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REVIEW

Needlesticks with safety devices and accident prevention: an integrative review

Agulhas com dispositivos de segurança e a prevenção de acidentes: revisão integrativa

Agujas con dispositivos de seguridad y prevención de accidentes: revisión integrativa

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ABSTRACT

Objective: To identify in the literature the efficacy of needlesticks with safety devices to reduce the occurrence of occupational accidents with exposure to biological material among health workers. **Method**: Integrative literature review, structured in the stages: Guiding question, search, categorization of studies, evaluation, discussion and interpretation of results, and synthesis of knowledge. Search for original articles and systematic reviews on the main bases of the Health area, published from 2000 to 2016 in Portuguese, English and Spanish, with descriptors: needlesticks injuries, exposure to biological agents, needles, protective devices, occupational accidents, accident prevention and health personnel. **Results:** We selected eleven articles, most characterized the passive safety devices as more effective in reducing the occurrence of injuries by needlesticks. **Conclusion:** The use of needlesticks with safety devices reduces the occurrence of accidents, bringing greater solvency when combined with the training of workers. **Descriptors:** Needlestick Injuries; Needles; Protective Devices; Accident Prevention; Health Personnel.

RESUMO

Objetivo: Identificar na literatura a eficácia do uso de agulhas com dispositivos de segurança para reduzir ocorrência de acidentes de trabalho com exposição a material biológico entre trabalhadores de saúde. **Método**: Revisão integrativa da literatura, estruturada nas etapas: Questão norteadora, busca, categorização dos estudos, avaliação, discussão e interpretação dos resultados, e síntese do conhecimento. Busca a artigos originais e revisões sistemáticas nas principais bases da área da Saúde, publicados de 2000 a 2016 em português, inglês e espanhol, com descritores: ferimentos penetrantes produzidos por agulhas, exposição a agentes biológicos, agulhas, equipamentos de proteção, acidentes de trabalho, prevenção de acidentes e pessoal de saúde. **Resultados:** Foram selecionados onze artigos, a maioria caracterizou os dispositivos de segurança passivos como mais efetivos na diminuição da ocorrência de lesões por agulhas. **Conclusão:** A utilização de agulhas com dispositivos de segurança reduz a ocorrência dos acidentes, trazendo maior resolutividade quando aliada à capacitação dos trabalhadores. **Descritores:** Ferimentos Penetrantes Produzidos por Agulha; Agulhas; Equipamento de Proteção; Prevenção de Acidentes; Pessoal de Saúde.

RESUMEN

Objetivo: Identificar en la literatura la eficacia del uso de agujas con dispositivos de seguridad para reducir la ocurrencia de accidentes del trabajo con exposición a material biológico entre trabajadores de la salud. **Método**: Revisión integrativa de la literatura, estructurada en las etapas: Cuestión orientadora, búsqueda, categorización de los estudios, evaluación, discusión e interpretación de los resultados, y síntesis del conocimiento. Busca artículos originales y revisiones sistemáticas en las principales bases del área de la salud, publicados desde 2000 hasta 2016 en Portugués, Inglés y Español, con descriptores: lesiones por pinchazo de agujas, exposición a agentes biológicos, agujas, equipos de seguridad, accidentes de trabajo, prevención de accidentes y personal de salud. **Resultados:** Se han seleccionado once artículos, la mayoría caracterizó los dispositivos de seguridad pasivos como más efectivos en la disminución de la ocurrencia de lesiones por agujas. **Conclusión:** La utilización de agujas con dispositivos de seguridad reduce la ocurrencia de los accidentes, trayendo mayor resolutividad cuando aliada a la capacitación de los trabajadores. **Descriptores:** Lesiones por Pinchazo de Aguja; Agujas; Equipos de Seguridad; Prevención de Accidentes; Personal de Salud.

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INTRODUCTION

According to the Ministry of Social Security (*Ministério da Previdência Social*), occupational accident is defined as "that which occurs through the exercise of work at the service of the company or, by exercising the work of special insured persons, causing bodily injury or functional disturbance that causes death, permanent or temporary loss or reduction of capacity for work"[1]. In this way, the health care of the worker must occur simultaneously with the epidemiological and health surveillance actions, acting in the promotion and protection of the latter, as well as in the recovery and rehabilitation of the health of workers who are submitted to risks and aggravations resulting from work[2].

