



Occupational exposures to needle stick injuries among health care staff; a review study

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Article info

Article History:

Received: 25 Nov. 2017

Accepted: 23 Dec. 2017

ePublished: 10 Mar. 2018

Keywords:

Infectious Diseases,
Needle Sticks,
Occupational Exposures,
Occupational Injuries

Abstract

Introduction: Infectious diseases have threatened human health throughout the history. One way of transmission of such diseases is exposing to the needle sticks. The present study was carried out aiming to introduce and investigate risk factors related to needle sticks and ways of prevention of infectious diseases related to needle stick among health care staff.

Methods: Searching key words including needle sticks, occupational injuries, occupational exposures (OEs) and infectious diseases, the researchers undertook a comprehensive investigation regardless of publication year of the reviewed articles in references including, Medline, CINAHL, Google Scholar, ScienceDirect and Scopus. Then the collected articles were scrutinized and processed.

Results: Dealing with needle sticks can transmit more than 20 types of pathogens including Hepatitis B, C and human immunodeficiency virus (HIV). Among health care staff, nurses are more vulnerable compared to others.

Conclusion: Exposure to blood and other risky body liquids is a serious risk factor among health care workers. Training medical staff, establishing reporting systems, changing high risk behaviors and vaccination can play an important role in prevention of the infectious diseases.

Citation: Elmi S, Babaie J, Malek M, Motazed Z, Shahsavari-Nia K. **Occupational exposures to needle stick injuries among health care staff; a review study.** J Anal Res Clin Med 2018; 6(1): 1-6. Doi: 10.15171/jarcm.2018.001

Introduction

Needle stick injuries (NSIs) are lesions coming from needles or a piece of a broken ampoule covered by blood or other body liquids. In most cases, NSI happens in transfusion of blood or its products, sampling and collecting disposals.^{1,2}

According to an estimation by the Center for Disease Control and Prevention (CDC), about 385000 individuals from American caring centers get needle stick. Injuries caused by needle sticks are among the most

dangerous occupational harms that threaten health care workers due to transmission of more than 20 types of pathogens. Although, most of the NSIs are preventable today, they are the matter of concern for their accompanied potential danger of transmitting infectious diseases like Hepatitis B, C, acquired immune deficiency syndrome (AIDS) or the same HIV, infection with herpes simplex virus (HSV), cytomegalovirus or parvovirus.³⁻⁷

Various investigations underline that the

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annual incidence of occupational exposure (OE) to biological factors including Hepatitis B, C and HIV varies from 0.78% to 5.15% individuals per 100 medical staff.^{8,9} The examinations and follow-ups for treatment of a serious infection from blood or blood products can cost millions of US dollars. This injury also includes disability costs and losing working opportunities, however, only the prevention of the disease costs 3000 dollars.¹⁰⁻¹² Investigations showed that at least 64% of medical staff were exposed to blood or body liquids at least once in their lives.¹³ Nurses account for the major part of the medical staff, therefore the higher rate of exposures can be observed among this group.¹⁴ Working staff in operation rooms, emergency units and laboratories have the highest exposures to the pathogens which frequently threaten their lives.¹⁵ NSIs can cause fear, anxiety and mental stresses among the health staff in addition to imposing high cost burdens on the health systems.¹⁶

The incidence of communicable diseases caused by blood contaminations and the high rate of the NSIs among health staff, more specifically among nurses, and also the serious damages and the importance of high-risk groups were the motivations to perform this study. Hence, we decided to undertake a study to investigate the OEs to needle sticks among the medical staff to find and introduce risk factors related to needle stick and ways of preventing infectious diseases caused by needle sticks among the health staff.

Methods

The present study was carried out in 2015 with the aim to identify and review the relevant studies. The researcher used databases including Medline, CINAHL, Google Scholar, ScienceDirect, Scopus and other published resources for their feasibility, comprehensiveness and accessibility regardless of the publication year. The terms needle stick, occupational injuries, OEs and infectious diseases were used as keywords to search the related articles. Then, all the

relevant articles implying the injuries among the health care staff caused by needle sticks were examined.

