Research Article

Prevalence and Determinants of Needle Stick among Nurses: Testing of Protection Motivation Theory

Behzad Karami-Matin[1], Farzad Jalilian,

Shoeib Rahimi[1] And Afshin Almasi[1*]

[1]Research Center for Environmental Determinants of Health,
Kermanshah University of Medical Sciences, Kermanshah, Iran
Corresponding Author :Afshin Almasi; Research Center for Environmental Determinants of Health,
Kermanshah University of Medical Sciences, Kermanshah, Iran

ABSTRACT

Background: Needle stick and sharps injuries (NSIs) are potential occupational hazards among employees of medical and health centers, which may lead to serious or fatal infections such as hepatitis B and C and HIV. The aim of the present study was determining the prevalence of and the factors related to NSIs in nurses using protection motivation theory (PMT).

Methods: This cross-sectional study was conducted in summer 2016 among 330 nurses in educational-therapeutic hospitals in the city of Kermanshah, Iran. The subjects were selected using random sampling with probability proportional to size and the information was collected using questionnaire in a self-report way. The data were analyzed using the statistical software SPSS-16 and by employing chi-square, t-test, Pearson's correlation and logistic regression.

Results: The prevalence of NSIs was 25.7% in nurses. Perceived severity (P=0.012 & OR=0.889), perceived self-efficacy (P<0.001 & OR=0.814) and perceived rewards (P=0.029 & OR=0.899) were stronger predictors of NSIs.

Conclusion: It seems that designing and implementation of educational programs to increase perceived severity of side effect of NSIs, self-efficacy, and rewards about NSIs behavior prevention may be usefulness of the results in order to prevent of NSIs.

Keywords: Hospital, Fear, Prevention.

INTRODUCTION

Needle stick and sharps injuries (NSIs) and facing patients' secretions are among potential occupational hazards for employees of medical and health centers (1). NSIs refer to the entering of a sharp object (a hollow bore needle or a sharp object such as a double-edged scalpel, scalpel, broken sphygmomanometer and etc.) into the body of the health care workers when contacting the blood and other body fluids and are a common problem for healthcare workers (2). Studies indicate that twenty pathogens that are transmittable through blood can be transmitted to the staff at health centers after these injuries. Among the aforementioned pathogens, the diseases caused by hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) are more important (3). The risk is between 30 to 60% for affliction with HBV, 3-4% of HCV and 0.3% for HIV (4). In addition to these three common and dangerous diseases, the injuries caused by NSIs can lead to the transmission of other diseases such as diseases caused by viruses, bacteria, fungi and other microorganisms such as blastomycosis,

brucellosis, cryptococcosis, diphtheria, gonorrhea and the like in health care workers, laboratory researchers and veterinarians (5). Meanwhile, nurses are the biggest group of staff in medical centers that come into contact with hollow bore needles that contain the highest volume of blood (6).

The prevalence of NSIs in health care workers in different countries is varied in a way that it was reported to be 33 in 1000 individuals in health care workers in Saudi Arabia, 17.4% in health centers employees in Colombia and 76.2% in nurses in western Turkey in the year 2000 (7-9). The studies conducted in Iran also show relatively high statistics regarding these injuries in health care workers. For example, the study by Nejadrahim in Urmia indicated 52% prevalence in NSIs in healthcare workers (10) and the study by Afrasiabi in Yasuj indicated a prevalence of 39% for NSIs in healthcare workers (11). NSIs, in addition to resulting in direct treatment costs, leads to high costs related to long-term complications, lost working hours due to requesting and receiving care, fear, stress and anxiety that results in behavioral and occupational changes in personnel (12). Considering the increasing prevalence of NSIs and the resulted dangers, the necessity of paying attention to educational programs is felt.

On the other hand, human behavior is a reflection of different factors and the knowledge of these causal networks for impacting the factors that influence behavior is among the important issues that have been and continue to be explored by experts of behavioral sciences.

Recognizing the factors that impact behavior is important in designing educational programs and, on the other hand, studies have indicated that the most effective educational programs are based on theory-based approaches that are originating from behavioral change models. Also, selection of an appropriate model or theory of health education is the first step in the process of planning an educational program and effective health education is dependent in the mastery in the use of best theories and approaches for any event (13). In this regard, motivation protection theory (MPT)

was proposed by Rogers in 1975, based on expectancy value theory, in order to explain the effects of fear on health behaviors and attitudes. This theory assumes that the acceptance of a recommended healthy behavior is a direct act from the individual's motivation to protect him. Rogers suggested that the fear of the constructs self-efficacy, response efficacy, response costs, perceived susceptibility and perceived severity can influence protection motivation (14-16). The present study was done with the aim of determining the prevalence of and the factors impacting NSIs, using MPT, in nurses working in educational-therapeutic hospitals, which are related to Kermanshah University of Medical Sciences.

