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Degree of Nurses' Compliance to the Guidelines of Occupational Exposure to Pathogenic Micro-organisms; A Review of Literature

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Abstract

Biological infectious hazards are the main factors which nursing staff deal with. It is fundamental rule, nurses to apply the guidelines of occupational exposure to pathogenic micro-organisms. The aim of this review was to examine the current literature on the degree of nurses' compliance to the guidelines of occupational according to exposure to pathogenic micro-organisms. A review of literature was conducted on the Medline / PubMed, Cochrane, Scopus, and Google Scholar databases from 2000 to 2018. The keywords used in the bibliography search were, health care professionals, nurses' attitudes, occupational exposure, and safety guidelines. The inclusion criteria were: a) studies that were directly related to the topic, and b) studies in English and Greek language, published in peer-reviewed journals. The search strategy revealed 1287 studies, 1260 excluded. Finally 27 studies were included. Nurses' compliance to the guidelines of occupational exposure to pathogenic microorganisms is described as unsatisfactory, and an emergency situation has been shown to be the major obstacle to follow the guidelines. It is necessary to understand the factors which contribute to nurse's non-compliance. The results show that there is a need to propose measures that will positively affect the nurses' performance.

Keywords: Health care professionals; Nurses' attitudes; Occupational exposure; Safety guidelines.

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1. Introduction

Worldwide, all employees spend 1/3 of their life at work. In the European Union, 10% of Health Care Professionals (HCP) is employed in hospitals. Hospitals are considered to be complex structures characterized by a wide range of industrial activities. Nursing Staff (NS) is the cornerstone of the health systems, as it has the most frequent contact with patients. This direct contact with patients makes them to be exposed to many occupational hazards, such as physical, chemical, biological, ergonomic and psychosocial factors more than other HCP [1].

Occupational exposure to pathogens is due to skin, eyes and mucous membrane with other parenteral fluids such as blood or other contaminated fluids or materials that they are likely to get in touch with. Injuries from needles and other sharp objects constitute the greatest risk for the transmission of infectious agents in HCP. The likelihood of injuries by sharp objects is much more frequent than needle sticks of the amount, while it has been found that about one in three nurses injured by needle at least once a year [2].

Objectives

Internationally, the most common injuries are those by used needles, in the attempt of NS to reposition the cover. Taking into account the statistics of USA Center Disease Control, the 32% of injuries stem from hypodermic needles, needle-suture (19%), venipuncture using a butterfly needle (12%), lancet (7%), stent (6%) and phlebotomy needles (6%). These devices have the ability to aspirate blood, constituting the number one risk factor. Specifically, these injuries are caused during handling of the needle in the patient (26%), in a discharge device (23%), counter to a colleague (10%), during cleaning trolleys and nursing premises (10%) and when performing venipuncture (6%). The needle stick derives during procedures in patients' wards, operating rooms, intensive care units or the emergency departments [3].

A large number of factors influence the compliance to the instructions, such as the emergent situation, the availability of appropriate equipment, the discomfort of patients, the feeling of fear, the costs of hospitalization and the ability to adapt to changes. It is noted that the compliance to guidelines is affected, through the Health Belief Model. The occupational exposure beyond the economic cost can cause fear, traumatic stress, anger, insomnia, nightmares, and depression, as well as, panic attacks during working hours to the HCP. Protecting HCP from infectious diseases is an integral part of the overall program for infections' prevention and control in every health facility [4,5].

Aim of this review was to assess the degree of nurses' compliance to the guidelines of occupational exposure to pathogenic microorganisms. A specific aim of the study was the critical analysis of research data and the mapping of the main factors, which lead nurses not to follow the protective measures, while performing their duties.

2. Methods

A review of literature was conducted on the Medline / PubMed, Cochrane, Scopus, and Google Scholar databases from 2000 to 2018. The keywords used in the bibliography search were, health care professionals, nurses' attitudes, occupational exposure, and safety guidelines. The inclusion criteria were: a) studies that were directly related to the topic, and b) studies in English and Greek language, published in peer-reviewed journals. The search strategy revealed 1287 studies, 1260 excluded, and finally 27 studies were appropriate for inclusion.

The identification and data extraction was performed by two reviewers. A data extraction sheet was developed with the following template: name of the first author, country of origin, year of publication, research design, aim, characteristics of participants, sample size, data collection method or instrument and, finally, the main results and outcomes. Studies' selection process is summarized in the Figure. (Flow-diagram).

