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The Effect of Education Based on Protection Motivation Theory on the Harmful Effects of Detergents and Disinfectants on Hospital Service Personnel

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Abstract: The individual protective behaviors have essential role inprevention ordecrease the incidence of the harmful effects of detergents. This study aimed to determine the effect of education based on protection motivation theory on the harmful effects of detergents and disinfectants on hospital service personnel. This Quasi-experimental study was conducted on 100 off hospital service personnel that randomly divided to control and Intervention groups. Data collection tool was a Multi-section questionnaire include demographic, awareness and protection motivation theory questions that its validity and reliability was confirmed by expert and cronbakh alpha percent. After primary data collecting, educational intervention performed and two months later data in both groups was collected again and analyzed in SPSS16 Software using descriptive and analytical statistics. Results showed that after intervention only in experimental group the mean scores of awareness off 12/82±2/42 with 18/06±3/25 and preventive behaviors on hospital service personnel off 14/50±3/41 with 20/06±3/76 meaningful increased. The results showed that education intervention based on protection motivation theory was useful in increasing awareness and promoting preventive behaviors of detergents and disinfectants on hospital service personnel.

Key words: Protection-motivation theory, detergents, hospital service personnel, awareness, service

INTRODUCTION

The concept of health promotion and the hope to enable people have access to the desirable level of health and maintain it is a truly magnificent and global goal. Although progress towards this goal is not fast enough, it is continuous and promising; and perhaps it can be documented nowhere but in the workplace. The most valuable assets are the ones used for humans. If an organization as well as a country is decided to compete in local, regional and global markets; allocation of the capital especially being committed to the development and implementation of health promotion in the workplace is considered as the most valuable investment (Rigel and Carucci, 2000). Maintenance, development and promotion of health in human communities are considered as the fundamental and key policies to establish and develop social justice in different countries and the fulfillment of such goals is taken into account as a personal and social value as well as a dire need for humans which has always been traditionally regarded as a national priority (Marandi and Marandi, 1998). Although, health is a multidimensional issue and many factors affect its provision, expansion or destruction; the presence of an efficient and effective health system is of great importance among all these factors. Among the various organizations of the health system, hospitals are considered as important institutions providing healthcare and educational services (Shepard *et al*., 2000). Observing hygiene standards in hospitals can result in the improvement of the status of health promotion process (Sadleir). Despite, the importance and necessity of these issues in the mission of a hospital, the hygienic state of Iran's hospitals is not completely considered and there is a need to take fundamental measures to improve it. Among, the different dimensions of the hygiene and cleanliness state of hospitals, much attention by healthcare centers should be focused on hygiene issues and educational measures related to personnel especially hospital service personnel. The majority of these hygiene measures are carried out by service personnel in hospitals. Each year, approximately 160 million of new cases of occupational diseases can be detected in the world among them the respiratory disease is the most common (Jacobs *et al*., 2008). Of the most common effects and diseases inflicted by exposure to chemical detergents

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are respiratory complications, chronic lung diseases and changes in lung function. The respiratory and allergic effects as well as the seizures caused by improper use of the detergents among service personnel in hospitals are very high. In a study conducted by Zock *et al.* (2007) the relationship between detergents and incidence of allergic symptoms such as asthma among 683 women with an average age of about 44 years old was investigated. There was a direct relationship between incidence and severity of asthma and the use of detergents which explained the importance of control over the amount and the way to use detergents as well as training on the correct use of detergents (Zock *et al*., 2007). According to a study by Habib *et al.* (2006), the women's behavioral strategies in terms of using detergents were examined. Although, the effects of detergents on women was highlighted in this study; women's beliefs, tendencies and information about the use of detergents was very low. It should be also noted that studies in the behavioral scope are very limited. Given the importance of this issue, studies on the behaviors of using detergents need to be expanded. The lvel of literacy and knowledge of the existing risks in their workplaces, an educational program regarding the factors associated with their work type and environment should be developed to promote level of knowledge and maintain and improve health level in this group of personnel. The main part of service personnel's job involves contacts with chemical detergents; therefore, they must become familiar with the characteristics of these substances, their use and the decontamination methods of such substances as well as their deleterious effects. They need to use protective gears and equipment when working with detergents such as masks, gloves, hats, boots or shoes in a proper and timely manner dingly, implementation of correct management practices for using these substances is a global issue (Glanz *et al*., 2002). One of the ways to reduce costs incurred to society and individuals is the implementation of preventive and educational measures. Hence, this study was to determine the relationship between knowledge and performance state of protective behaviors against harmful effects of detergents and disinfectants among service personnel in hospitals in the city of Zahedan.