METHOD

This cross-sectional study was conducted in summer 2016 among 330 nurses in educational-therapeutic hospitals in the city of Kermanshah, in the west of Iran. For conducting the present study, after coordinating with the authorities of Kermanshah University of Medical Sciences and the managements of educational hospitals in the city of Kermanshah, the educational-therapeutic hospitals were considered as strata and, using simple random sampling and with probability proportional to size in each stratum, the participants were selected and the designed questionnaire was distributed among them.

Then the required information was collected from them. It should be pointed out that the subjects in the study were justified in the way the study is conducted, the confidentiality of the information and the objective of the study and they all entered the study willingly. After omitting the incomplete questionnaires, 300 questionnaires were analyzed (the response rate in the present study was 90.9%).

Data collection tool

The data collection tool in this study was a questionnaire which was consisted of two sections. The first section was a questionnaire related to background and demographic information and was consisted of 6 questions that evaluated information regarding age (in years),

sex (male, female), education level (bachelor's degree, Master's degree), work experience (years) and work place section.

The second section questionnaires consisted of questions that were related to protection motivation theory. For measuring PMT constructs, the research team designed items with Likert-style scoring from never (1) to very much (5) based on the previous conducted theory-based studies on the prevention of NSIs (14, 15). The face validity of the questionnaires was verified through a group of experts and the reliabilities of the questionnaires were verified using Cronbach's alpha as follows:

Perceived susceptibility questionnaire was consisted of four questions; for example, "it is possible that I will sustain NSIs in future". A higher score indicated higher susceptibility in the individual for NSIs. The Cronbach's alpha coefficient for perceived susceptibility was estimated to be 0.88.

Perceived severity questionnaire was consisted of four questions; for example, "NSIs can be the cause of a serious and major health problem". A higher score indicated a higher perceived severity of problems caused by NSIs in the individual. The Cronbach's alpha coefficient for perceived severity was estimated to be 0.87.

Perceived self-efficacy of doing preventive behaviors for NSIs questionnaire was consisted of six questions; for example, "to what extent do you believe in your ability to observe NSIs preventive principles (such as safe injection and etc.)?" A higher score indicated a higher perceived self-efficacy.

The Cronbach's alpha coefficient for perceived self-efficacy was estimated to be 0.84.

Perceived response costs of doing preventive behaviors for NSIs questionnaire was consisted of four questions; for example, "complete observation of preventive principles for NSIs takes a lot of my time".

A higher score indicated a higher perceived response cost in the individual for the lack of doing NSIs preventive behaviors. The Cronbach's

alpha coefficient for the perceived response costs was estimated to be 0.78.

Perceived cost efficacy of doing preventive behaviors for NSIs questionnaire was consisted of three questions; for example, "doing NSIs preventive behaviors results in relief in me". A higher score indicated a higher efficacy cost in the individual for doing NSIs preventive behaviors. The Cronbach's alpha coefficient for this was estimated to be 0.67.

Perceived reward of doing preventive behaviors for NSIs questionnaire was consisted of four questions; for example, "If I doing NSIs preventive behavior, I am more relaxed". A higher score indicated a higher efficacy reward in the individual for doing NSIs preventive behaviors. The Cronbach's alpha coefficient for this was estimated to be 0.65.

Finally, the data collected by the questionnaires were entered into the statistical software SPSS version 16 and analyzed using chi-square test, t-test, Pearson correlation and logistic regression.

RESULTS

According to the results the age range of the participants was 21-50 years and their mean age was 32.27 years with a standard deviation of 7.18. The mean of the employees' work experience was 8.74 years with a standard deviation of 6.95. 55.7% of the participants (167 individuals) were male and 44.3% (133 individuals) were female. The study of the educational status of the samples of the study indicated that 81% (243 individuals) had a bachelor's degree and 19% (57 individuals) had master's degrees.

Regarding the marital status of the participants, it was found that 47% (141 individuals) were single and 53% (159 individuals) were married. The results indicated that 77 individuals (25.7%) of the participants had a history of sustaining NSIs during work.

Table (1) shows the results of the relationship between background variables and the history of sustaining NSIs.

