

Eye Accidents in the Work Environment of Health: an Integrative Review

REVIEW

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Abstract

It is an integrative literature review with the objective of integrating the knowledge produced about eye accidents in the work environment of health, pointing out the main causes of impairment of visual acuity and protective factors. Five databases were consulted to select the articles - SCOPUS, CINAHL, PubMed, LILACS and Web of Science - which included six articles. The results show that the studies were conducted between 2005 and 2013. The eye accidents were grouped into three categories: the cause of the eye accident, post-accident management, and protection factor. It is concluded that non-adherence to eye protection measures is an important factor in accidents involving the eye, which makes rethink the security policies implemented by health institutions with an emphasis on visual apparatus.

Introduction

The health care workers are often exposed in their professional practice to the risks inherent in the high number of handling patients, machinery, and equipment, which can lead to damages to health workers and the institutions [1].

The adoption of protective measures and the provision of protective equipment for health professionals is mandatory for health facilities to promote and protect the physical and psychological integrity of these professionals. Biosecurity measures taken include washing hands after any contact with patients; safe disposal of sharps; use of gloves, masks, goggles, aprons; coverage of injured mucosa [2].

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Keywords

Eye Injuries; Eye Burns; Foreign Bodies in the Eye; Worker's Health; Work Accidents.

The activities arising from the work process can cause physical and mental damage to workers, because of the often non-use of personal protective equipment and the lack of knowledge about the risks and their control measures [3]. Occupational eye injuries are noteworthy for having little literature related to this issue.

Data on causes of blindness and visual acuity are usually performed in hospitals, schools, care services and medical offices [4]. The impairment of visual acuity increases with advancing age, and there are increasing numbers of blindness cases and low vision perceived with increasing average life of the population [5].

The visual changes can be worse when the individual is exposed to harmful agents in the workplace. The causes of visual changes differ according to the public to be studied [4]. Mandatory goggle use in workplaces decreases the risk of eye injury [6]. The completion of placement and periodic testing is necessary for early detection of ocular changes, which helps in the promotion and prevention of health.

Routinely, health professionals are exposed to occupational risks, mainly biological risks (blood and body fluids) through direct contact with the ocular mucosa, and may cause many changes in the conjunctiva and possible impairment of visual acuity. This implies a major social impact because of the high cost to the state [6] with hospital admissions, removal, and permanent or temporary visual impairment.

Ocular work-related diseases affect the productive capacity of the person affected by this disabling disease, which results in a social and economic impact, burdening the public safe due to the need for treatment, hospitalization, and rehabilitation, as well as the payment of help to sickness.

Occupational and environmental exposure are a serious public health problem because it requires the implementation of joint actions of assistance, surveillance, supervision of work and health edu-

cation environments, to reduce the harmfulness of these environments and achieve early detection of individuals with eye changes.

It is necessary the knowledge of the scientific literature on the ocular accidents in health care to define the epidemiology of these accidents and to improve the working environment and post-accident management of this health professional and also suitable protective factors.

This complex scenario should be carefully studied, both for the advancement of health science, as for the real reorientation of production of care in public health services. Based on the above, the following question emerged: What is the epidemiological profile of ocular accidents in the workplace in the health sector? From this question, this article aims to integrate the knowledge produced about eye accidents in the work environment of health, pointing out the main causes of impairment of visual acuity and protective factors.

Methods

It was conducted an integrative literature review to gather and synthesize the results of research on a particular topic or issue in a systematic and organized manner, contributing to the deepening of the problem. It consists of a comprehensive methodological approach that includes different types of studies, experimental and observational, theoretical and empirical, and allows a global understanding of the phenomenon under investigation [7].

This research method includes six phases: topic identification or sampling guiding question or search in the literature; categorization of studies; assessment of included studies; interpretation of results and synthesis of knowledge evidenced in the analyzed articles, also called, review presentation [7-8].

The review started with the question: What is the epidemiological profile of ocular accidents in the workplace in the health sector?