A survey by the International Labor Organization (ILO) of the European Union estimated that approximately 2.34 million people worldwide die each year from occupational accidents or diseases resulting from them. This fact demonstrates a negative impact on the economic development of the nations, becoming a public health problem[3]. According to the World Health Organization (WHO), there are approximately 2 million per year of occupational exposures to bloodborne pathogens in an estimated 35 million health workers worldwide[4]. In 2013, in Brazil, 717,911 accidents and work-related illnesses were reported[5]. According to data from the Ministry of Health (*Ministério da Saúde*), about 58,000 nursing professionals are exposed to contamination by biological risks in Brazilian territory[6].

Many countries have implemented a number of accident prevention regulations, such as the United States, which have had legislation on accident prevention with needlesticks since 2000[7]. In Brazil, Regulatory Norm - RN 32, from 2008, establishes that employers must provide sharps with a safety device to health professionals and also provides a system of systematic epidemiological surveillance for the control of Occupational Accidents with Biologic Material (ATMB - *Acidentes de Trabalho com Material Biológico*) among health professionals and the adoption of prophylactic measures[8].

The occurrence of ATMB among nursing workers is frequent due to specific characteristics in the care delivery, where the manipulation of body fluids, needlesticks and sharp objects is constant, added to the complexity of the activities developed and the characteristics of the work setting[9]. The most common occupational accidents, involving professionals and students in hospital setting, are accidental exposures with needlesticks. The risk of the injured individual acquiring an infection through these exposures depends on factors such as: extent of injury, volume of biological fluid present, systemic conditions of the professional, characteristics of the microorganisms present and clinical conditions of the source patient, as well as adequate behaviors after exposure[10].

Among the various pathogens that can be acquired in the event of such accidents, the possibility of contamination by Human Immunodeficiency Virus (HBV), Hepatitis B (HBV) and Hepatitis C (HCV), which in epidemiological terms are more frequent in the ATMB context[9]. Accidents involving needlesticks account for a large proportion of transmissions of infectious diseases (80-90%) among health workers, and the risk of transmitting infection from a contaminated needlestick is one in three for hepatitis B, one in thirty for hepatitis C and one in three hundred for HIV[11-12].

As an important result, it is expected that the use of needlesticks with a safety device will reduce the incidence of occupational accidents both for the team that provides direct care and also for those who carry out the final waste disposal[13].

However, the number of manufacturers of instruments with safety devices is still relatively restricted in Brazil[14]. There are the specific containers of the safety devices, which completely isolate the needlestick, allowing the hands to remain behind the cutting element, minimizing the risk of infection to patients, and not creating problems related to the control of additional infection when compared to conventional devices, in other words, unsafe devices[14]. Despite the acquisition of materials with safe devices around the world, some studies show considerable variation in methodology, results, outcomes, and efficacy by device type. Therefore, workers should contribute to the selection of the most appropriate technology and evaluate the effectiveness of various materials in the context of their own work settings[14].

The health professional has the responsibility to be aware of the mechanisms of his own safety and of his patient. For this, it is necessary to obtain specific knowledge of how occupational accidents can occur and to promote the maintenance of settingal safety through educational actions[15]. In addition, it is important accident notification, even when minor injuries occur that are ignored by health workers because they do not know that such a record supports their safety and contributes to the analysis of scientific research[16].

Given this context, the development of this study is justified in order to synthesize the knowledge produced on the subject and to contribute to the effectiveness of the use of needlesticks with safety devices to prevent the occurrence of occupational accidents with exposure to potentially biological material contaminated and subsidize the planning of new research. This project is linked to the Occupational Accident Prevention Network (REPAT - *Rede de Prevenção de Acidente de Trabalho*/USP).

OBJECTIVE

To identify in the literature the efficacy of needlesticks with safety devices to reduce the occurrence of occupational accidents with exposure to biological material among health workers.

METHOD

This is an integrative review of the literature. This method makes it possible to summarize the completed researches and to obtain conclusions from the analysis of a topic of interest. Literature review is a strategy that identifies and analyzes existing evidence in health practices when the body of scientific knowledge is not sufficiently substantiated[17]. An integrative review requires for its elaboration, the adhesion of phases that present a methodological rigor in search of evidence on a certain subject. These phases comprise six steps that are: Select and describe the issue for review; Select the studies that will be part of the sample; Elect the characteristics of the revised searches; To analyze the findings according to the inclusion and exclusion criteria established in the study project; Interpret the results; and Elaborate an article with the purpose of announcing and divulging the results found[18].