MATERIALS AND METHODS

This semi-experimental interventional study was conducted on 100 service personnel in hospitals in the city of Zahedan. The sampling method was in a random simple form and according to the sample size. A researcher-designed questionnaire was used to collect the data. After the required permits were obtained from the research deputy vice-chancellor of the university and considering the ethics, the objectives and the essence of this study were described for the participants. A consent form was also completed by these individuals before the administration of the questionnaire. The questionnaires were also distributed among the participant service personnel based on their consent and tendency and then the required data were collected.

The methodology of implementing the program included lectures, brainstorming and subsequent discussions because service personnel needed to spell out their negative attitudes and perceived barriers to their behaviors due to lack of a particular supporting organization, low job ranking among personnel and an inappropriate level of knowledge regarding the terms and conditions of their jobs to gain proper motivation to adopt healthy behaviors in other stages through providing correct information and raising their health and well-being knowledge. At the end of the research session, a pamphlet was given to participants to raise their awareness and knowledge in terms of different types of detergents and their method of use as well as preventive and protective measures against these substances to help them have continuous exposure to health messages and make the importance of this issue clear. In this study, the data were collected through questionnaires and interviews via the SPSS16 Software and they were analyzed considering central tendency, independent t-test, chi-square, linear correlation coefficient and regression analysis. The required matching was also carried out for the demographic variables of gender and working experience among the participants in the program. The inclusion criteria in this study were individuals' consent and tendency to take part in this program and having no problems or special diseases associated with the use of detergents as well as physical health (the ability to attend the program).

Data collection instrument was a questionnaire. The first section of the questionnaire was related to personnel's demographic information (2 items). The second section of the questionnaire was based on knowledge and behavior items to measure the level of knowledge and performance among individuals towards considering hygiene standards and taking protective measures against the use of detergents. Content validity and face validity of the questionnaire were evaluated under the supervision of specialists in health education and environmental health and its reliability was confirmed by doing a pilot study on 20 samples and calculating Cronbach's alpha (alpha range in the pilot study was between 0.62 and 0.85 and it was between 0.66 and 0.87 in the total sample). The first section of the questionnaire

included 2 items on demographic characteristics such as service personnel's gender and years of working experience. The second section contained 15 items on knowledge and 9 items on behavior. The items related to knowledge included answers such as True I Do not Know-False scored 2, 1 and zero; respectively. The second section was composed of 9 items associated with performance measurement with answers including Always-Often-Sometimes-Rarely-Never scored 4, 3, 2, 1, 0, respectively.

RESULTS AND DISCUSSION

The participants of this study consisted of 100 service personnel from educational hospitals in the city of Zahedan. Of the participants; 49 % were female and 51% were male. The 35 people had 1-10 year working experience. The number of participants with 10-20 years of working experience and 20-30 years of working experience was 35 and 30 individuals, respectively. According to the results of independent t-test, there was no significant relationship between gender (in women and men) and level of knowledge ($p = 0.807$). According to the results of independent t-test, there was no significant relationship between gender (in women and men) and behavior ($p = 0.745$). A statistically significant relationship between level of knowledge and performance status of protective and preventive behaviors against the harmful effects of detergents and disinfectants was observed among the participants in this study ($p = 0.001$).

As the findings of this study revealed; the scores of knowledge, behavior, perceived susceptibility, perceived severity, response efficiency, self-efficacy, response cost, reward, fear, protection motivation in the experimental group before the intervention had no significant difference compared to those of the control group ($p>0.05$) but there was a significant difference between the two groups after the intervention ($p<0/05$) so that the mean and the standard deviation of knowledge and behavior scores changed from 12.82±2.42 and 14.50±3.41 to 18.06±3.25 and 20.06±3.76, respectively. These values changed from 4.40±1.56 to 6.92±1.36 for perceived susceptibility. There were also variations from 4.92±1.70, 2.80±1.35 and 3.20±1.49 to 8.40±1.76, 5.36±1.49 and 5.40±1.42, respectively for perceived susceptibility, perceived severity and response efficiency. The mean and the standard deviation of the scores of response cost and reward varied from 2.40±1.34 to 4.34±1.18 and from 4.22±1.71 to 6.96±1.38, respectively. These values changed from 3.28±2.13 to 5.46±1.24 for fear and from 3.54±1.72 to 5.10±1.65 for protection motivation. The data related to the frequency of individuals in terms of gender and working experience are provided in Table 1. According to the results of the Chi-square test, there was a significant relationship between gender and working experience ($p = 0.035$). According to Table 2, the results of Pearson correlation coefficient revealed a significant relationship between the structures of knowledge and behavior ($p = 0.001$). Pearson correlation coefficient also indicated a positive relationship between preventive behaviors against the effects of detergents and disinfectants and knowledge, perceived susceptibility, response efficiency, fear and protection motivation at a 0.01 level (Table 3). Multiple linear regression analysis (multivariate in procedure) was performed to explain the behavior. The shown in Table 4 independent variables of knowledge, behavior, perceived susceptibility, perceived severity, response efficiency, self-efficacy, response cost, reward, fear and protection motivation were inserted in the model. Shown in Table 5 one of the variables (knowledge) remained in the model. Given $p<0.05$, the multiple linear regression model (multivariate) was significant. That is, the model could explain or predict the changes in the dependent variable (behavior) through the independent variables (knowledge). This value explained according to the adjusted correlation coefficient was 0.07. The strongest structures predicting changes in behavior was knowledge.