The search was conducted in June 2015 in the following databases: SCOPUS, CINAHL (Cumulative Index to Nursing and Allied Health Literature), PubMed (National Library of Medicine and National Institutes of Health), LILACS (Latin American and Caribbean Health Sciences) and Web of Science. The access to each database was conducted in one day by two researchers at the same time on different computers, guided by a search protocol built to ensure the selection of the largest number of important items for the research.

Controlled keywords identified in the MESH (Medical Subject Headings) were: Eye Injuries; Eye Injuries, Penetrating; Occupational Health; Accidents, Occupational. Uncontrolled keywords were: Eye Burns; Eye Foreign Bodies; Eye accident.

The crosses were: Eye Injuries OR Eye Injuries, Penetrating AND Occupational Health; Eye Injuries OR Eye Injuries, Penetrating AND Accidents, occupational; Eye Burns AND Occupational Health; Eye Burns AND Accidents, occupational; Eye Foreign Bodies AND Occupational Health; Eye Foreign Bodies AND Accidents, occupational; Eye accident AND Occupational Health; Eye accident AND Accidents, occupational.

Available publications were taken until June 2015, not occurring period cutting without previous time limit to provide a comprehensive assessment of the studied object.

The inclusion criteria for the selection of publications were articles available electronically; meeting the thematic, free and full articles in Portuguese, English or Spanish. Exclusion criteria were repeated articles, letters to the reader, review studies, theses, dissertations, opinions.

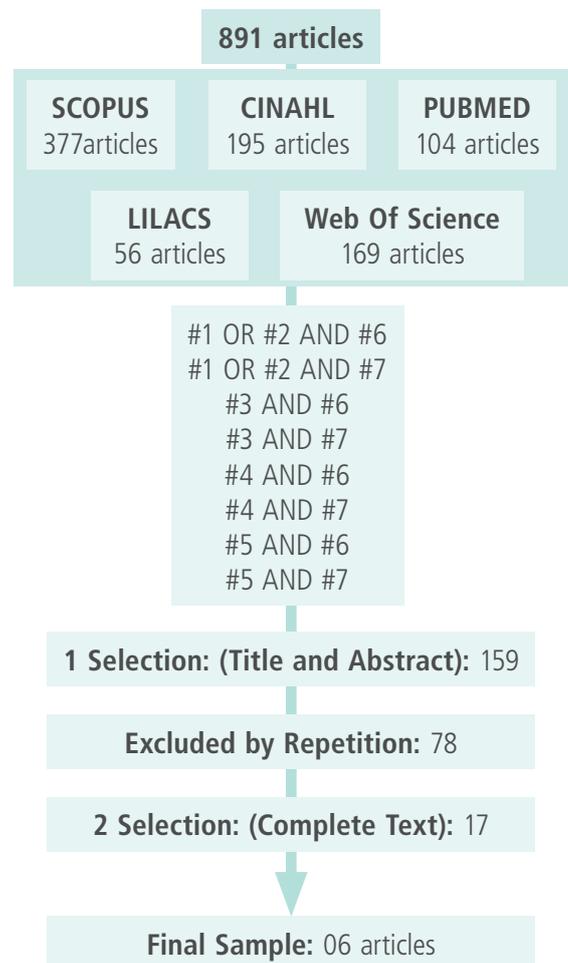
During the research and applying the keywords crossing, there were 891 articles found, which 210 were complete articles. After completion of the initial data collection stage and the inclusion and exclusion criteria applied to reading each article, the sample consisted of 06 (six) articles, being two (02) from SCOPUS, 01 (one) from LILACS and three (03) from Web of Science. A critical evaluation of the

studies took place in three stages: the title selection; preliminary reading (abstract); further reading of the texts.

The data extraction strategy was made by an instrument containing information on the identity of publication, the location of the study, type of journal, methods and results.