Strategy for the identification of studies

In the first phase the question of search was decided: Is the use of needlesticks with safety devices effective in reducing the occurrence of occupational accidents with exposure to biological material among health workers?

The search strategy was conducted through researches to the main health databases: Web of Science (WOS), Medline/PubMed, LILACS, Scopus, Cochrane, CINAHL and SciELO collection, from 2000 to 2016, by the mean of the descriptors: needlesticks injuries, exposure to biological agents, needlesticks, protective devices, occupational accidents, accident prevention and health personnel, all identified in the *Descritores de Ciências da Saúde* (DeCS) of the Virtual Health Library and in Medical Subject Headings (MeSH) of the PubMed database. A search was made to the databases, in April 2017, and the data were organized in flowchart for further analysis.

Initially, the descriptors were crossed at each base, eliminating duplicate references. In LILACS, the descriptors: penetrating injuries produced by needlestick, exposure to biological agents and needlesticks were used in the OR group, as well as the descriptors occupational accidents and accident prevention, interposing with AND descriptors protective devices and health personnel. In Pubmed and Cochrane, the strategy with the English descriptors was used as follows: "Needlestick Injuries" OR "Needles" AND "Protective Devices" AND "Accidents, Occupational" OR "Accident Prevention" AND "Health Personnel". In the Web of Science and Scopus, the English descriptors were used as follows: "Needlestick Injuries", "Needles", OR "Exposure to Biological Agents" AND "Protective Devices" AND "Accidents, Occupational" OR "Accident Prevention" AND "Health Personnel". In CINAHL, the following strategy was used: "Needlestick Injuries" OR "Needles" AND "Protective Devices" AND "Accidents, Occupational" OR "Safety" AND "Health Personnel". And in the Scielo collection, the descriptors used were needlesticks AND *dispositivos de segurança*.

Criteria of inclusion and exclusion

After this step, the references were selected, from the reading of the titles and abstracts, which met the following inclusion criteria: original articles and systematic reviews, available in full in open access in Portuguese, English and Spanish. Then, the complete texts of each selected article were read, seeking to choose the studies that answered the research question. After this process, publications that did not meet the selection criteria mentioned above, which did not respond to the research question, were duplicated and those that did not have the full text available online in open access.

In order to organize the strategies of identification, selection and inclusion of the studies within the proposed eligibility criteria, the flowchart was used as the basis of the flowchart Preferred Reporting Items for Systematic Reviews and Meta-Analyzes (PRISMA)[19].

Extraction and alaysis of data

For the organization of the data, a form was used based on the Form of the *Red de Enfermería en Salud Ocupacional* - RedENSO International[20], used in several studies carried out by the *Rede de Enfermagem em Saúde Ocupacional* (freely translated as Network of Nursing in Occupational Health) - RedENSO - Brazil. The identification of the publication (title, volume, number and year), authorship, place of study, research objectives, method, type of study, type of needlestick and model, evidence level of the study and effectiveness of the use of needlesticks with protective device. The data was included, with double typing, in the worksheet of the program Microsoft Excel 2013, version 15.0.4805.1003.

Regarding the design of the studies, the categorization of the following types was used: bibliographic, descriptive, experimental and exploratory research. The bibliographical research tries to explain a problem from published theoretical references, seeks to know and analyze the cultural and scientific contributions of the past on a certain subject, theme or problem. Descriptive research observes, records, analyzes, and correlates facts or phenomena (variables) without manipulating them. It seeks to discover the frequency with which a phenomenon occurs, its relation to others, its nature and characteristics. It can take several forms, such as: descriptive studies, opinion research, motivational research, case studies and documentary research. The experimental research is characterized by directly manipulating the variables related to the object of study. The relationship between the causes and the effects of a given phenomenon is studied. With the use of control situations it interferes directly with reality, manipulating the independent variable in order to observe the dependent. In the case of quasi-experimental studies, there is no existence of an independent control group, generally each subject is self-control. Exploratory research does not require the elaboration of hypotheses to be tested, but it subsidizes significant hypotheses for further research, it is restricted to defining objects and seeking more information about a particular subject of study. It aims to become familiar with the phenomenon or gain a new perception of it and discover new ideas[21].