Results

Totally, 35 studies were reviewed. The review showed that the highest rate of injuries due to the OEs happened when recapping needle, during the transfusion of patient's body liquid from syringe to test tube and inappropriate disposal of the used needle.¹⁷ According to the investigations, injection safety has 5 fundamental standards,¹⁰ including: 1. Any type of injection, phlebotomy, using lancet, intravenous injections or infusions must be according to clear cut standards to prevent and control infection 2. Risky behaviors among medical and health staff must be reduced to prevent injuries due to needle sticks 3. Safety level among medical staff when working with needle sticks must be promoted 4. Any hazardous waste materials must be appropriately collected, stored, transported and disposed and 5. Behaviors and social attitudes of clients, doctors and other medical staff in terms of prescription of injection medications must be changed.¹⁸

Various studies showed that compared to other medical working staff, nurses were likely to be more at risk of OEs.¹⁹⁻²⁴ Regarding the place of exposures, studies indicated heterogeneous findings possibly due to the difference in hospital systems.²⁵ In an investigation, it was revealed that the highest OE rates happened in internal diseases unit followed by the surgery unit and operation rooms.²⁶ The difference may be due to different hospital systems either in terms of equipment safety or staff skills. Based on the studies, the accuracy of the medical staff in prevention of injuries increases with increasing their age and experience.²⁷ Smith et al. showed that nurses with the age of less than 25 years are more likely to be exposed to NSIs.²⁸ Moreover, in a study by Ilhan et al., it was indicated that the ages less than or equal to 24 years or a job experience of less than 4 years are of the effective factors of in the

rate of NSIs.²⁹ Investigations also revealed that most of the NSI incidents happen in the morning shifts; this finding is in agreement with the findings of the studies by Jonaidi Jafari et al.,³⁰ Khalouei et al.³¹ and Ghasemi et al.³²

In several studies, vaccination was mentioned as a preventive factor of diseases caused by the OEs.^{33,34} Therefore, vaccination coverage area varies according to the levels and types of health facilities in different countries. In a research in Uganda, only 6.2% of the participants under study were vaccinated of which, only 34.8% were completely vaccinated. This study mentioned the lack of state facilities as the reason for the low coverage of vaccination and pointed out that most of the participants were vaccinated with the personal expenses.³⁵ In a study in Poland, 75.7% of the participants were completely vaccinated.³⁶ The rate of vaccination of the medical staff to NSIs was 72% in the United states, among which 98% had a controlled level of Hepatitis B surface antibody (HBsAb).³⁷ A high rate of coverage (> 90%) of vaccination was reported in most national studies.³⁸⁻⁴¹

Discussion

According to the investigations, it seems that recording of OEs in health care systems is carried out in a very incomplete way. In most developing countries, most of the injuries from needle sticks in health centers remain neglected. It is estimated that the real rate of injuries from needle sticks is 10 times higher than the reported values.⁴² Furthermore, the rate of OEs has been reported to be different in various studies. For instance, Miraki et al. reported the rate of incidence of OEs to be 80.0% among the medical staff in Sanandaj, Iran.⁴³

The rate of OEs was 71.1% in a study by Askarian and Malekmakan among the students of medicine in Shiraz, Iran.⁴⁴ The rate of OEs in northern Portugal was reported as 64.5% in a study by Martins et al.⁷ Wicker et al. indicated that the rate of OEs in Germany was less than 45.0% in all groups of the medical staff.⁴⁵

However, this rate was 88.6% in an Ethiopian study.⁴⁶ Moreover, the reason for the lack of reporting OEs varies from one study to another. In a study by Thomas and Murray, only 9% of the participants agreed to have a system for necessary follow-ups after injuries.⁴⁷ Other studies mentioned other reasons for the lack of reporting of injuries like, neutrality of reports on the process of disease, lack of knowledge, uncomplicated previous injuries and being busy.⁴⁸

Based on the studies, the higher rate of OEs among nurses was due to the nature and type of duties in nursing. In addition, nurses highlighted presence in caring procedures and also great number of nursing staff compared to the other members of a clinical group.^{14,19,24} It seems that the higher rate of OE among the younger staff is due to their low clinical skills compared to the experienced ones. The higher rate of OEs among the staff of the morning work shifts compared to the other shifts can be attributed to the high amount of work and high admissions and visits.^{31,32}

Conclusion

Based on the reviewed studies, formulating and holding educational training and job safety courses for health and clinical staff accompanied by personal protection equipment can be suggested to reduce the rate of incidence of OEs and subsequent diseases due to blood contaminations in hospitals. Moreover, structuring a standard reporting system, changing wrong and useless behaviors and vaccination can play fundamental role in prevention of diseases like Hepatitis B, C and AIDS.

According to the present study, continuous training programs to improve the occupational skills of the health staff, an appropriate health record system for medical staff, complete vaccination, safe equipment to carry out risky cares and reporting OEs seem to be necessary.

Acknowledgments

The authors would like to thank all individuals who participated in this study.

Authors' Contribution

All of the authors contributed equally.

Funding

There is no funding support.

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