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Ishikawa Diagram: Causes and Solutions of Hiv Infection in Nursing Professionals Due to Sharps Use

Diagrama de Ishikawa: Causas e Soluções da Infecção ao Hiv Adquirida por Profissionais de Enfermagem Através de Materiais Perfurocortantes

Diagrama de Ishikawa: Causas y Soluciones de la Infección al Vih Adquirida por Profesionales de Enfermado a Través de Materiales Perfurocortantes

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ABSTRACT

Objective: The study's goal has been to analyze, through the Ishikawa Diagram, the causes and solutions of HIV infection in nursing professionals due to sharps handling. **Methods:** It is a literature review based on the Construction of the Ishikawa Diagram, which was carried out in May 2017 in the PubMed and Virtual Health Library databases. **Results:** The following are the main causes of HIV infection through sharps: work overload, perception of frail risk, careless use of needles, lack of training. Regarding the solutions: adequate post-exposure management, implementing and monitoring compliance with biosafety standards, improving the notification of accidents with sharps. **Conclusion:** There is a need to alerting managers towards intervening in the factors that might trigger accidents with sharp materials by the nursing team.

Descriptors: : HIV, Nursing, Accidents Occupational, Triggering Factors.

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RESUMO

Objetivo: Analisar por meio do Diagrama de Ishikawa as causas e soluções da infecção ao HIV adquirida por profissionais de enfermagem no manuseio de materiais perfurocortantes. **Métodos:** Revisão da literatura baseada na Construção do Diagrama de Ishikawa, realizado em maio de 2017 nas bases de dados Pubmed e Biblioteca Virtual de Saúde. **Resultados:** Dentre as causas da infecção ao HIV através de perfurocortantes: sobrecarga de trabalho, percepção de risco fragilizada, utilização descuidada de agulhas, ausência de treinamento. Quanto às soluções: gestão pós exposição adequada, implementar e fiscalizar o cumprimento das normas de biossegurança, aprimorar a notificação de acidentes com materiais perfurocortantes. **Conclusão:** Destaca-se a necessidade de sensibilizar gestores para intervir nos fatores que podem desencadear acidentes com materiais perfurocortantes pela equipe de enfermagem.

Descriptores: HIV, Enfermagem, Acidentes de Trabalho,Fatores Desencadeantes.

RESUMEN

Objetivo: Analizar por medio del Diagrama de Ishikawa las causas y soluciones de la infección al VIH adquirida por profesionales de enfermería en el manejo de materiales punzocortantes. **Métodos:** Revisión de la literatura basada en la construcción del diagrama de Ishikawa, realizado en mayo de 2017 en las bases de datos Pubmed y Biblioteca Virtual de Salud.**Resultados:** Entre las causas de la infección por el VIH a través de punzocortantes: sobrecarga de trabajo, percepción de riesgo fragilizada, utilización descuidada de agujas, ausencia de entrenamiento. En cuanto a las soluciones: gestión post exposición adecuada, implementar y fiscalizar el cumplimiento de las normas de bioseguridad, mejorar la notificación de accidentes con materiales punzocortantes. **Conclusión:** Se destaca la necesidad de sensibilizar a los gestores para intervenir en los factores que pueden desencadenar accidentes con materiales punzocortantes por el equipo de enfermería.

Descriptores: VIH, Enfermería, Accidentes de Trabajo, Factores Desencadenantes.