3. Results

This review presents the main findings of 27 published studies. Five articles, with regard to hand hygiene, were found. Participants reported high compliance rates (95%) of washing hands before and after use of gloves, whilst after the rejection of gloves, hand washing was noted to lower rates. In other studies the rate reached the 64.3%. The rate of washing hands after contact with the patient appeared to be at 54% of the nurses involved. In Intensive Care Units compliance of nurses to wash hands before the beginning of the shift reached the 12% [6-10]. In the study of Ganczak and Szych (2007), compliance to the use of gloves whenever was necessary accounted to 83%, while the use of double gloves in surgeries was only 12% in the survey of Jeong and colleagues in 2008 [11, 12].

Furthermore, 9 studies showed that 50.9% of nurses repositioned the needle cap from a used syringe [13-20]. On the contrary, Stein et al. noted that 99% of nurses reported that they cover a used needle cap and 85% reject them to special equipment [7]. The results of literature review are shown in Table.

4. Labels of figures and tables

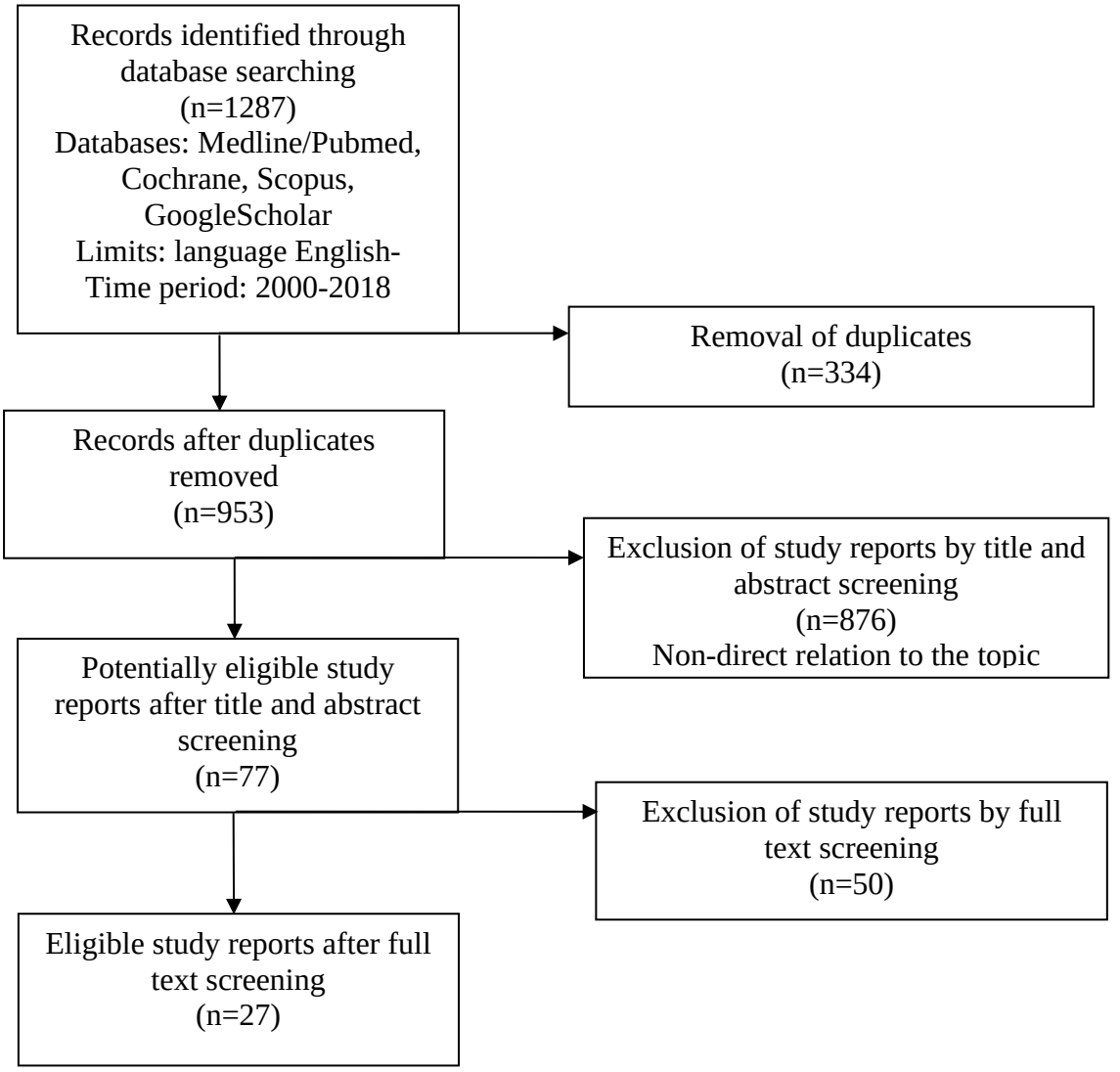

Figure 1: Flow diagram of studies selection

Table 1: Literature Review Results

Authors & Date of Publications	Participants (N)	Study Design	Aim of Study	Results
Hasak et al., 2018	605 Health Care Workers (HCW)	Cross-sectional survey	Assessment of needle stick (NS), prevalence, protection practices and attitudes	• 24.8% reported the injury • 25% wore double gloves
Suliman et al., 2018	279 Student Nurses	Cross-sectional and descriptive study	Prevalence and risk factors of NS and sharp injuries (SI)	Prevalence of NS and SI was 23.7% and 9.8%, respectively
Xiong et al., 2017	302 Nurses	GHQ-28 Standardized Questionnaire	Investigate mental health status of nurses exposed to blood through NS injuries	• 162 experienced NI • 75.9% exposed to blood were suspected to suffer from mental disorder
d. Ettorre G., 2017	765 Registered Nurses (RNs)	Cross-sectional nested case-control analysis	Prevention of NS and SI	Sis were more frequent among RN working 3 or more nightshifts
