

Effect of Training Defense Mechanisms on the Perceived Stress of Emergency Nurses in the Exposure of Sharp Objects and Patients' Secretions

Gholizadgougjehyaran H.*¹ MSc, Motaarefi H.² PhD, Habibzadeh H.³ PhD

¹ Department of Nursing, Khoi School of Medical Sciences and Health Services, Urmia University of Medical Sciences, Urmia, Iran

² Department of Internal-Surgery Nursing, Khoi School of Medical Sciences and Health Services, Urmia University of Medical Sciences, Urmia, Iran

³ Department of Nursing, Faculty of Nursing and Midwifery, Urmia University of Medical Sciences, Urmia, Iran

Abstract

Aims: Nurses are under stress and fear due to exposure to infectious diseases and needle stick injuries. The present study aimed to investigate the effect of training emergency nurses' defense mechanisms in dealing with sharp objects and patients' secretions.

Materials & Methods: This semi-experimental study was conducted with 90 emergency nurses selected by census method from two emergency wards of Imam Khomeini and Qamar Bani Hashem hospitals in 2020 and divided into intervention and control groups. Defense mechanisms were taught to nurses in the intervention group by a consultant psychologist. The questionnaire on exposure to sharp objects and secretions of patients and the perceived stress of nurses was completed by nurses before and after the intervention. The collected data were analyzed using SPSS 20 software and non-parametric Chi-square and Covariance tests.

Findings: 55.6% of nurses had a history of exposure. The perceived stress mean before the intervention was 94.65 ± 6.17 in the control group and 91.43 ± 7.10 in the intervention group ($p > 0.05$). The perceived stress mean was decreased significantly in the intervention group (62.66 ± 3.19) compared to the control group (94.64 ± 6.15) after the intervention ($p < 0.001$).

Conclusion: Implementing the training program reduces the stress of encountering sharp objects and patient secretions in nurses working in emergency departments.

Keywords

Education [<https://www.ncbi.nlm.nih.gov/mesh/68004493>];

Perceived Stress [Not in MeSH];

Sharp Objects [Not in MeSH];

Secretions of Patients [Not in MeSH];

Nurses [<https://www.ncbi.nlm.nih.gov/mesh/68009726>]

*Corresponding Author

Tel: +98 (44) 36465260

Fax: +98 (44) 36465262

Post Address: Khoi School of Medical Sciences and Health Services, Urmia University of Medical Sciences, Shahid Montazeri Street, Urmia, Iran. Postal Code: 5816645533

Email: h.gholizad1991@gmail.com

Received: July 1, 2022

Accepted: September 21, 2022

ePublished: November 2, 2022

Introduction

Needle stick injuries (NSIs) are among the most common occupational hazards among healthcare workers (HCWs) worldwide that need to be addressed and represent the most common sources of infection [1]. Infectious complications related to occupational exposure to NSI can result in serious health problems ranging from mild to extreme anxiety [2, 3].

Nowadays, with technological advances in medicine, the use of invasive procedures and injections in patients has expanded. As a result, healthcare staff are exposed to a high risk of blood-borne pathogens [4].

Among 20 blood-borne pathogens transferred through NSI to healthcare workers, viral infections such as hepatitis B, C, and human immunodeficiency virus (HIV) are the most dangerous and common [5, 6]. Furthermore, the risk of infections from NSIs ranges from 0.2 to 0.5% for HIV, 3–10% for HCV, and 40% for HBV [7].

According to the Centers for Disease Control and Prevention (CDC) and the European Agency for Safety and Health at Work, more than 385,000 and one million NSI cases are reported annually among HCWs working in hospitals in the United States and Europe, respectively [8, 9]. Worldwide, about three million HCWs were exposed to blood pathogens through percutaneous, of which two million were exposed to HBV, 0.9 million were exposed to HCV, and 170,000 were exposed to HIV, of which more than 90% occurred in developing countries [10–12].

World Health Organization (WHO) estimated that NSIs cause HCV, which accounts for 16,000, HBV, which accounts for 66,000, and HIV, which accounts for 1,000 annually among HCWs [13]. Furthermore, percutaneous exposure accounts for approximately 37.0% of HBV, 39.0% of HCV, and 4.4% of HIV cases among HCWs [14].

