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# The relationship between the use of sharp instruments and the risks associated with health service workers: a systematic review protocol

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**Abstract.** Work accidents are characterized as those resulting from the exercise of work in the service of a company, which can harm the worker. health care workers suffer from the risk of exposure to contaminants and sharps in their daily practice. The handling of perforating material predominates as a situation of exposure to occupational accidents among health professionals, being the main source of disease transmission within the hospital environment. Thus, a systematic review is proposed to obtain relevant information on these risks in order to plan appropriate future interventions to avoid related negative consequences. Thus, following the preferred reporting items for systematic reviews and meta-analyzes protocols (PRISMA-P), this systematic review protocol was developed in order to provide guidelines appropriate for the development of research that can deliver results to meet objective sought. Five databases will be accessed (SCOPUS, PubMed, Science Direct, EBSCOhost and Web of Science) and a total of 9 keyword combinations will be used. This protocol is registered with PROSPERO under the code of PROSPERO CRD42020205684
**Keywords***:* Occupational exposure; Occupational risk; needlestick injuries; sharps injuries; accidental puncture.

## Introduction

*Rationale*

The official definition of occupational accident (OA) states that the OA is characterized as that resulting from the exercise of work in the service of a company, which may cause a personal injury or functional disturbance, permanent or temporary, with consequent loss or reduction ability to work. In some cases, it can lead worker to the death (Brasil, 2008).

According to Costa (2005), the OA may be related to several predisposing factors due to the peculiarities of the activities performed by humans. These factors include occupational violence, physical, chemical, biological, psychosocial and ergonomic. The consequences of occupational accidents and injuries include physical, psychological and economic damage, both to workers and their dependents (Mbarki et al, 2013).

Hospitals are classified as a risky workplace. Like other high-risk workplaces, they are characterized by a high level of exposure to hazardous agents, which significantly endanger the health and lives of workers, patients and community members, if not properly treated (Araujo et al, 2012; Pruss et al, 2014; Silva. 2019).

Occupational accidents involving workers in a hospital environment involve considerable economic impact, given the occurrence of loss of qualified labor due to occupational injuries, as well as damage to the institution's image, when cases occur where professionals infect patients (Van Gemert-Pijnen et al, 2006).

The health professional is exposed to a greater risk of certain immunologically preventable infections than the general population. The risk of acquiring infections from sharps injuries is a cause for concern among healthcare workers and hospital

management around the world. These workers suffer daily from the risk of exposure to contaminating materials and sharps in their practice (Simão et al, 2010).

Any object that may cause a cut or puncture is considered a sharp material, as an example in health units we can mention the needle, the peripheral intravenous device, the scalpel, the blades and broken ampoules (Santos et al, 2011).

The handling of perforating material predominates as a situation of exposure to occupational accidents among health professionals, these health professionals perform their work activities in health institutions, an activity that involves contact with patients and with blood and other body fluids constantly (Toledo et al, 2008).

Based on the information previously exposed, the objective of this systematic review was, through analysis of publications on this topic, to identify which hospital workers have direct or indirect contact with sharps within the hospital environment and what are the occupational risks biological factors to which they are exposed.

The objective of this systematic review is to identify the biological occupational risks to which hospital workers are exposed, who are at risk of having direct contact with sharp materials within the hospital environment. Specifically, the proposed systematic review will attempt to sequentially answer the following questions:

1. What are the actors involved in the proposed scenario?
2. What are the sharp-cutting materials that are manipulated by these actors within the hospital environment?
3. What risks do these actors take when manipulating these materials considered dangerous?

## METHODS

*Research structure*

This systematic review protocol follows the guidelines described in the preferred report items for systematic reviews and meta-analysis protocols (PRISMA-P) Statement (Shamseer et al. 2015, Moher et al. 2015).

Eligibility criteria

*Type of studies*

Initially, only articles published and peer-reviewed will be used. Experimental and theoretical studies, case studies or field studies will be found where information related to occupational risks within the hospital environment related to chemotherapeutic manipulation will be found. Articles that do not contain information relevant to the subject will be deleted.

*Context*

Eligible publications will include those that present investigations developed in the hospital environment.

*Type of participants*

The research will focus on staff actively working within the hospital environment. The study will include female and male samples, without age limits, of the various professional activities, various trainings. There will be no additional restrictions.

*Interventions*

Any type of result related to occupational risk with sharp materials within a hospital environment will be considered. All types of studies analyzing accidents, reporting the type of accident and, when possible, main causes will also be considered.

*Configurations*

Any configuration in any country, in any type of hospital are considered.

*Language*

The study will consider only articles written in English.

*Exclusion criteria*

The study will exclude documents other than peer-reviewed published articles or that is not an essential document. As well as all studies before 2016.

**Information sources**

The search will include the following electronic databases: SCOPUS, PubMed, Science Direct, EBSCOhost, and Web of Science. It will be conducted in articles from 2016. The year range is set for relevant non-repetitive results.

However, the study will also review the references of the articles collected to look for any additional records relevant to the review objectives. Similarly, authors with more articles on the subject and journals that appear frequently in searches will be analyzed in greater depth. This process will be repeated until no further related results can be found. In this case, publications older than the set range may be used.