From the reading of each article selected, it was possible to characterize them as the author, year, the country origin of publication, purpose, population and main results. Then, the terms were brought together by the similarity of content, divided into three categories: eye accidents causes; post-accident management; protection factor. (Figure 1)

Figure 1: Synthesis of the data extraction process. Natal/RN, 2015.



Results and Discussion

With the application of the inclusion and exclusion criteria, the final sample consisted of six articles. **Table 1** summarizes the search results from the intersection described above.

Most publications occurred in 2009 (33.33%), in the years between 2005 and 2009. The objectives varied, but they include the analyzed object of study. **Table 2** shows the characteristics of the included studies.

Table 1. Distribution of the articles according to databases.

| Databases | Articles Found | Articles Included |
|----------------|----------------|-------------------|
| SCOPUS | 306 | 2 |
| CINAHL | 278 | 0 |
| PUBMED | 104 | 0 |
| LILACS | 56 | 1 |
| Web of Science | 147 | 3 |
| Total | 891 | 6 |

Table 2. Distribution of articles according to the author, year of publication, country, objective, population and main results. Natal/RN 2015.

| Item | Author/Year/Country | Objective | Population | Main results |
|------|-----------------------------------|---|---|---|
| A | Almeida, et al./2005/Brasil | To characterize the environment; to identify nursing workers who were victims of eye accidents and the type of accident; to describe the actions taken after the accident and to propose health education methodologies. | Nursing professionals | Of the total population, 4.46% of nurses were victims of some eye accident, and all were female. Main exposure: blood, secretions and organic substances, chemicals substances, biological materials, medications and mechanical agents. |
| B | Jovic-Vranes et al./2006/Sérvia | To examine the use of safety practices and the incidence of occupational exposure to blood and blood-containing materials in health professionals during medical procedures in Serbia. | Health professionals (doctors, dentists, nurses, laboratory technicians and others) | Of the total of respondents, 34.4% of accidents with blood affected the eyes and other mucous membranes. The goggles were never used by 72.9%. Nurses have the lowest rates of self-protection (2.2%). Nearly 80% did not know the guidelines for the practice of safety. Main exposure: blood and body fluids. |
| C | CHONG, et al./2007/Nova Zelândia | To test the degree of protection offered by modern design goggles used in surgeries. | Surgeons. | Of the total, 26.8% had experienced some splashes in the eye. There was 2.8% admitted who had an infection disease palpebral fissure after the accident. 78.8% said they routinely use eye protection. Main exposure: blood. |
| D | Leiss, et al./2009/Estados Unidos | To describe the circumstances of the blood exhibition events among American paramedics. | Paramedics | Of 138 mucosa exposures, 71.8% occurred in the eye and 23.5% in both the nose and eyes. Most were male. Main exposure: blood, body fluids, and vomiting. |
| E | Tehrani, et al./2009/Inglaterra | To determine the risk of eye infection in burn surgery team and these risks justifying the universal adoption of the policy of protection for the eyes. | Surgeons, specialization students, undergraduates, and surgical technologist. | There were 100 surgical procedures assessed. The risk of eye injury splash for those who participated in the surgery was 52% in surgeons, 19% specialization students, 5.5% of undergraduate students and 4% of the surgical technologist. Main exposure: blood. |
| F | Gatto et al./2013/Itália | To report clinical and nonclinical injuries occurred in the Department of Oral Sciences, University of Bologna over a period of thirteen years (1999-2011), to identify trends and evaluate their relevance to the procedures performed during clinical activity. | Teachers, researchers, dentists, aux. dental office, nurses, students. | Of the accidents, 11% involve the eyes. Most were female (55%), graduate students (40%). Main exposure: blood. |

Regarding eye accidents in health care, according to the results of scientific articles analyzed, they were listed and grouped into three categories: eye accident cause, post-accident management and protection factor (**Table 3**). The cause of eye accidents and the protection factor were the categories that had the highest number of articles.