Many studies have reported the psychological effects of a sharps injury on healthcare workers as being anxiety, stress, depression, and post-traumatic stress disorder (PTSD). Studies have shown that exposure to infectious diseases and NSI can cause stress in nurses [15]. This type of stress harms individuals and influences their families and colleagues. The psychological aspects of needle stick injuries are often overlooked. The chances of physical damage, infection, and so on are focused on by society, but these risks are, in reality, minimal. The primary health implication of needle stick incidents is probably psychiatric injury caused by fear and worry [16]. The Society of Occupational Medicine calls for much greater awareness of sharps injuries' psychiatric and physical effects. We need to reduce the incidence of needle stick injuries by raising awareness and education and making safer equipment available. Still, we must also ensure that people have rapid access to post-exposure support,

including psychological help, if needed. Education is one of the key elements in raising awareness and improving the clinical skills of the staff. Several studies have shown that taking comprehensive precautions not only encourages staff performance during clinical practice but also is effective for improving compliance with corporate policies and guidelines. A safe work environment and efficient training to confront the hazards of needle-stick injuries can reduce the incidence of these injuries [17–19].

This study aimed to examine the effect of education on the stress-induced due to exposure to needle sticks among nurses working in emergency wards.

Materials and Methods

This study was conducted semi-experimentally with a before and after design, in which the number of samples required was based on the research of Lori Pour *et al.* [20]. The average occupational exposure in the case and control groups before the intervention was 25.1 ± 7.0 and 21.7 ± 6.1 . After the intervention, 16.6 ± 4.4 and 20.6 ± 2.0 , respectively, based on 5% error and 90% test power, the minimum sample size of 41 people was determined for each group. Due to the limited statistical population, all 95 nurses working in two emergency wards of Imam Khomeini and Qamar Bani Hashem hospitals in 2020 were included in the study. The intervention group (42 emergency nurses of Imam Khomeini Hospital) and the control group (48 emergency nurses of Qamar Bani Hashem Hospital) were studied. Inclusion criteria included working in the emergency department permanently (not temporary or substitute), six months of experience working there, and having a bachelor's degree in nursing or higher. Exclusion criteria were dissatisfaction with continuing cooperation, not fully participating in classes, or transferring to other departments. Also, the researcher explained the confidentiality of the information related to the samples, and the research units were requested to answer all the information accurately and honestly.

Data were collected using a two-part questionnaire; part one consisted of demographic data, and part two consisted of questions about needle stick exposure. The study's objectives were explained, and stress questionnaires were distributed among them; 20 closed questions were measured using the Likert scale (wherein very low gets a score 1; low gets 2, mean gets 3, high gets 4, and very high gets score 5). The minimum possible score was 20, and the maximum score was 100. To evaluate the validity of the tool's content, five members of the nursing professor were used to find defense mechanisms in reducing stress and anxiety, and a consultant psychologist was used to familiarize the nurses with these mechanisms, which was in the form of three sessions. Three months after the educational

intervention, the level of exposure to perceived stress in the two groups was investigated.

The data from the questionnaires were entered into SPSS 20 software and evaluated by Chi-square and Covariance tests.

Findings

The two groups did not have significant differences in terms of demographic characteristics ($p > 0.05$).

Most participants (53.3%) were women, and most (31.1%) were 25-30. About 30% of the participants had over five years of experience working in the emergency department. Most participants (90%) were on rotating shifts, 55.6% of the nurses had a history of exposure, and 72.42% reported the exposure to the infection control expert.

The perceived stress mean before the intervention was 94.65 ± 6.17 in the control group and 91.43 ± 7.10 in the intervention group ($p > 0.05$). The perceived stress mean was decreased significantly in the intervention group (62.66 ± 3.19) compared to the control group (94.64 ± 6.15) after the intervention ($p < 0.001$).

Discussion

Nurses are the main component and pillar of the health care system. While performing their responsibilities, nurses experience various types of work-related injuries and stress, which harm their health and nursing quality [21, 22].

The present study aimed to measure emergency department nurses' stress levels. This study measured stress in nurses exposed to sharp instruments using a specific, valid, and reliable measuring tool. Then, nurses' awareness and knowledge in this field were increased by an educational intervention. After the intervention, the stress level was repeatedly measured using sharp instruments.

The study of Gelsema showed a significant relationship between job stress and the nature of nursing [23]. Studies conducted on the impact of education on occupational stress reveal the positive effects of education in reducing stress. A study that included 105 hours of psychological training on attitude and communication skills caused a reduction of stress in oncology nurses [24]. Another study also showed no significant difference in stress between nurses injured by sharp objects last month and nurses with no injury history.

However, despite higher stress, no significant difference was observed. This study's samples were not homogeneous due to the differences in work experience. This means that nursing groups had a significantly higher experience [25]. In another study, occupational safety awareness and safety behavior significantly decreased the rate of injuries with sharp objects [26]. Results of many studies imply that improving performance, attitudes, awareness, and

education is essential to control and reduce injuries [27, 28].