Evaluation of the evidence level of the studies

To rank the evidence found in the studies, the classification proposed by the Agency for Healthcare Research and Quality was adopted, where the levels of evidence are: level 1, meta-analysis of multiple controlled studies; level 2, individual study with experimental design; level 3, study with quasi-experimental design as a study without randomization with single group pre- and post-test, time series or case-control; level 4, study with non-experimental design as descriptive correlational and qualitative research or case studies; level 5, report of cases or data obtained in a systematic, verifiable quality or program evaluation data; level 6, opinion of reputable authorities based on clinical competence or opinion of expert committees, including interpretations of non-research based information, regulatory or legal opinions[22].

RESULTS

We identified 206 articles tracked in the databases. Of this total, 29 were pre-selected, according to the inclusion criteria established for this study. After analysis, 11 studies met the eligibility criteria and answered the question of research, eight identified in CINAHL, two in Scopus and one in MEDLINE/Pubmed. Figure 1 shows the flowchart of the process for the selection of the studies which were included in this integrative review.

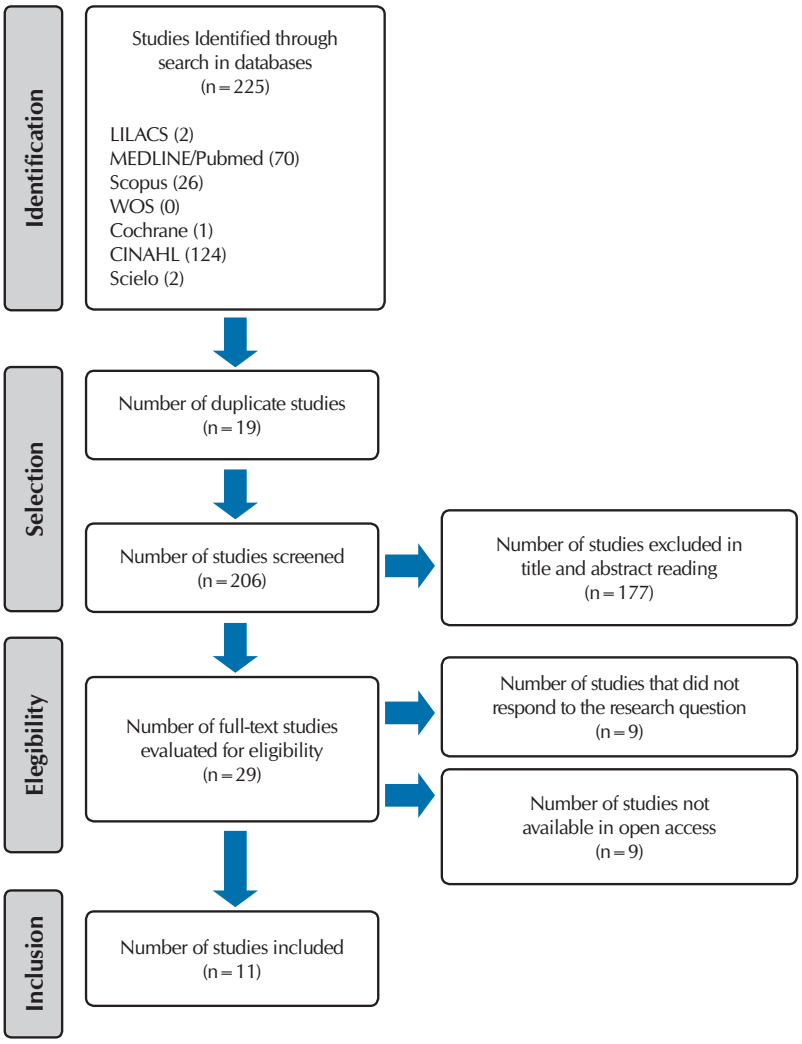

Figure 1 - Flowchart for identification, selection and inclusion of studies

Among the included studies, five were conducted in the United States[23-27], two in Brazil[28-29], one in France[30], one in Italy[31], one in Scotland[32] and one in Lebanon[33]. Regarding authorship, six studies were carried out by physicians[23-24,27,29-30,34], four by professionals with a degree in science[25,28,31-32] and one per nurse[26]. About the type of publication, ten are articles and one is systematic review[33]. As to the language, ten studies were available in English and one in Portuguese[28].