The cause of eye accident has six characteristics. Health professionals are daily exposed to environmental risks from the workplace, which can affect the ocular mucosa. They are in contact with blood, feces, vomit, chemical substances, medicine, and mechanical agent mainly by splashing in the conjunctiva.

The context and the organization of work influence the quality of life, physical and psychosocial health of workers. The lighting, temperature,

Table 3. Eye accidents according to the established categories.

| Category | N (Articles) |
|--|----------------------|
| Ocular accident cause | 6 (A, B, C, D, E, F) |
| Contact with blood | |
| Contact with excreta (urine, feces) | |
| Contact with vomit | |
| Contact with chemical substances | |
| Contact with medications | |
| Mechanical agent (scalp, syringe, IV pole) | |
| Post-accident management | 3 (A, B, C) |
| Wash the eye with water and saline solution | |
| Search specialist in ophthalmology | |
| Report to the epidemiology service and/or occupational health | |
| Perform serologic testing | |
| Protection factor | 6 (A, B, C, D, E, F) |
| Care in handling chemicals substances | |
| Personal protective equipment use (EPI) - goggles, face shield | |
| Health education | |
| Use of security protocols-standard precautions | |

and adequate moisture during the working process reduces the level of stress of the team and, consequently, produces a significant improvement in the eye well-being and better performance in health care [3]. The employer must be aware of the environmental risks in the workplace, through the professional insertion of health in discussions and implementation of changes/improvements in the workplace.

The main consequences of ocular exposure to various pathogens are irritation, itching, redness, blurred vision, burning, swelling, inflammation, eye pain [3], which may progress to contamination of the palpebral fissure, as viral papilloma and conjunctivitis [9].

The exposure time factor also has a direct influence on the ocular mucosa contact with pathogen agent or the professional who is more time exposed is more likely to come into contact with the splash [10].

Developed countries have recognized the importance of implementing the practices and health and safety protocols at work, so the implementation of Universal Precautions Measures (MPU), currently called Standard Precautions, which are forms of prevention used in the care of all patients in the handling of blood, secretions and excretions and contact with mucous membranes and not full skin [11].

Biosecurity measures are intended to reduce exposure to blood or body fluids. The adoption of specific measures recommended for handling and disposal of instruments contaminated with organic material [12] includes the use of Personal Protective Equipment - PPE (procedure and surgical gloves, respiratory masks, goggles and face shield) [11].

One study found that professionals involved in an emergency (paramedics) had accidents in the ocular mucosa, especially during cardiopulmonary resuscitation due to exposure to these people to vomit, spit, or to cough up blood or fluids containing blood from the patient [13].

The contact with blood and/or body fluids should be considered an emergency to be initiated prophylactic intervention against HIV and hepatitis B [3, 14]. Many professionals do not perform prophylactic measures after the accident [9, 14]. Some professionals stated they were not informed about the practice of safety and post-exposure protocols [15]. This contamination occurs by needlestick accidents. However, they can occur through splashes in the eye [3, 9].

Concerning diseases acquired through accidents with biological material, hepatitis B is the greater risk. The incidence of transmission among workers exposed to this virus ranges from 6% to 30%. About hepatitis C, the risk of transmission of percutaneous exposure to the biological material is approximately 1.8%, and HIV is estimated at 0.3% of the risk of contamination after percutaneous exposure [16].

There is a constant risk to mechanical agents such as serum support, scalp, needles, syringes, intravenous devices, which can unintentionally contact the professional, often evidenced by inattention or carelessness in handling such work equipment [3].

It is also necessary to prevent a human error to reduce the risk of accidents with mechanical agents. Prevention of these failures occurs precisely because the team training, demonstration of the operation of equipment and new equipment [17].

The category of post-accident management includes the eye wash with water and saline solution, seek an expert in ophthalmology, epidemiology report to service and/or occupational health and perform serologic testing.