INTRODUCTION

Work accident occurs either during work at the service of the company, or by the service of special insured persons, then causing bodily injury or functional disturbance, which causes death or reduction of work capacity, permanent or temporary.[1]

In health services, the professionals most vulnerable to the risk of accidents with biological material are those who have direct contact with patients, composed mainly by the nursing and medical staff, who perform procedures with the presence of secretions and blood. In closed areas, such as the Intensive Care Unit and the Surgical Center, the occurrence of this type of accident is more frequent due to the intense performance of procedures with sharps, such as scalpel blades and needles, as well as procedures such as tracheal aspirations.[2]

Nursing professionals act in a variety of conducts, performing actions that involve health promotion and disease prevention, through healing, rehabilitation, and relief of suffering. In this trajectory, these professionals are exposed to innumerable risks: biological, physical, mechanical, chemical and psychosocial, which can cause occupational accidents and also occupational diseases.[3]

Disposal of the material, lack of attention, rushing in the emergency room, carelessness, distraction in the care of agitated patients, work overload, venipuncture procedures, and inadequate use of Personal Protective Equipment (PPE) are factors predisposing to an occurrence of accidents at work.[4]

Sharpness accidents are considered a serious problem for healthcare professionals, because of the possibility of infection with the Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV); In Brazil, about 58,000 nursing professionals may be exposed to biological risk contamination.[5]

On the world stage, occupational accidents are a concern for authorities because of the economic and social implications they entail. Approximately 2.2 million people die every year worldwide due to work-related accidents.[6]

The nursing professional should know their rights and if necessary demand them. You must still understand that all institutions have duties and standards. The professional should be aware of the risks of his job, but there are ways to prevent them. Overconfidence, both in oneself and in colleagues, must be worked by the institution, as it impedes the performance of activities with excellence.[7]

There are more than 20 pathogens that can be transmitted by occupational exposure to sharps. The cases of notifications, for this reason, resulted in the elaboration of standards of biosafety called Standard Precautions, established by the Centers for Disease Control and Prevention (CDC) in 1996. In Brazil, this concern materialized with Regulatory Norm No. 32 (RN-32), which established basic guidelines for the adoption of measures to protect the health and safety of health service workers, such as: use of PPE, hand hygiene, vaccination against hepatitis B, tetanus and diphtheria, among others.[8]

Emphasis is given to the Ordinance 1.748/2011 from the Ministry of Labor that states that it is an obligation of the employer to train its employees for the handling of sharps and to prepare an accident prevention plan for these devices.[9]

This subject becomes of great relevance since it involves the formation of health professionals focused on accident prevention, and awakens the scientific community for epidemiological data involving biological material and sharps.

Given this perspective, the following guiding question appeared: What are the causes and strategies of solutions for HIV infection in nursing professionals during sharps handling?

Therefore, the study's goal was to analyze, through the Ishikawa Diagram, the causes and solutions of HIV infection in nursing professionals due to sharps handling.

METHODS

This is a research review of the literature based on the Construction of the Ishikawa Diagram, in order to expose the causes and strategies of the solution of HIV infection in nursing professionals in the handling of sharps.

The Ishikawa Diagram is represented by a graph that shows all the causes that can contribute to the emergence of a certain effect, was developed by Kaoru Ishikawa in 1943 and has since been widely disseminated in health quality management sectors. After the creation of this first graph, the second graph is constructed that reveals the solution strategies for solving the problems found.[10]

In order to formulate the Ishikawa Diagram this study followed the following steps:

1. Brainstorming ideas about the causes and solutions of HIV infection in nursing professionals through the use of sharps;
2. Literature review in two databases (PubMed and Virtual Health Library) using as descriptors Occupational Exposure AND HIV AND nursing;
3. Formulating a table characterizing the studies found in the literature review;
4. Building the Ishikawa Diagram referring to the causes of HIV infection by nursing professionals in the handling of sharps;
5. Creating the solution strategies through the Ishikawa Diagram referring to the causes of HIV infection by nursing professionals in the handling of sharps.

In order to perform the literature review, the PICO strategy was followed, where P = problem population; I = intervention; C = comparison; O = outcome. This strategy has the capacity to expand the search for evidence in the databases, avoiding unnecessary examinations.11 P - nursing professionals; I - not applicable; C - not applicable; O - HIV and sharps.