Three studies specified the brand or the company's safety device factory, implemented: safety needlesticks (Eclipse, SafetyGlide, SurGuard and Magellan), mechanical safety syringe (RPD), automatic retractable syringes (Integra, VanishPoint), manual retractable syringe (Procedure-SF, Baksnap, Invirosnap), armored syringes (Safety-Lok, Monoject, Digitally Activated Shielded Syringe) (23); a protective retractable shield (Catheter ETTER IV CATH)[35]; passively activated IV catheter system (Introcan Safety)[31].

The other studies (eight) did not mention the brand, nor manufacturer or supplier. Of the 11 studies analyzed, three used guidelines and training prior to the introduction of safety devices[24,27,31]. One study states that professionals in the main medical center studied undergo annual training on standard precautions over a period of one hour and thirty minutes, and also receive guidance on registering occupational accidents at the institution[27]. The other two studies carried out training as a method of analysis, not because it is a common routine in the work setting. All health care professionals received training from a health safety representative from their institution and a representative from the manufacturer of the safety devices provided[24,31].

The studies were classified into two categories for the organization of the results regarding the effectiveness of safety devices in the prevention of ATMB in health professionals. The first category, presented in Chart 1, refers to the type of security device analyzed. Eight articles informed the nature of the safety device analyzed, being this passive or active. Active protection devices are defined as those that depend on user activation, most commonly found in institutions, and passive protection devices have automatic activation[31]. The second category, presented in Chart 2, refers to the type of perforating material analyzed.

The data are presented in Charts 1 and 2 referring to the categories mentioned above.

Study 8 concludes that the safety materials purchased did not result in better cost-effectiveness, and there was an increase in injuries by needlesticks after the introduction of safety devices. The authors report that in the use of active protection devices there is no adherence of the nursing professionals to the norms recommended, and it is necessary to have continuous training and programs aimed at risk prevention, as accidents with needlesticks persist in happening even with the most modern technology available and cost effective. The acquisition of materials with passive safety devices is an alternative for the reduction of injuries by needlesticks[27].

Study 1 reports that there were few hospitals that used the same models of safety devices to allow valid comparisons between those who were passive or active. The study is characterized as observational and there is a lack of confirmation about the effect of safety syringes due to the lower statistical power of the same. However, the organizational climate analysis asserts that working conditions appear to be more important in determining risk than the safety device, so poor organizational climate and high workloads were associated with a 50% probability of injuries due to needlesticks bites and near accidents with hospital nurses.

The other studies presented in Chart 1 conclude that the passive safety devices reflect more effective results in the reduction of injuries by needlesticks. In study 3, the comparison between passive and active safety devices occurs; no study 5, between active and conventional safety devices; in study 6, the comparison is made between conventional and passive devices, whereas in studies 2 and 7, the introduction of the

device is compared only with its absence before using it. In all comparisons, passive safety devices are more effective. Study 8 concludes that passive devices currently represent a small portion in the market for safety engineering devices, but that the wider dissemination of a set with a greater variety of passive devices, with the continuing education of end users, would result in an effective sharps injury prevention program.

The four studies presented in Chart 2 conclude, within their particularities, that the use of the evaluated safety devices was effective to reduce the occupational accidents by percutaneous injury.

Study 11 deals with a systematic review. The systematic review found that there is evidence of moderate quality about the use of safety devices designed for intravenous injections, infusions, and phlebotomy procedures in reducing injury rates by needlesticks in health workers.

Studies 9 and 10 conclude that guidelines and use of safety devices prevented most injuries, and study 10 specifically emphasizes that the only likely intervention that would result in greater benefit is the introduction of devices with retractable or shielded needlesticks for effects of blood collection and administration of injections.

Chart 1 – Presentation of data related to title, year, country, type of safety device analyzed, methodological outline, main results and evidence level