Table 1: The evaluation of mean, standard deviation, range score of knowledge and behavior

Index scale	Mean	SD
Awareness	18/06	3/25
Practice	14/50	3/41
Valnerability	6/92	1/36
Severity	8/40	1/376
Response effectiveness	5/36	1/49
Self-efficacy	5/40	1/42
Responce-cost	4/34	1/18
Reward	6/96	1/24
Fear	5/46	1/24
Protection motivation	5/10	1/65

Table 2: Pearson cerrelation coefficient between the structures of protection motivation theory knowledge and behavior

Variable level	The significance
Awarness r = 0/00	Practice

In this study, all service personnel had a potential exposure to toxic chemicals and hazards caused by the use of detergents. Despite this issue, these individuals' level of knowledge in terms of maintaining their health while working with detergents was very low (Courneya and Hellsten, 2001). Also, Zock *et al.* (2007) reported the amount of contacts with various detergents among different countries by 58.87% which demonstrated the importance of raising the level of knowledge about health among individuals in order to promote their appropriate performance in the use of these substances. Moreover, there was no significant relationship between

Table 3: The correlation coefficients of components protection motivation theory

Pearson correlation (p-value)	Awareness	Vulnerability	Severity	Response effectiveness	Self-efficacy	Response cost	Reward	Fear	Protection motivation	Practice
Awareness	1									
Vulnerability	0/491	1								
	0/000									
Severity	0/605	0/596	1							
	0/000	0/000								
Response effectiveness	0/564	0/459	0/537	1						
	0/000	0/001	0/000							
Self-efficacy	0/362	0/480	0/568	0/413	1					
	0/010	0/000	0/000	0/003						
Response cost	0/591	0/466	0/437	0/481	0/231	1				
	0/000	0/001	0/002	0/000	0/107					
Reward	0/287	0/335	0/353	0/080	0/666	0/045	1			
	0/043	0/017	0/012	0/582	0/000	0/756				
Fear	-0/742	-0/604	-0/717	0/562	-0/504	-0/543	-0/423	1		
	0/000	0/000	0/000	0/000	0/000	0/000	0/002			
Protection motivation	-0/635	-0/345	-0/321	-0/333	-0/520	-0/247	-0/287	0/429	1	
	0/000	0/014	0/023	0/018	0/000	0/084	0/043	0/002		
Practice	0/782	0/493	0/611	0/530	0/596	0/523	0/403	-0/728	-0/607	1
	0/000	0/000	0/000	0/000	0/000	0/000	0/004	0/000	0/000	

Table 4: Protection motivation model can explain behavior

Model	The coefficient of determinatio	The correlation coefficient	The correlation coefficient adjusted	F	p-value
1	0/299	0/089	0/070	4/698	0/035

Table 5: The effects of independent variables on the dependent variable behavior

Independent variables	B	SE	Beta	t-value	Sig.
Awareness	0/383	0/177	0/299	2/168	0/035