A study revealed that nursing professionals do not follow or unaware the standard measures of a health institution. At times, they wash the eye, others they do not take any action after the accident. The correct procedure is to wash with water or saline solution and seek an emergency service to prevent eye disorders [4]. The lack of specialized

monitoring may result in severe problems with the visual device.

The post-exposure prophylactic measures are not fully effective. Thus, it should be emphasized the need to program permanent educational activities to familiarize professionals with universal precautions [11].

It is essential to the injured person or his superior to report the accident on the epidemiology service and/or occupational health [3, 15]. Therefore, from these data, the institution may know the profile of accidents and propose improvements in the workplace.

The third category is the protection factor involving care on the handling of blood and body fluids; care on handling chemicals substances; personal protective equipment use (EPI); health education; and use of security protocols - standard precautions.

The protection of the professionals involved in health care includes washing hands, wearing gloves, use of EPI (goggles, face shield), because all patients are potential carriers of a virus, bacteria, fungus. The use of these protective measures and barriers hinders direct contact with pathogens [3]. The proper prevention avoids ocular lesions [14]. The companies should provide the safety devices and guidance on the mandatory use of EPI.

Ocular accidents can happen with the use of glasses. However, this data is not significant compared to its protection factor [10, 13]. This may be associated with the care of uncooperative patients, needing a continuing education to assist the individual in this situation [13].

Health professionals still do not have a culture of using eye protection, often using prescription glasses, without any protective effectiveness. In some situations, these people use modern glasses that aesthetically are nicer. However, they do not have the appropriate level of protection, because the goggles must be continuous across the midline of the face, covering the back of the nose at eye level [9].

One study found that among health professionals, dentists are the most exposed to blood and other materials containing blood with eye contact and other mucous membranes, and they are used to use mask and goggles. Doctors regularly protect themselves with gloves, masks, and goggles. Nurses have the lowest rate of self-protection. Most health professionals did not use goggles [15].

Health education aims to educate workers about health and eye care, accident consequences, post-accident management, the need for emergency and periodicals tests, protective factors and equipment, risk management to reduce human error and exposure to blood and body fluids [3, 13-15].

Professionals often demonstrate knowledge about the risks of contamination of the conjunctiva. However, they have some resistance in its adherence. Many of them use prescription glasses as the only protection. The main complaints about eye protection are the lack of comfort, the unavailability, the difficulty of adjusting the prescription glasses [9]. The non-use is mainly justified because they think it is not useful, they do not have time in the emergency moment and they not think they need any protection [13].

Standard precautions are attitudes that should be adopted by health professionals in health care, aiming to reduce direct contact by accidents with blood and body fluids of the patient [3, 14]. Despite the knowledge of these measures, the professionals do not respect the risk of splashing blood in the ocular mucosa [9]. Institutions must adopt a standard security policy, which is a risk management [10, 15] for the use of PPE, emphasizing the use of glasses among health professionals.

It is necessary to pay attention to the health professionals working process because the range of occupational risks they are exposed, whether biological, physical, chemical, ergonomic and mechanical, protecting the physical and mental integrity and promoting their general well-being. Also, institutions should be concerned about selecting PPE

associating an aesthetically better model and an effective protection engineering to increase acceptance and use.

Conclusion

With the results of this study, it is clear that it is interesting to emphasize that health workers are subject to accidents, because of occupational activity provide biological, chemical and physical risks, accidents, among others.

To these types of accidents be minimized, the adoption of Standard Precautions measures is proposed by the workers through the use of PPE, in this case, the goggles.

It is necessary to identify and evaluate the risks arising from the environmental context and the organization of work, with an emphasis on contact with the ocular mucosa, due to constant exposure to health care professionals during the work process. Companies should promote education, prevention and treatment directed to the employee and to the activity performed to protect the physical and mental integrity of the employee in the work context.

Non-adherence to eye protective measures by health care professionals enables to rethink security policies implemented by health institutions with an emphasis on visual devices. Companies should worry when choosing PPE able to provide comfort and effective security to increase acceptance of use.

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