Kasatpibal et al., 2016	2031 Operating Room Nurses (ORN)	Cross-sectional study	Prevalence and risk factors of NS and SI	Prevalence of Nis and Sis were 23.7% and 9.8%, respectively
Zhang et al., 2015	463 Nurses	Questionnaire	Report the prevalence and risk factors of NSs	• 64.9% reported the injury • NSs more common among female and young Nurses
Azadi et al., 2011	111 Clinical Nurses	Cross-sectional study	Determine the frequency of NSs	• 54.1% had no experience of contaminated injuries • 36.8% reported the injury

Efstathiou et al., 2011	4 focus groups of Nurses (N=30 each group)	Qualitive research design	Elicit Nurses' perception of the factors influencing compliance with Standard Precautions (SP)	• Emergency situation • Lack of protective equipment available • Patients' discomfort
Nagao et al., 2009	164 Staff Nurses (SN)	Retrospective study	Barrier precautions	15.41% Scrub Nurses injured during "counting and shorting of sharps"
Delobelle et al., 2009	71 Primary HCW 69 Nurses	• Cross-sectional study • Questionnaire	Exploration HIV/ AIDS-related knowledge, attitudes, practices and perceptions	3 out of 4 Nurses practiced Universal Practices (UP)
Zafar et al., 2008	29 Doctors 51 Nurses	• Cross-sectional study • Structured pre- tested Questionnaire	Assessment the knowledge, attitude and practices regarding NSs	• 45% NSs • Injury frequency higher among doctors ($p<0.001$)
Paudyal et al., 2008	324 HCW	Questionnaire Survey	Assessment the knowledge, attitude and infection control practices	Maximum scores of knowledge, attitude and practice items were 16%, 14% and 0.3%, respectively
Jeong et al., 2008	158 Operating Room Scrub Nurses	• Cross-sectional study • Self-administered Questionnaire	Determine the level of compliance with /and education on standard precautions	• 12% double gloving • 2% protective eyewear • 10% not recapping used needles
Ganczak and Szych, 2007	601 Surgical Nurses	Confidential Questionnaire	Evaluation of compliance with personal	• 83% glove use • 9% protective eyewear