Title	Year/ Country	Type of safety device analyzed	Methodologival outline	Main Results	Evidence Level
Study 1 Organizational climate, staffing, and safety equipment as predictors of needlestick injuries and near-misses in hospital nurses[26]	2002 USA	As security device active as passive protection	Quantitative, Exploratory	The use of 3 of the 4 types of protective devices examined was associated with a decrease in the probability of incident occurrences with needlesticks and near misses.	4
Study 2 Using an intravenous catheter system to prevent needlestick injury[31]	2010 Italy	Passive protection safety device	Quantitative, Descriptive	After the campaign and use of the safety catheters the reported incidents of injuries involving catheters were 19 to 2. And in these two cases no devices were used for prevention.	2
Study 3 Safety Syringes and Anti-Needlestick Devices in Orthopaedic Surgery[23]	2011 USA	As security device active as passive protection	Quantitative, Quasi - Experimental	Passive devices are most effective, followed by automatic retractable syringes, armored needlesticks, armored syringes and manually retractable syringes.	3
Study 4 Percutaneous injuries from hollow bore safety-engineered sharps devices[25]	2013 USA	Passive protection safety device	Quantitative, Exploratory	42.9% of accidents with the safety device occurred after device use and are probably avoidable through effective use of safety technology and 45.8% of injuries occurred with phlebotomists when the device was not properly activated.	5
Study 5 Needlestick Injury Rates According to Different Types of Safety Engineered Devices: Results of a French Multicenter Study[30]	2014 France	As security device active as passive protection	Quantitative, Exploratory	Passive devices are associated with lower incidence rates. In particular, the automatic retraction lancets presented the lowest incidence rate of injuries of all safety devices. And the use of needlesticks without safety has been associated with very high injury rates.	4
Study 6 Effect of the introduction of a engineered sharps injury prevent device on the percutaneous injury rate in healthcare workers[27]	2014 USA	Passive protection safety device	Quantitative, Quasi - Experimental	The rate of percutaneous injuries of the IV catheter with the safety device decreased over each consecutive month, while the rate of injuries suffered by suture needlesticks without a safety device increased significantly.	3
Study 7 Impact of a single safety-engineered device on the occurrence of percutaneous injuries in a general hospital in Brazil[29]	2014 Brazil	Passive protection safety device	Quantitative, Descriptive	A significant decrease in the rate of percutaneous injuries was observed while the introduction of safety lancet reduced the number of small and hollow needlesticks purchased by the hospital.	3
Study 8 Cost-effectiveness of needle and catheter over needle with active protection devices in the hospital setting[28]	2015 Brazil	Active protection safety device	Quantitative, Descriptive	Even with the device there was a 30% increase in accidents. The cost increased by 211.08%.	4

Chart 2 – Presentation of data referring to the title, year, country, type of percutaneous material analyzed, methodological outline, main results and evidence level

Title	Year/ Country	Type of percutaneous material analyzed	Methodological outline	Main Results	Evidence Level
Study 9 Effect of Implementing Safety-Engineered Devices on Percutaneous Injury Epidemiology[24]	2004 USA	Needlesticks for blood collection, IV inserts, IM and SC and injections	Quantitative, Quasi-Experimental	The implementation of safety engineering devices has reduced rates of percutaneous injuries among professions, activities, injury times and devices.	3
Study 10 Potential for reported needlestick injury prevention among healthcare workers through safety device usage and improvement of guideline adherence: expert panel assessment[32]	2006 Scotland	Syringes with safety engineering devices	Quantitative, Descriptive	Multifactorial analysis indicated that injuries were significantly more likely to be prevented by the use of safety devices than those that occurred through other procedures.	4
Study 11 Use of safety-engineered devices by healthcare workers for intravenous and/ or phlebotomy procedures in healthcare settings: a systematic review and meta-analysis[33]	2016 Lebanon	Variety of IV systems of needlesticks and catheters, portable needlesticks, arteriovenous fistula needlesticks, vacuum collection device, steel needlesticks and syringes	Systematic Review	We identified 22 eligible studies: 12 evaluated devices for intravenous procedures, 5 for phlebotomy and 5 for both. Of the 22 studies, 21 were observational and 1 randomized. All studies evaluated the reduction of injuries by needlesticks.	1

DISCUSSION

In the present study, it was verified that, of the 11 studies analyzed, 10 verified the reduction of the occurrence of occupational accidents with needlesticks that have the safety device among health workers. Of the eight studies that classify safety devices into active or passive devices, most assert that passive devices are more effective in preventing injuries by needlesticks over active or conventional devices. The risk of health personnel injury when using conventional devices is 25 times higher than the risk associated with the use of the safety device[31].

The less a user has to handle a device after use, the more effective the device will be in preventing injuries. Passive devices eliminate this human factor[25] and also the need for elaborate training. Although the costs of fully automatic devices may be an obstacle to their use, this factor can be rewarded with lower costs associated with injuries[29]. It was estimated that the use of safety devices could save hospitals the value of $ 2,723 incurred for each injury acquired per worker, and it is thought that the incremental cost would be offset by the decrease in expenses related to injuries and infections to workers[34].