*Search strategy*

The first stage will involve the research and screening of the literature with the use of keywords, which will be combined into phrases and will include Boolean terms (AND, OR), in addition to the inclusion and exclusion criteria already provided for in the search.

Keyword combinations will be formed as follows:

[(*"Occupational risk" or "Health worker" or "*Occupational exposure*")*
AND
*("needlestick injuries"* or "accidental puncture" or *"sharps injuries"*)]

The appropriate search engines will be used, which will display all titles. In each database, the search will be performed by entering each combination (separated by the "and" operator) and

selecting, when possible, "article title, abstract, keywords". All literature eligible for inclusion based on titles will be uploaded to Endnote. This step will be faithfully reproduced for each of the selected databases.

The articles included will be selected by two independent reviewers (1R and 2R) using the criteria for eligibility and exclusion. First, both will look at titles, keywords, and summary; Secondly, introduction and conclusion will be analyzed (in addition to titles, keywords and summary again); and without third place, the full texts will be read; Then they will verify all the information found. If disagreements arise, a third reviewer (3R) must participate before a final decision is made. If data important for the review is missing or unclear, an attempt will be made to contact the corresponding study author to resolve or clarify the problem. Two independent reviewers (1R and 2R) will collect data from the selected articles. Subsequently, the retrieved information will be crossed. Any disagreement will be discussed between them and the third reviewer (3R). The following data will be extracted and recorded in duplicate by two reviewers (1R and 2R) for each study: author; year of publication; country, risks found; outcome measure (s); relevant results and conclusion (s).

In a next step, as the selected articles are analyzed, new potential keywords will be identified, and new research will be conducted. Similarly, references will also be checked to find older articles that could provide additional information. This procedure will be repeated for new articles identified until no more relevant results are obtained. In addition, other works developed by the authors of the primary studies included in the review will be consulted in order to find related investigations that meet the established inclusion criteria.

Finally, in a last stage of the research, additional sources referenced in the analyzed articles will be identified and accessed. If many articles are published in the same journal, special attention should be given to this and a more careful search should be performed.

*Study records*

*Data management*

After completing the search and recording the number of articles collected in a table, the selected articles from each database will be exported for screening and duplicate removal. The title and abstracts will be analyzed. Then, after taking into consideration the established selection criteria, the full text of the resulting studies will be retrieved and evaluated.

The number of articles resulting from each filter stage will be recorded in the in the aforementioned table. This will keep track of all studies from the first articles identified to the selected final publications, along with the number of articles excluded from each applied criterion.

Records management will be performed with "EndNote" software.

*Selection process*

As each combination is entered, three exclusion phases will apply:

A. Through search filters, the following criteria will be considered:

i. Date: Articles published since 2016. However, for the previously mentioned final stages of the research process, no date restrictions will apply.
ii. Document Type: Articles.
iii. Font type: journal.
iv. Language: English.
v. Title of source: related to occupational health, sharps, and hospital environment.

B. Repeated articles will be removed.

C. Articles will be deleted if any of the following conditions are met:

i. Studies are not applied in a hospital setting.
ii. Studies do not consider occupational risk.

*Data collection process*

From the selected final studies, the full text will be retrieved in order to collect information of interest. The information extracted will include:

1. general information: authors, year of publication, country.
2. Characteristics of the sample: function performed, gender distribution, risk.
3. Context: in hospital environment; associated risks.
4. Characteristics of the study: objectives, risks considered, materials and equipment capable of producing risk, conclusions.
5. Main limitations of the study.
6. Quality assessment: Possible risk of bias (risk of selection bias, accuracy, risk of information bias, risk of investigator bias), report (assessment of overall study quality), external validity (assessment of whether results of the study are generalizable), internal validity (bias evaluation due to study sample selection and / or confounding), power (evaluation of whether the study results could be obtained by chance).

*Data items*

Synthesis tables will be elaborated with information compiling the topics presented in the section above, mainly: reference and country, sample size, function exercised, gender distribution and mean age group, study objectives, conclusions, risks Evaluations.

*Results and priorization*

The main outcome of this research is to verify what are the most common risks in the manipulation of sharp materials, which are the most common means of getting hurt and which are the actors who are most prone to these risks.

*Risk of bias in individual studies*

The risk of bias will be evaluated individually for this review.

*Data synthesis*

The summary of the data will be performed through a narrative, based on the tables of assembled data (with information from the eligible documents). With this perspective, the bias will also be considered when analyzing the data.

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*Protocol registration*

This protocol is registered in the Prospective International Register of Systematic Reviews (PROSPERO) code CRD42020205684

*Authors contribution*

Design and development of the study: TFBXS. HC. MR.
Title and abstract selection: TFBXS. HC. MR.
Full-text screening: TFBXS.
Data extraction: TFBXS.
Critical Rating: TFBXS.
Analysis and interpretation of the data: TFBXS.
Draft protocol: TFBXS.
Support in project development: TFBXS.

All authors have read and approved the final version.

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