journal of Epidemiology
Occupational accidents due to exposure to biological material among the multiprofessional team of	Nurse	Quantitative	Nursing School Journal of USP

prehospital care (Minas Gerais, 2009) ⁽¹³⁾			
Occupational exposure of nursing professionals from an intensive care unit to biological material (São Paulo, 2009) ⁽¹⁴⁾	Nurse	Quantitative	Electronic Nursing Journal
Adherence of nursing professionals to clinical follow-up after occupational exposure to biological material (São Paulo, 2009) ⁽¹⁵⁾	Nurse	Quantitative	Electronic Nursing Journal
Occupational exposure to potentially contaminated material among care professionals (São Paulo, 2009) ⁽¹⁶⁾	Nurse	Quantitative	Cogitare Nursing
Situations of biological risk present in nursing care in family health units (USF) (São Paulo, 2010) ⁽¹⁷⁾	Nurse	Quantitative	Latin American Nursing Journal
Accident with sharp material among nursing professionals of a university hospital (São	Nurse	Quantitative	Gaúcha Nursing Journal



Paulo, 2010) (18)			
Accidents registered at the Reference Center on Worker's Health of Ribeirão Preto, São Paulo (São Paulo, 2010) (19)	Nurse	Quantitative	Gaúcha Nursing Journal
The influence of exposure to biological material on the adherence to the use of personal protective equipment (Goiás, 2010) (20)	Nurse	Qualitative	Science, Care and Health
Brazilian legislation and international recommendations on occupational exposure to agents (São Paulo, 2011) (21)	Nurse	Qualitative	Brazilian Journal of Nursing
The meaning of work accidents with biological material for nursing professionals (São Paulo, 2011) (22)	Nurse	Qualitative	Gaúcha Nursing Journal
Prevention of Accidents with Biological Material among Nursing Students (São Paulo, 2011)	Nurse	Quantitative	UERJ Nursing Journal

(23)			
Home hospitalization: risk of biological exposure for the health team (São Paulo, 2012) (24)	Nurse	Qualitative	Nursing School Journal of USP
Notification of work accidents related to exposure to biological material: a cross-sectional study (São Paulo, 2012) (25)	Nurse	Quantitative	Online Brazilian Journal of Nursing
Risk and vulnerability in the practices of health professionals (Santa Catarina, 2012) (26)	Nurse	Qualitative	Gaúcha Nursing Journal
Social Representations on the Causes of Accidents with Sharp Materials by Nursing Technicians (Piauí, 2012) (27)	Nurse	Qualitative	Latin American Nursing Journal
Occupational exposure by biological material in the Santa Casa de Pelotas Hospital - 2004 to 2008 (Paraná, 2012) (28)	Nurse	Quantitative	Anna Nery Nursing School Journal



Consultation and specialized clinical follow-up of nursing professionals injured by biological material (São Paulo, 2013) (29)	Nurse	Quantitative	Nursing School Journal of USP
Accident with biological material in prehospital mobile care: the reality of health and non-health workers (Goiás, 2013) (30)	Nurse	Qualitative	Brazilian Journal of Nursing
Epidemiological profile of accidents with biological material among medical students in a surgical emergency room (Paraná, 2013) (31)	Doctor	Quantitative	Journal of the Brazilian College of Surgeons
Characterization of occupational exposures to biological material among hospital workers in the Municipality of Teresina, State of Piauí, Brazil, 2007 to 2011 (Piauí, 2013) (32)	Nurse	Quantitative	Epidemiology and Health Services
Consequences of	Nurse	Quantitative	Anna Nery Nursing

occupational exposure to biological material among employees of a university hospital (São Paulo, 2014) (33)			School Journal
Clinical follow-up of health professionals and students exposed to potentially contaminated biological material (São Paulo, 2015) (34)	Nurse	Quantitative	Nursing School Journal of USP

Source: Research data

There were publications published every year, except for 2016 and 2017. The highest number was found in 2012, with five publications, followed by 2010, 2013 and 2009 (four publications), 2011 (three publications), 2006 and 2008 (two publications), 2007, 2014 and 2015 (one publication).

In the classification according to the professional category of the authors, nursing was identified as the category that published 90% of the analyzed articles, being the most represented. This evidences a greater quantitative of scientific productions and a greater concern in the evolution of the knowledge that bases its practices.