The "I" (intervention) and the "C" (comparison) were not included, as they did not correspond to the objectives of the study. We sought to answer the guiding question: What are the causes and strategies of solutions for HIV infection in nursing professionals during sharps handling?

The search in the databases was carried out in May 2017 in the PubMed and Virtual Health Library (VHL) databases, using as inclusion criteria: articles published in the Portuguese, English and Spanish languages, available in full, at no cost for access, performed with human, nursing professionals published over the period from 2008 to 2017. We excluded all meta-analysis studies, literature review, with costs for access, not addressing the subject, letter, editorial, case study, pilot study, repeated articles, articles whose subjects are not nursing professionals. The descriptors used were: Occupational Exposure AND HIV AND nursing.

Figure 1 shows the search strategies performed in each of the databases. After the identification of the articles, reading the titles and abstracts of 30 samples, 13 articles were excluded. We have selected 17 articles for reading in its totality. The 17 articles were read in full and then 07 articles were excluded, being the final sample composed of 09 articles.

Search strategy	Occupational Exposure AND HIV AND nursing			
Databases	Number of articles by databases	Articles excluded after reading titles and abstracts	Articles deleted after full reading	Final sample
PubMed	14	07	03	4
Virtual Health Library	16	06	05	5
TOTAL	30	13	08	9

REASONS FOR EXCLUSION AFTER READING THE TITLES AND ABSTRACTS	PubMed	Virtual Health Library
It does not address the issue.	4	-
Does not have nursing professionals in the study.	2	2
Review articles or meta-analysis.	1	-
Repeated articles.	-	3
Pilot study.	-	-
Editorial/Case Study.	-	2
REASONS FOR EXCLUSION AFTER FULL READING OF THE ARTICLES		
No free access	2	2
Does not address nursing professionals	1	1
Case study	-	2

Figure 1 - The search strategies performed in the databases

The information extracted from the articles read in full was as follows: first author's formation, publication period, publication year, study sample, study type, place of the study, level of evidence, causes and solutions of HIV infection in professionals due to sharps handling.

We have adopted the classification of levels of evidence ranging from one to seven, with the number one, five and seven being excluded, according to the exclusion criteria of the study. Level two is strong and corresponds to clinical trials, randomized, controlled and well-delimited studies; level three is moderate and corresponds to controlled clinical trials without randomization, level four is moderate and concentrates case-control trials and cohort, level six is weak and encompasses a single, descriptive and qualitative study.[12]

RESULTS AND DISCUSSION

After reading in full the 9 articles that composed the sample, the **Table 1** with characteristics of the studies were constructed, and 11.1% (1) article with level of evidence was identified and 88.8% (8) Qualis A2, 22.2% (2) Qualis B3, 11.1% (1) Qualis B2 and B1, respectively and two articles were not included in the journals on the Sucupira Platform to identify Qualis. As for the year of publication 44.4% (4) in 2016 and 55.5% (5) in the year 2014. These articles found

in the Literature Review supported the production of the Ishikawa Diagram.

Table 1 - Characteristics of the studies found in the Literature Review.

Author (year)	Schooling of the first author	Journal Qualis in nursing or health	Sample
He, et al (2016)	Financial Security Adviser	Int. J. Environ. Res. Public Health/ A2	234
Samargandy, et al (2016)	Medicine student	Saudi Med J/B3	326
Makhado, et al (2016)	Nurse	Curations/ Não consta	233
Powers, et al. (2016)	Doctor	American Journal of Infection Control/ A2	231
Leiss (2014)	Physiotherapy	Jstage/Não consta.	833
Andrade et al, (2014)	Doctor	Infect/B2	231
Machado Alba, et al (2014)	-	Ciencia & Trabajo/B3	656
Julio, et al (2014)	Nurse	Revista Brasileira de Enfermagem/A2	460
Villarinho, et al (2014)	Nurse	Esc Anna Nery/B1	23

Note: The titles of the journals were kept as in their original language.

