Environmental problem awareness, eco-friendly attitude and eco-friendly nursing practice in hospital nurses

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병원 간호사의 환경문제 인식, 친환경 태도, 친환경 간호수행

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Abstract   The purpose of this study was to investigate the relationship between environment problem recognition, eco-friendly attitude, and eco-friendly nursing practice. A self-reported questionnaire was completed by 191 hospital nurses from October to November, 2012. The data were analyzed through t-test, one way ANOVA, Pearson correlation analysis, and multiple regression analysis. There was a positive correlation between environment problem recognition (r=.46, p<.001), eco-friendly attitude (r=.36, p<.001), and eco-friendly health care in the hospital nurses. The explanatory power of the variables accounted for 35.0%. This study indicated that it is necessary to promote the awareness towards environment problem and eco-friendly attitude in the hospital nurses in Korea.

Key Words : Awareness, Convergent environmental problem, Eco-friendly education, Eco-friendly nursing practice, Hospital nurse

요 약   본 연구의 목적은 환경문제 인식, 친환경 태도, 친환경 간호수행의 상관관계를 알고자 하는데 있다. 191명 의 병원 간호사가 2012년 10월부터 11월까지 자기기입식 설문을 작성하였으며, 자료 분석은 t-test, one way ANOVA, Pearson 상관관계, multiple regression analysis를 사용하였다. 설문은 환경문제인식, 친환경태도, 친환경보건 관리로 구성되었고, 환경문제인식 (r=.46, p<.001), 친환경태도 (r=.36, p<.001), 친환경 보건관리 사이에 양의 상관관 계가 있었다. 변수들에 대한 설명력은 35.0%였다. 본 연구를 통해 국내 병원 간호사의 환경문제와 친환경태도에 대 한 인식도를 향상시킬 필요가 있음을 증명하였다. 본 연구 결과를 통해 병원 간호사의 친환경 간호수행을 향상시키 기 위한 병원 내 친환경 프로그램 개발 연구를 제안한다.

주제어 : 병원간호사, 환경문제 인식, 친환경 태도, 친환경 간호수행, 친환경 교육

1. Introduction

1.1 Background

The Industrial Revolution set in motion remarkable development and economic growth that has brought prosperity to humankind. Rising carbon emissions from this economic growth, however, created serious environmental problems including climate change and global warming, and the international community agreed to the Kyoto Protocols in 1997 to solve these environmental challenges [1]. Since then, countries have worked to prevent environmental pollution by establishing and adhering to global standards, and Korea too has been striving to prepare eco-conscious policies and action plans in order to create a "post-carbon society" and promote environmentally-friendly green growth [2,3].

Environmentally-friendly green growth aims to minimize climate change and environmental damage by saving resources and transforming industrial structures [3]. The health care industry is an important participant in this global effort to deal with global warming and prevent environmental contamination, and has been making preparations for a low-carbon society [1]. Government and non-governmental organizations joined hands to established Health Care Without Harm (HCWH) and Hospitals for a Healthy Environment (H2E). HCWH and H2E are calling for the removal of toxin-producing products to prevent environmental problems caused by medical waste, and the removal of incinerators in order to cut the formation of dioxin from the burning of polyvinyl chloride (PVC) products [4].

While surveys conducted by the Ministry of Environment show that 79% of the Korean people are interested in the environment, actual participation in eco-friendly activities are low [3]. Public interest does not automatically lead to voluntary participation and action [5]. How much people engage in eco-friendly activities is determined by the knowledge of, and attitude towards, environmental issues, and members of

the health care industry are generally insensitive to environmental issues [6]. Health care professionals are not widely aware of the chemical contamination and the social burden of diseases caused by the massive quantities of material resources expended for the treatment of patients [1]. Promoting this interest in environmental issues within healthcare facilities will, in turn, raise awareness in eco-friendly healthcare service [1,7].

Eco-friendly healthcare service aims to provide a nature-friendly environment, reduce waste contamination, and preserve resources by promoting an eco-friendly mindset. Contamination from medical waste can be curtailed by using eco-friendly products that minimize hazardous materials [1]. These activities not only cut costs but contribute to green growth and ultimately to the effort to create a low-carbon society [3,8].

Research on eco-friendly healthcare service includes the analysis of impact on patients and hospital workers, economic impact, and environmental reform [8]. However, this paper aims to approach this issue from the angle of practicing eco-friendly nursing, which is defined by the effort to provide nursing services with an enhance degree of environmental awareness to protect humans from environmental threat factors [9]. Dixon and Dixon emphasized that nurses armed with knowledge of eco-friendly nursing can better protect the health of patients [10]. Environmentally-aware nursing practice has been defined as nursing services performed by a nurse who retains knowledge and cognition of environmental issues.