Regarding the types of studies, there was a predominance of the quantitative study (75%), followed by the qualitative (21%) and quantitative and qualitative (4%) studies. It is estimated that this predominance was due to the accident report cards, which generate data that can be analyzed in a statistical and descriptive way.

Regarding the place of publication, it was observed that 60.7% of the studies were carried



out in the Southeast region, 16 in the State of São Paulo and one in the State of Minas Gerais; 10.7% in the Center-West region, two studies in the State of Goiás and one in the State of Mato Grosso do Sul; 21.4% are concentrated in the southern region, one in the state of Rio Grande do Sul, three in Paraná and two in Santa Catarina; 7.1% of researches in the Northeast region, two studies in the state of Piauí. A gap can be observed in scientific productions in the northern region of the country.

For the analysis of the content of the articles, a complete reading of the selected publications was carried out with the purpose of recognizing and organizing the initial ideas. From the readings, the Units of Significance (US) emerged, which were later grouped into categories, according to Table 2. The emerging categories were: "Category I - Inadequate work processes"; "Category II - Absence of technical training of employees".

Table 2. Description of Registration Units according to their central themes and defined categories (include in the table below the ordinal value before the percentage)

UNITS OF SIGNIFICANCE	%	CATEGORIES
Inadequate disposal	46	Inadequate work processes
Inadequate environment	43	
Risky handling	29	
Recapping or disconnecting the needle	32	
Recklessness	43	
Inadequate training	43	Absence of technical training of employees

Source: Research data

The most common units of significance were improper disposal, recklessness and inadequate

training. That is, the reasons for exposure to biological material can be reduced to the minimum acceptable level, as these are factors that we can solve.

DISCUSSION

Category I - Inappropriate work process

Although the literature makes it clear that the disposal of sharps residues must be done exclusively in discard boxes, the analyzed studies point to the inadequate working process during disposal as the main cause of exposures. Such a situation can be observed through the use of temporary or common waste disposal sites, in addition to the use above the allowed limit of the collection box ⁽⁹⁻²⁴⁻²⁵⁻³⁰⁻³⁴⁾.

In the analyzed studies, problems related to the use of alternative devices to the collection boxes, the inadequate quantification of these boxes and, as far as the location of these boxes in the sectors, were observed, requiring the professional to move for long distances with the residue, which can catalyze accidents of this nature ⁽⁹⁻¹⁰⁻¹⁹⁻²³⁻²⁴⁻²⁶⁾.

Such situations may be associated with up to 55% of injuries caused by sharp and piercing objects within the units and generate risks not only to health professionals, but also to the entire network of waste management workers, such as general service professionals ⁽¹²⁻¹⁶⁾.

The lack of adherence to standard precautions was also reported in the articles analyzed, as well as the re-capping and disconnection of needles after the procedures ⁽¹³⁻¹⁷⁻¹⁹⁻²¹⁻²⁴⁻²⁵⁻²⁸⁻³²⁾.

The protection of the workers' health and safety in establishments that provide health services in general should be considered relevant to achieve the goals established in the PGRSS. In addition to the appropriate conditions, it is necessary to inform the worker about the specific risk analysis of health care waste. From the identification of the risks, control measures are

listed as some "lines of conduct" for common protection, work organization, individual protection and training ⁽⁴⁾.

In this sense, sharp objects must be discarded separately, near the place of their usage, immediately after use or need for disposal, in rigid, puncture, rupture and leak resistant containers with a lid and properly identified. They must comply with the parameters referenced in specific standards, being expressly prohibited the emptying of these containers for reuse. Disposable needles should be discarded along with the syringes, and it is forbidden to re-cap or disconnect them manually ⁽²⁾.

Although we have several manuals and studies regarding biosafety and good practices, the professionals still lack the necessary sensibility to put them fully into practice. In addition, institutions must comply with safety standards, providing an adequate infrastructure for safe activities and devices.

It was also observed as a cause of exposure to biological material, the inadequacy of the environment, such as poor lighting, wrong processes and long shifts ⁽¹¹⁻¹⁴⁻²⁰⁻²⁵⁻³¹⁾.