Os restantes quatro estudos que não classificaram os dispositivos de segurança concluem que os mesmos também reduzem a ocorrência dos acidentes por needlesticks, dado que corrobora com o estudo anterior, o qual afirma que encontraram índices de injuries mais baixos para dispositivos de segurança do que para dispositivos convencionais[36]. Da mesma forma, outro estudo também apresenta dados afirmando que os benefícios da introdução de dispositivos de segurança são potencialmente grandes tanto em termos de custos econômicos compensados, quanto ao evitar os ferimentos por needlesticks aos funcionários, trazendo maiores benefícios aos mesmos e aos pacientes[37].

Over time there has been improvement in the safety engineering of sharps and, in many categories, it has been observed that they evolved from devices with additional sliding cylinder or needlestick protection to devices where the safety mechanism is an integral part of the operation of the same and the activation of the security feature is automatic[25]. In this context, it is important to highlight that, even with the evidence of the needlestick accident reduction, the implementation of safety devices is only one of the important prevention measures[38]. Other tools should also be valued, such as the implementation of risk prevention programs, the importance of notification, and training that instructs professionals to correctly use the safety devices provided by the service, avoiding accidents due to non-activation or improper device activation, both before, during and after the procedures[28,31-32,39]. Because there are different models of safety devices developed in the market (automatic, semi-automatic and manual activation), such requirements on the education and training of professionals become even more relevant[40]. During the planning of the devices, human factors must be taken into account, incorporating simple, intuitive and effective mechanisms when handled[26].

It was identified, in this study, the predominance of researches developed in the United States of America, where there has been mandatory implementation of devices in health services since the 1980s. The formal efforts to prevent exposure of health workers in that country began in 1985 when the Centers for Disease Control and Prevention (CDC) recommended the use of standard precautions for health workers. In 1987, this recommendation was updated and in 1991 the Occupational Safety and Health Administration (OSHA) promulgated the pathogen pattern of blood whose standard precautions have become the cornerstone. Revisions mandated by the Needlestick Safety

and Prevention Act were adopted in October 2001[35]. Other laws have also been implemented, such as Directive 2010/32/CE in the European Union and the UK Health Act[35]. In Brazil, RN 32, a Brazilian standardization aimed at the protection of health workers, is based on the continuous training of workers, on programs that address the risks and measures of protection against occupational hazards; but when there is none of these pillars, protection becomes inefficient[28,41-42], requiring complementation and effective control of its application and results[32]. Ordinance 748 of August 30, 2011, published by the Ministry of Labor and Employment (*Ministério do Trabalho e Emprego*), states that companies that produce or market sharps must make available to health workers the training on the correct use of safety devices. In Appendix III of RN 32, on the Plan for the Prevention of Risks of Accidents with Sharps, highlights the training of workers. It establishes that the training must be proven by means of documents that inform the date, the schedule, the workload, the content taught, the name and the professional training or qualification of the instructor and the workers involved[43].

Study limitations

As limitations of the present study, it is important not to include articles that were not available in open access.

Contributions to the sector of Nursing

The present study provides evidence from the literature on the efficacy of safety devices in the prevention of occupational accidents with needlesticks for health professionals, and especially for the nursing team, considered the main provider of comprehensive care assistance, which presents greater vulnerability to occupational accidents with needlesticks. Thus, this study sought scientific support for how to act in the prevention of occupational accidents, in the use of safety devices and training of workers, in order to contribute to health knowledge at work in order to subsidize new studies and modify the practice in health[41-42].

CONCLUSION

Studies have shown that the use of needlesticks with safety devices is effective in reducing occupational accidents with exposure to potentially contaminated biological material in health workers. Safety devices with passive mechanism are more effective than those of active mechanism. Studies that analyzed the type of device evidenced that the use of needlesticks with safety devices reduces the occurrence of percutaneous injuries, when compared to those where the devices were not used. The studies showed that the use of needlesticks with safety devices should be combined with the training of professionals for greater resolutiveness.

We consider that the use of needlesticks with safety devices in the health services, besides being a legal recommendation, is of fundamental importance for the prevention of occupational accidents with exposure to biological material, due to the great manipulation of needlesticks by health professionals. Other prevention strategies include the use of Individual Protective Devices, adherence to Standard Precautions and awareness of professionals regarding the notification of accidents when not avoided.

More comprehensive studies and strong scientific evidence are recommended to increase knowledge about the effectiveness of safety devices and the reduction of costs to the employing institution by the use of these safety devices.

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