working experience and knowledge scores which was in line with the results of the present study as well as the findings obtained by Godazaneh *et al.* (2006). There was also a high probability among personnel with higher working experience and education level to have lower levels of healthcare knowledge and awareness in relation to protective behaviors in strategies to use the detergents. Unlike the present study; the results of a study by Nourizadeh *et al.* (2011) revealed that level of knowledge is broadened following increased age. In this study, the results of the linear regression analysis between protective behaviors while using detergents and individuals' knowledge of maintaining their health showed a significant relationship which were consistent with the findings of studies by Nourizadeh *et al.* (2011) and Godazandeh *et al.* (2006). According to the study by Negahban Bonabi, 85% of individuals stored the detergents next to food stuff and they did not pay attention to their separate storage. Although, providing a healthy environment is very important, unfortunately few of them had healthcare knowledge and awareness in terms of safe storage and proper strategies to use the detergents while most experts including Barron warned that any detergent must be kept in separate cabinets (not just in separate shelves) and away from other substances especially food stuff due to some chemical activities. For example, some detergents such as mopping liquids that contain ammonia should not be kept beside detergents containing bleaches (Courneya and Hellsten, 2001). However; due to the low level of knowledge and awareness about health in individuals, a criterion of storing the detergents is their availability in most cases. In addition to the above issues, the likelihood of toxic poisoning by detergents goes up as one of the major health problems in developing countries (Meyer *et al.*, 2007). According to the results of several studies; the lower the level of knowledge in individuals, the lower the probability of their protective behaviors against risk factors. In a study, Ivanov warns that no exact knowledge on how to use detergents threatens individuals' health (Ivanov *et al.*, 1997). According to the studies by Habbib *et al.* (2006), most of the participants had low level of health knowledge and awareness and their protective behaviors (such as the use of gloves, masks, reading the instructions for use) were not performed in a correct way while using detergents. They also had no knowledge of prohibition of mixing dangerous detergents. They usually mixed several detergents to provide better washing effects which led to compounds with detrimental effects including pulmonary irritation, damage to throat, headache and shortness of breath (Courneya and HEllston, 2001; Habib *et al.*, 2006).

The results of an investigation by Filiz *et al.* (2006) on the knowledge and behavior of adolescents in terms of skin protection showed a significant relationship between knowledge and protective measures. In a study by Istebsari, education had an impact on increasing awareness (Rogers, 1975) which was consistent with findings of the present study. The results of studies in this area along with the findings of the present study indicated that the lower the level of awareness, the lower

the use of protective measures; in addition, educational intervention can have an important role in raising awareness among people. Therefore, research in the area of health behavior can easily prevent many diseases and unhealthy behaviors (Tohidi and Gorbani, 2009). Several studies have also highlighted lack of awareness and attitude in individuals. Rahimian in a study found a significant relationship between low level of education in parents and the positivity of Helicobacter pylori infection in children (Rahimian *et al*., 2008). In fact, lack of knowledge and the subsequent failure to comply with hygienic behaviors is inevitable in any society. Individuals and societies are in need of correct behavioral education to understand and practice the correct way of life, stay healthy and avoid diseases; in this regard, education plays a key role (Zareban *et al*., 2006). This study to the best knowledge of the researchers is the first investigation on the harmful effects of detergents and disinfectants and since there were no similar studies in the review of literature; the studies conducted in the area of protection are considered. The results of this study showed a low level of awareness among service personnel in hospitals. The reasons behind general awareness in this respect are lack of publicity by media, lack of meetings by health officials, inattention to the issue of prevention and mere focus on treatment. These findings are similar to results of other studies including the ones by Motamedi *et al*. (2010), Kleier (2004), Khorsandi *et al*. (2010) gamig (Shamsi *et al*., 2009) and Morowati Sharifabad (Hosseini*et al*., 2009).

CONCLUSION

In conclusion, it should be noted that one of the major issues associated with the adoption of correct preventive behaviors and health concepts is the existence of cultural and intra-cultural differences. It seems that non-compliance with health behaviors can be observed in every society because right and wrong health behaviors constitute a part of culture in that society (Salimi *et al*., 2007). Therefore; individuals need to form up health behaviors and have proper educational programs in order to practice the correct way of living, stay healthy, prevent diseases and have better behaviors in this regard. Using self-reports to collect the required data associated with awareness and behavior was one of the limitations of this study that may create bias in the assessment of the results. This study was conducted among service personnel in educational hospitals in the city of Zahedan; however, according to the findings of this study, it can be conducted in other hospitals and centers. Given the results of this study, the importance of awareness and knowledge in individuals and its relationship with adopting correct behaviors during the use of detergents; it is recommended to provide individuals with the required education in a public manner in order to promote their health. According to the World Health Organization (WHO, 2000), vulnerable groups must be placed as priorities of health programs. Since, there are limited studies in the area of education to service personnel in hospitals in terms of the effects of detergents; thus, this study was conducted to provide a correct performance in the use of these chemicals and to find the wrong behaviors in order to do planning in terms of reforms and changes in behaviors.

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