In examining the level of stress perceived by nurses regarding exposure to sharp objects and patients' secretions, Mehrdad *et al.*'s study showed that the prevalence of exposure to injuries with sharp objects and patients' secretions and psycho-social factors related to it in evaluated among nurses in Iran and the results showed that 58.1% of the injured had moderate to high level of stress [29]. In one study, the total stress level among the studied nurses showed that most of the nurses suffered from moderate to severe stress due to the exposure caused by the needle stick. In contrast, the minority of about ten percent of the nurses suffered from mild stress [30]. Moyed *et al.* showed that injury prevention training with sharp objects-specific instructions regarding safety and occupational accidents reduced the stress score of nurses, which was consistent with the results of the present study [31].

The management of health care systems should be encouraged to use defense mechanisms training as a comprehensive prevention program, reducing complications and managing complications to improve the quality of nursing care in in-service training.

Conclusion

Implementing the training program reduces the stress of encountering sharp objects and patient secretions in nurses working in emergency departments.

Acknowledgments: We thank the officials of the Faculty of Nursing and Midwifery of Urmia University of Medical Sciences, the officials and staff of Qamar-e Banihashem and Imam Khomeini Khoy hospitals, and all the colleagues and participants who helped us in conducting this research.

Ethical Permissions: This research has been approved by the ethics committee of Urmia University of Medical Sciences (Ethical Code 328.1398REC.UMSU.IR).

Conflicts of Interests: No cases have been reported by the authors.

Authors' Contribution: Gholizadgougjehyaran H (First Author), Introduction Writer/Main Researcher/Discussion Writer (40%); Motaarefi H (Second Author), Methodologist/Assistant Researcher/Statistical Analyst (30%); Habibzadeh H (Third Author), Methodologist/Assistant Researcher (30%)

Funding/Support: This article was retrieved from the master's thesis in internal medicine surgery (No. 9561), conducted with the financial support of the Vice Chancellor for Research of Urmia University of Medical Sciences.

References

- 1- Bouya S, Balouchi A, Rafiemanesh H, Amirshahi M, Dastres M, Moghadam MP, *et al.* Global prevalence and device related causes of needle stick injuries among health care workers: A systematic review and meta-analysis. *Ann Glob Health.* 2020;86(1):35.
- 2- Yimechew Z, Tiruneh G, Ejigu T. Occupational exposures to blood and body fluids among health care workers and