Table 2 – Characteristics, causes and solutions for HIV infection in nursing professionals due to sharps use according to studies found in the Literature Review.

Study type	Place	E	Causes	Solutions
Case-control Cohort	Affiliate Hospital of the University of Xiangnan, a public polyclinic in Hunan Province.	04	- Lack of training - Double working hours - Do not use Personal Protective Equipment	- Integrated educational interventions improve nurses' knowledge about reducing the risk of occupationally acquired infections and improve compliance with universal precautionary procedures.
Cross-sectional	University Hospital at King Abdulaziz, Jeddah, Kingdom of Saudi Arabia.	06	- Fragility in the disposal of sharps - Careless use of needle.	- Proper post-exposure management.
Cross-sectional	In the province of Limpopo	06	- Lack of knowledge about accidents with sharps - Bureaucratization	- Reformulate policies, guidelines and programs to ensure prompt assistance in the event of accidents with sharps. - Internal post-exposure prophylaxis service.
Descriptive correlational	Ambulatory.	06	- Fragility in adopting Standard Precautions - Work overload.	- Supervision of the use of Standard Precautions.
Cross-sectional	North Carolina Board of Nursing	06	- Instability in the use of Personal Protective Equipment. - Physical and mental tiredness.	- Use locking devices - Implement a security system for health care environments.
Descriptive Longitudinal	Antioquia, Colombia.	06	- Needle used in mucous membranes with carelessness.	- Establishment of post-exposure prophylaxis.
Descriptive Cross-sectional	Colombia	06	- Type of procedure, type of patient to be treated with the piercing material influences the care to be taken.	- Establish health policies and occupational risks, allowing the initiation of Epidemiological Surveillance processes.
Descriptive Cross-sectional	South Macro-region of *Minas Gerais* State.	06	- Improper disposal of sharps in trash bags or countertop, bed, floor, and other places.	- Notification at national level of accidents involving exposure to biological material is an important action to implement prevention and control strategies.
Socio-historical	*Santa Catarina* State.	06	- Downgrading of knowledge. - Lack of perception of risk of accident with sharps.	- Continuing education with frequent updates on standard precautions - Implementation of Biosafety standards.

E= level of evidence.

The Ishikawa Diagrams based on the **Table 1** and **2** are shown in **Figure 2** and **3**.

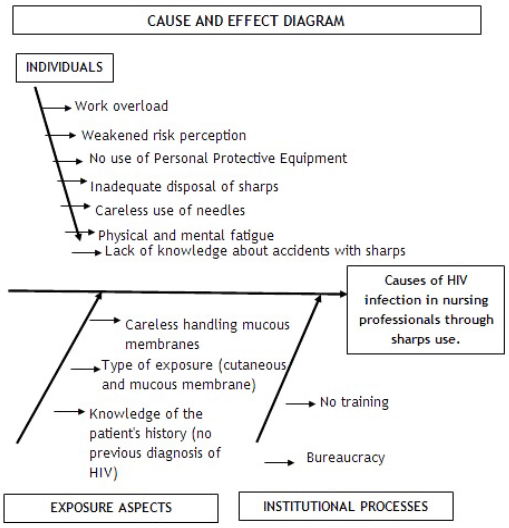

Figure 2 - Causes of HIV infection in nursing professionals due to sharps handling.

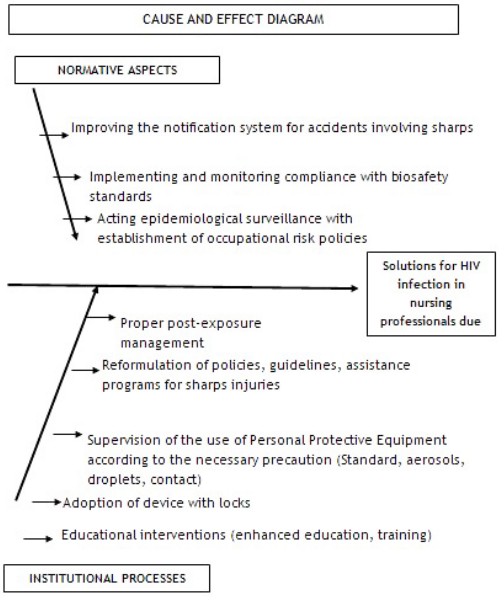

Figure 3 - Solution strategies towards the causes of HIV infection in nursing professionals due to sharps handling.