			protective equipment	
Schmid et al., 2007	787 Employees and Medical students	Questionnaire	Obtain data for incidence, reporting and follow-up of occupational exposure to blood or other body fluids	• 29.5% students NS • 22.5% Employees NS
Golan et al., 2006	1619 Hand hygiene opportunities	Crossover trial	Hand hygiene compliance	Compliance was 10% before care was given and 36% after one
Ayaranci and Kosgeroglu, 2004	139 Nurses	Questionnaire	Determination the rate of blood borne infections after NS and SI	• 69.1% not reported the injury • 32.4% not vaccinated against Hepatitis B virus
Blegen et al., 2004	1105 SN	Questionnaire	Assure the quality of patient care	• 48% NS • 22% other exposures to body fluids
Bennet and Mansell, 2004	379 Community Nurses	Questionnaire survey	Compliance with UP	• 21% NS • 84% reported the injury
Osborne, 2003	227 ORN	• Descriptive correlation study • Questionnaire	Compliance with occupational exposures	• 55.6% double gloving • 92% eye protection
Wnut , 2003	28 HCW	Observational study	Determine the epidemiology of occupational exposure to HIV infection	Nurses are most at risk for occupational exposure
Stein et al., 2003	143 Nurses 75 Doctors	Cross- sectional survey	Compliance with UP	Significant differences concerning transmission and risks ($p<0.001$)

Doebbeling et al., 2003	3223 HCW	Assessment of occupational risk factors	Examination of factors associated with blood exposure	Increased 2%-3% for each sharp handled in a typical week
Chan et al., 2002	306 Nurses	Cross- sectional survey	Knowledge and compliance with UP	Inadequate knowledge UP insufficient and inappropriate
Naing et al., 2001	150 SN	Structured self-administered Questionnaire	Identification of compliance of glove utilization	Low compliance (13.5%)
Godin et al., 2000	156 RN	Self-administered Questionnaire	Prediction and explanation nurses' adherence to UP	38% applied the UP
Shiao et al., 1999	10469 HCW	Questionnaire	Identification of factors associated with non-reporting behavior of Sis	• 87.3% experience with Sis • 81.2% Sis not reported

5. Discussion

Through this review of literature, studies show that an emergency situation could be a significant barrier to compliance to necessary procedures. The lack of protective equipment (gloves, masks etc) and the multiple responsibilities of the nurses could be a major obstacle to obtain the necessary precautions [28].

In contrast to the above, the daily implementation of the precautions removes the stress of a possible infection. In many studies, participants, also, reported, that it should be motivations, which will drive to the use of precautionary measures [27-29]. These are the high-risk group of patients, the negative experience nurses could have after exposure to pathogens, continuous information on new techniques and reminder (with signs, posters, etc.), caring foreign patients from underdeveloped countries and the good example that can provide the high-ranking colleagues [30-31].

It is clear that nurses come in contact with many occupational hazards, daily. Often having as a priority the health and safety of patient neglect to ensure their own security through non-compliance to guidelines for protecting themselves [32].

Hematogenous transmission of diseases often occurs after injury and may cause contamination of the nurse. The most common risks is the virus of human immunodeficiency (HIV) and hepatitis B or hepatitis C, but there are more than 20 blood diseases which may infect nurses [6]. Injuries from needles and other sharp objects are responsible for the transmission of infectious agents in the healthcare. Nurses have the highest rates in this type of injury than other health professionals [17].The observed high occupational exposure to pathogens among nurses could be attributed, among others, to the failure of observing safety precautions. The guidelines for nurse prophylaxis, generally, define measures concerning the organization of monitoring infections associated with health care facilities, health staff assessment on the state of vaccination, staff training in infection control and special measures for protection from blood- transmitted diseases such as the use of gloves (e.g., vaccination against hepatitis B) [14].

Last but not least, the most important measure is the prevention of these injuries. So it is necessary, nurses avoid coverage of used needles, because this is a common movement, which causes of self-harm [24]. The contaminated sharp instruments must be disposed of in a special container, never on the patient or in areas that may be covered with soft materials such as gauze or paper [25]. It is also important to avoid delivering sharp instruments from hand to hand. Avoiding accidents contribute continuous updating of nurses with clear instructions or warnings [25].

Study Limitations

Although there are numerous studies addressing the issue of nurses' compliance to the guidelines and management of them, there are several limitations. Those include the study design, the observation period and the sample size.

Clinical Implications

In clinical practice it is important to make changes in education, which will improve the prevention of such incidents. More specifically, the presence of health professional in primary and secondary health care systems is essential for ensuring communication between health providers and NS.

Research Directions

The data indicate that nurses derive their knowledge from a large extent on previous experience, including the experience of colleagues. Also, it is noted that during nursing education is necessary to prepare trainees to work in different situations. The well-trained nurses in combination with their experiences in patient's care could approach, manage and deal with them using a standard model nursing care.

6. Conclusions

The implementation of appropriate guidelines provides the necessary technical equipment and preserves 35-40 million HCP worldwide, away from the transmission of pathogenic microorganisms.

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