- medical students in university of Gondar hospital, northwest of Ethiopia. *Glob J Med Res Microbiol Pathol.* 2013;13(3):17-23.
- 3- Mengistu DA, Tolera ST, Demmu YM. Worldwide prevalence of occupational exposure to needle stick injury among healthcare workers: A systematic review and meta-analysis. *Can J Infect Dis Med Microbiol.* 2021;2021:9019534.
- 4- Amini M, Behzadnia MJ, Saboori F, Bahadori MK, Ravangard R. Needle-stick injuries among healthcare workers in a teaching hospital. *Trauma Mon.* 2015;20(4):e18829.
- 5- Zeighami R, Azimiyan J, Haghi M, Kaboodi B, Bijani B, Haghi M. A comparison between the risk of needle stick injuries among nurses in emergency wards and nurses in other wards of hospitals. *Mod Care J.* 2014;10(4):272-8.
- 6- Aggarwal V, Seth A, Chandra J, Gupta R, Kumar P, Dutta AK. Occupational exposure to human immunodeficiency virus in health care providers: A retrospective analysis. *Indian J Community Med.* 2012;37(1):45-9.
- 7- Cheng HC, Su CY, Yen AM, Huang CF. Factors affecting occupational exposure to needlestick and sharps injuries among dentists in Taiwan: A nationwide survey. *PLoS One.* 2013;7(4):e34911.
- 8- Centers for Disease Control and Prevention. Stop Sticks Campaign—Sharps Injuries [Internet]. Atlanta: CDC. 2019 Feb- [cited 2022 May 14]. Available from: <https://www.cdc.gov/nora/councils/hcsa/stopsticks/sharpsinjuries.html>.
- 9- Himmelreich H, Rabenau HF, Rindermann M, Stephan C, Bickel M, Marzi I, et al. The management of needlestick injuries. *Dtsch Arztebl Int.* 2013;110(5):61-7.
- 10- World Health Organization. The world health report: Reducing risks, promoting healthy life [Internet]. Geneva:WHO. 2002 Sep- [Cited 2022 May 14]. Available from: <https://www.who.int/publications-detail-redirect/9241562072>.
- 11- Sagoe-Moses C, Pearson RD, Perry J, Jagger J. Risks to health care workers in developing countries. *N Eng J Med.* 2001;345(7):538-41.
- 12- ILO, WHO. Joint ILO/WHO Guidelines on Health Services Organization and HIV/AIDS. Geneva: International Labour Office; 2005.
- 13- Prüss-Üstün A, Rapiti E, Hutin Y. Estimation of the global burden of disease attributable to contaminated sharps injuries among health-care workers. *Am J Ind Med.* 2005;48(6):482-90.
- 14- Rapiti E, Prüss-Üstün A, Hutin Y. Sharps injuries: Assessing the burden of disease from sharps injuries to health-care workers at national and local levels. *Environ Burden Dis Series.* 2005;11.
- 15- Hambridge K, Endacott R, Nichols A. The experience and psychological impact of a sharps injury on a nursing student population in the UK. *Br J Nurs.* 2021;30(15):910.
- 16- Mehta A, Rodrigues C, Singhal T, Lopes N, D'Souza N, Sathe K, Dastur FD. Interventions to reduce needle stick injuries at a tertiary care center. *Indian J Med Microbiol.* 2010;28(1):17-20.
- 17- Walle L, Abebe E, Tsegaye M, Franco H, Birhanu D, Azage M. Factors associated with needle stick and sharp injuries among healthcare workers in Felege Hiwot referral hospital, Bahir Dar, northwest Ethiopia: Facility based cross-sectional survey. *Int J Infect Control.* 2013;9(4):171-2.
- 18- Taheri MR, Khorvash F, Hasan Zadeh A. Assessment of mental workload and relationship with needle stick injuries among Isfahan Alzahra hospital nurses. *Med J Mashhad Univ Med Sci.* 2016;58(10):70-577. [Persian]
- 19- Kim EY, Moon K. Prevalence rate and risk factors for needlestick and sharps injuries in education practicum among nursing students. *J Health Info Stat.* 2019;44(3):262-70.
- 20- Loripoor M, Mirzaye T, Ravari A. Effect of universal precautions instruction on occupational exposure. *J Birjand Univ Med Sci.* 2007;14(4):9-15. [Persian]
- 21- Ghona Abd-Elnaser A, Mona Gamal M. Evaluations of stress level caused by fear of exposure to needle stick injury among nurses: A cross-sectional study. *Tanta Sci Nurs J.* 2018;15(2):79-101.
- 22- Mengistu DA, Tolera ST, Demmu YM. Worldwide prevalence of occupational exposure to needle stick injury among healthcare workers: A systematic review and meta-analysis. *Can J Infect Dis Med Microbiol.* 2021;2021:9019534.
- 23- Gelsema TI, Van Der Doef M, Maes S, Akerboom S, Verhoeven C. Job stress in the nursing profession: The influence of organizational and environmental conditions and job characteristics. *Int J Manag.* 2005;12(3):222-40.
- 24- Delvaux N, Razavi D, Marchal S, Bredart A, Farvacques C, Slachmuylder JL. Effects of a 105 hours psychological training program on attitudes, communication skills and occupational stress in oncology: A randomised study. *Br J Cancer.* 2004;90(1):106-14.
- 25- Azmoon H, Dehghan H, Pourabdian S. Evaluation of trait anxiety levels between exposed and non-exposed health care workers to needle stick in Isfahan Al-Zahra hospital. *Pakistan J Med Sci.* 2013;29(1).
- 26- Yao WX, Wu YL, Yang B, Zhang LY, Yao C, Huang CH, et al. Occupational safety training and education for needlestick injuries among nursing students in China: Intervention study. *Nurse Educ Today.* 2013;33(8):834-7.
- 27- Sreedharan J, Muttappillymyalil J, Venkatramana M. Knowledge about standard precautions among university hospital nurses in the United Arab Emirates. *Eastern Mediterr Health J.* 2011;17(4):331-4.
- 28- Bambenongama NM, Likwela JL. Healthcare professionals' knowledge, attitudes and practices in relation to standard hospital precautions. *Sante Publique.* 2013;25(5):663-73. [French]
- 29- Wang C, Huang L, Li J, Dai J. Relationship between psychosocial working conditions, stress perception, and needle-stick injury among healthcare workers in Shanghai. *BMC Public Health.* 2019;19(1):1-11.
- 30- Mehrdad R, Atkins EH, Sharifian SA, Pouryaghoob G. Psychosocial factors at work and blood-borne exposure among nurses. *Int J Occup Environ Med.* 2014;5(1):32-9.
- 31- Moayed MS, Mahmoudi H, Ebadi A, Salary MM, Danial Z. Effect of education on stress of exposure to sharps among nurses in emergency and trauma care wards. *Trauma Mon.* 2015;20(2):e17709.