The individual aspects found in this study deserve special mention, since it includes the use of Individual Protection Equipment, this being one of the basic precautions as prevention measures adopted by health professionals when there is blood manipulation and excretions of patients, regardless of whether or not there are contagious diseases defined in pre-diagnosed cases.[13]

Other factors, such as inattention to the procedures, disbelief in the occurrence of sharps injuries, stress, risk behavior, long working hours, contribute to the occurrence of work-related accidents.[14]

Sharp accidents occur due to inadequate work organization, material availability, neglecting the PPE use and lack of training. In this way, the teams handling sharp materials should take maximum care during procedures, never exceeding the maximum capacity of the descartex and never practicing needle re-focusing.[15]

The lack of knowledge regarding the risk and the type of PPE indicated for each procedure is also a factor that leads professionals to not use PPE or to make inappropriate use of PPE in a way that facilitates the exposure of HIV infection.[16]

As far as institutional processes are concerned, training is a tool used to inform employees about the risks they are exposed to in their work environment, generally the need for training is demonstrated when there is a gap between what is required of an employee to comply his assignments or routines in a competent way and what he knows in fact and what enables him to do so.[17]

Bureaucracy was cited as a motivating factor for accidents. Study also identified this factor as the most cited motif.[18]

The institutional aspects represented as solutions for HIV infection by nursing through sharps address educational interventions and the importance of worker participation in the training process and the development of a sense of responsibility for safety are known, not as a mechanism of but rather as a process of recognition of belonging to a particular work environment in which everyone is responsible for safety.[19]

In general, the main reasons not to notify are lack of knowledge about how to do it, excessive bureaucracy, fear of punishment by the immediate leadership and attribution of low risk to the accident.[20]

Risk management, in addition to being mandatory, aims to provide workers with protection by reducing the frequency and severity of accidents. Therefore, it is necessary to know the circumstances related to the exposures from the development of adequate surveillance systems.[21]

Post-exposure prophylaxis measures as a solution for HIV infection by sharps in the nursing team, shows the need to initiate it immediately after contact with biological material or sharps, aiming for greater effectiveness, reducing the possibility of contamination. Hence, occupational exposures with the presence of blood and body fluids should be treated as medical urgency.[22]

Considering the limitations of the study, it is possible to point the search in only two databases, then being necessary to broaden the exploration in the literature.

CONCLUSIONS

The study's purpose was to analyze the causes and solutions of HIV infection by sharps use and found among the causes of work overload, weakened risk perception, physical and mental fatigue, and lack of knowledge of the patient's history. The following solutions stand out: supervision of the use of PPE, post-exposure management, and educational activities.

Therefore, it is observed the need to implement public policies, improve the functioning of Biosafety aspects, alert the Internal Commissions of Accident Prevention, with the perspective of obtaining favorable results in reducing the risks to biological agents in the nursing team.

It is also of the utmost importance to sensitize managers to consider the overload aspect of work, providing hourly workload and dimensioning compatible with the good physical and mental functioning of the professional, in addition to salaries compatible with a healthy quality of life as the professional does not need to have several employment links. It is still considered the need of commitment of the nursing professionals to participate in training and report accidents with sharps.

Concerning the teaching, it becomes relevant to prepare future nursing professionals to handle sharps with caution, attention, using them and safely disposing them.

It should be emphasized that new studies are needed so that the scientific community, population, health professionals, managers, universities can see the theme in a singular way, giving their due credibility.

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