Table 1: Association between background variable and NSIs

		Needle stick		P-value
		No Mean (SD) N (%)	Yes Mean (SD) N (%)	
Age		31.79 (7.09)	33.66 (7.31)	t= -1.972, P= 0.050
Job History		8.19 (6.71)	10.31 (7.43)	t= -2.316, P= 0.021
Sex	Male	126 (75.4 %)	41 (24.6 %)	X^2= 0.246, P= 0.620
	Female	97 (72.9 %)	36 (27.1 %)	
Education Level	BSc	179 (73.7 %)	64 (26.3 %)	X^2= 0.302, P= 0.583
	MSc	44 (77.2 %)	13 (22.8 %)	
Marital Status	Single	109 (77.3 %)	32 (22.7 %)	X^2= 1.231, P= 0.267
	Married	114 (71.7 %)	45 (28.3 %)	

The correlation between PMT constructs regarding sustaining NSIs is shown in Table 2.

Table 2: Correlation between different components of protection motivation theory

Component	X1	X2	X3	X4	X5	X6
X1. Susceptibility	1					
X2. Severity	$^{**}0.448$	1				
X3. Response Costs	-0.185^{**}	-0.202	1			
X4. Response Efficacy	0.587^{**}	0.710^{**}	-0.299^{*}	1		
X5. Self-Efficacy	0.284^{**}	0.209^{**}	-0.175^{**}	0.405^{**}	1	
X6. Rewards	0.718^{**}	0.607^{**}	-0.163^{**}	0.602^{**}	0.330^{**}	1

** Correlation is significant at the 0.01 level (2-tailed).

The results of logistic regression analysis regarding PMT constructs in predicting NSIs are given in Table 3, and as seen from the results, the optimal model is specified in the fourth stage and the constructs perceived severity (P=0.012 & OR=0.889), perceived self-efficacy (P<0.001 & OR=0.814) and perceived rewards (P=0. 29 & OR=0.899) were stronger predictors of NSIs.

Table 3: The correlation between different components of protection motivation theory and Needle stick using logistic regression analysis

Variable	β	SE(β)	Wald	P-value	OR	Lower	Upper
Severity	-0.117	0.047	6.282	0.012	0.889	0.811	0.975
Self-Efficacy	-0.206	0.041	25.500	< 0.001	0.814	0.751	0.882
Rewards	-0.106	0.049	4.756	0.029	0.899	0.817	0.989

DISCUSSION

The results indicated that the prevalence of NSIs in nurses explored was 25.7%. In this regard, different studies indicate that the prevalence of NSIs in healthcare workers is between 18 and 80%. For example, Ziraba has reported the prevalence to be 67.8% in Uganda, Al Awaidy has reported it to be 17.9% in Oman, Muralidhar has reported the prevalence to be 80.1% in India and Smith has reported it to be 46% in Japan (17-20). Different studies conducted in Iran indicate the prevalence of NSIs in healthcare workers in a way that Mohammad Nejad et al reported the

prevalence of NSIs to be 47% in nurses at Imam Khomeini Hospital (21). Other studies conducted in Ardabil and Qazvin reported the prevalence to be 55 and 32% respectively (22, 23). Also, Mirzaei Alavijeh et al, carried out study on nurses attending emergency centers of medical training hospitals in Kermanshah, the west of Iran, and reported 41.4% of the participants had history of needle-sticking (24). In addition, Askarian et al, in their study on nurses at hospitals in the Fars Province, reported the prevalence of NSIs to be 49.6% (25). The findings indicate a high prevalence of NSIs in healthcare workers and,

considering the complications and damages followed by NSIs, they show the necessity of paying more attention to NSIs. In line with this, different recommendations have been provided by the centers for disease control and prevention (CDS) which include using Vasofix s which provides passive protection against NSIs and the use of blunt-tip needles. Another recommended strategy provided by CDC is the use of appropriate educational programs for prevention and reduction of NSIs in healthcare workers (26). Therefore, the identification of behavioral factors impacting NSIs is important for designing and implementing preventive educational programs.

The results of the present study also indicated that the prevalence of NSIs is increased with the increase of work experience which is natural to some extent because the more the individual is in the work place, the more likely he/she will sustain injury. However, it should be noted that healthcare workers may assume that they have experience and adopt preventive behaviors less with the increase of their experience. Therefore, providing educational and retraining programs during work is recommended in this regard.

Logistic regression analysis indicated that the constructs perceived severity, perceived self-efficacy and received rewards were stronger predictors of NSIs. The results are high consistent with those of the other studies. In line with this, the study by Shamohamadi et al which was conducted on hospital staff indicated that the constructs perceived severity and perceived benefits were significantly effective in predicting NSIs (26). Also, the study by Yousafzai et al conducted on healthcare workers in Pakistan indicated that perceived severity and perceived barriers were more important and stronger predictors of NSIs (27).

CONCLUSION
Considering the results, it seems that the improvement of perceived severity of the damages of NSIs, self-efficacy of doing NSIs preventive behavior and the beliefs related to rewards resulted from doing NSIs preventive behaviors should be emphasized in planning educational programs to achieve useful results.

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