Poor handling was also observed as a major source of accidents and contamination. This occurs from the transfer of biological material from syringes to examination bottles, and improper use of PPE ⁽²⁴⁻²⁶⁻¹⁸⁾. According to the Ministry of Health ⁽³⁵⁾, minimum requirements are necessary for safe work with biological agents and potentially pathogenic biological materials, called containment. The term containment is used to describe the biosafety procedures used in the manipulation of biological agents according to their risk classification. The purpose of containment is to prevent, reduce or eliminate the exposure of professionals, users of the health system, the general population and the environment to potentially dangerous agents.

Containment occurs at two main levels, primary containment and secondary containment. The first refers to the protection of professionals

and users against the exposure to risk agents, generally achieved by the use of appropriate individual protective equipment, by the implementation of Good Laboratory Practices (GLP) and includes immunization as a factor of protection. Secondary containment is the protection of the environment against exposure to risk agents. Thus, this level of containment includes the adoption of measures and practices related to: a) individual protection; b) the use of individual or collective safety equipment; (c) the adoption of working techniques and practices in accordance with the risk class of the tampered agent, (d) the suitability of the premises and the infrastructure of the workplace ⁽³⁵⁾.

It is expected that all health professionals are aware of biosafety measures. However, for several reasons, they end up not doing it correctly and this increases the number of cases of exposure to biological material and risk of contamination. In this sense, risky handling is one of the most significant causes of exposure to biological material.

Despite this, recklessness is present in 43% of the studies analyzed and, in this sense, it can be said that self-confidence and the feeling that accidents only happen to other people is what leads these professionals to error. As an example, the causes of accidents were: overconfidence, lack of attention and lack of care ^(14-22-23 27-33).

Category II - Lack of technical training of employees

According to the Ministry of Health ⁽⁴⁾, the health and safety of workers training is based on three fundamental stages of risk analysis: 1. Recognition of risks in the work process; 2. Study and analysis of the existing situation, including defining critical control points; 3. Control of the existing risks. The compliance with the first two steps is important in order to achieve the main objective the best way possible, which falls under "control of existing risks". Within the risk analysis, priorities are specified for the intervention levels of control measures: 1st priority: elimination of the

polluting source (or contaminant); 2nd priority: risk control in the generating source (collective protection); 3rd priority: risk control in the environment, between the source and the individuals (collective protection); 4th priority: control of the risk to which the individual who is directly involved is exposed (individual protection)

In this sense, it was observed that in 43% of the researched articles, the lack of training and qualification was pointed out as one of the main reasons for work accidents with sharp objects, thus possibly exposing the involved parties to biological material⁽⁸⁻⁹⁻¹⁵⁻¹⁸⁻²³⁻²⁶⁻³¹⁾.

It is up to the employer to provide the necessary qualification for the workers involved in waste management, from its generation to the collection of such material. Thus, it was observed that in comparative studies, there was a significant decline in the number of accidents after adequate training⁽²⁹⁻³³⁾.

Health unit managers should implement qualification procedures for employees who are part of the waste segregation process at any stage. Employers must keep the supporting documents of the training that reports the hours, the content taught, the name and professional training of the instructor, and the workers involved. As well as promoting courses, trainings and campaigns aimed at all those involved in management, as well as their frequencies, where the focus is the environmental issue⁽⁴⁾.

CONCLUSION

The present review showed that factors related to individuals, work and the institution itself are associated with the adherence of health workers to the correct handling and disposal of RSS. These factors act both in isolation and articulated with each other, greatly influencing the work process of health professionals, in which it is essential to examine these factors in different realities.

The qualification of the workers was pointed

out as necessary for the incorporation of safe practices in health institutions. In addition, other measures related to the environment and work organization are important when achieving an organizational safety culture. These measures include: improvements on the physical structure of the work place, adequate provision of PPE, supervision of safe practices, etc. One cannot think of actions directed exclusively to individuals, without considering the context and the multiple factors that interfere in these behaviors.

In an individual context, unsafe practices such as needle re-capping point to a negative impregnation in the professional culture, so only with intense training could it be possible to reverse this situation. The studies that report that, with adequate training, it is possible to promote safe biosafety practices, reducing the accident due to exposure to biological material rates.

The literature analyzed points to the need to share responsibilities between workers and health services. The services should provide the conditions for the execution of safe practices. While the workers need to establish the ethical commitment, recognizing the risk they are exposed to and taking the measures recommended to minimize the occurrence of occupational exposure.

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