One major factor in reforming activities that impact the environment is the awareness of environmental issues and attitude towards addressing these issues of nursing students [5]. The awareness shared among members of the nursing profession can be gauged by examining eco-friendly nursing practices [11]. Social influence creates a more environmentally-aware attitude which is then actualized as more eco-friendly practices, and it can be surmised that individuals who

view eco-friendly activities in a positive light are also eager to engage in eco-friendly nursing practices [9]. With rising awareness in our society of the importance of protecting the environment, a series of studies have appeared ranging from analysis of eco-friendly health behavior and nursing practices to examinations of the achievements of eco-friendly medical service and management. There have been relatively little research on eco-friendly health behavior after 2011 in both Korea and abroad [9]. Most of the literature in this area has focused on medical science and business management, while the correlations between the main pillars of the study of nursing including people, health and environment has been the focus of research in this field. This study aims to explore the correlations between the awareness of environment problems, eco-friendly attitude and eco-friendly health care in hospital nurses and study the impact of these variables on eco-friendly nursing practices.

The goal of this study is to identify the correlation between demographical and environmental variables related to the performance of eco-friendly nursing practices by hospital nurses to provide baseline data for the study and practice of eco-friendly nursing.

1.2 Purpose of the study

This study aims to identify the correlations between eco-friendly nursing practice, awareness of environmental problems and an eco-friendly attitude. First, eco-friendly nursing practices carried out by the subjects based on basic demographical profiles were identified. Second, the degree of the subjects' awareness of environmental problems, eco-friendly attitude and the performance of eco-friendly nursing was determined. Third, the correlations between the subjects' awareness of environmental problems and eco-friendly attitude and the actual performance of eco-friendly nursing practices was determined. Fourth, this study examines to what extent the awareness of environmental problems and the eco-friendly attitude of

a subject can be used to predict the level of eco-friendly nursing practice in the subject.

2. Methods

This study is a survey research aimed at determining the level of eco-friendly nursing practices by hospital nurses, and investigating the impact of an awareness of environmental problems and eco-friendly attitude on eco-friendly nursing practice.

2.1 Subject selection

A convenience sampling was performed of nurses working in general hospitals in B City (1 location), D City (1 location), and P City (2 locations); after using G*Power ver. 3.1.2 to perform a multiple regression analysis at a significant level of 0.05, effect size of 0.15 and statistical power of 0.95, the appropriate sample size was determined to be a minimum of 172 subjects. Data from 206 respondents were collected to maintain a sufficient margin for subject dropout, and 16 incomplete responses were discarded to leave a pool of 191 responses for analysis.

Data collection was performed from October 1, 2012 to November 30. The survey was composed of questions on the subject's general demographical profile, awareness of environmental issues, eco-friendly attitude and eco-friendly nursing practice. Following hospital ethics committee approval (CR-12-096), the surveys were deployed through a request for assistance to the nursing department. To protect the ethical considerations of the subjects, the surveys were distributed to respondents who were briefed about the purpose, process, the rights and autonomy of the subjects, and confidentiality, and then were asked to sign a written letter of consent. Approximately 20 minutes were provided for completing the survey, and a small gift was presented to each respondent at its conclusion.

2.2 Study instruments

1) Awareness of environmental problems

The instrument developed by Ahn and Lee [12] was deployed to gauge awareness of environmental problems, and the issues were composed of: average concentration level for ozone warning, quality standard for drinking water, causes for the sick building syndrome, air pollution and the management of occupational diseases, types of genetically-modified foods, waste disposal by landfill, cadmium contamination of water, types of environmental hormones, the causes of mad cow disease, and the mechanism behind acid rain formation. The instrument for this section included 15 items with 1 point for "disagree" and 4 points for "strongly agree," with 15-60 as the range of awareness of environmental issues. A higher score indicated a greater awareness of the main issues. The instrument was used with permission from its developers. Cronbach's alpha in Ahn and Lee [12] was 0.87, and 0.73 in the present study.

2) Eco-friendly attitude

Eco-friendly attitude is the positive conviction held by a subject on a particular act or practice [11], and the instrument developed by Vaske and Kobrin [13] and modified by Kim [9] was employed. Ten items were included in this part of the survey to gauge the eco-friendly attitude of respondents, including: "I make efforts to learn about solutions to environmental problems," "I talk to other people about environmental problems," "I try to convince people around me to behave in an environmentally-responsible manner," "I talk to my family about the environment," "I take part in community environmental protection activities," "I separate my trash for recycling," and "I conserve water." A 5-point Likert scale was used, with 1 for "strongly disagree" and 5 for "strongly agree." Points for eco-friendly attitude ranged from 10 to 50, with higher scores indicating a more positive attitude. Cronbach's alpha at the time of the instrument's

development was 0.89, 0.81 for Kim [9], and 0.91 for the present study.

3) Eco-friendly nursing practice

Eco-friendly nursing practice was measured using the instrument for eco-friendly nursing attitude. "Nurses and Environmental Health Attitude" developed by Eco-Nurse (http://econurse.org/health.html) was retranslated from a translation by a professor of English literature, and was composed of ten items with the index of content validity (CVI) checked by three professors of nursing and three head nurses. Survey items included: "I treat the environment with care, as it is the fundamental foundation and source of nursing," "I purchase eco-friendly products and equipment," "I practice nursing that aims to reduce contamination from waste," "I provide holistic nursing that factors in the environment," "I am aware of the amount of waste that is generated each year," "I make efforts to reduce toxic substances," "I fulfill the role of a nursing and environmental activity expert," "I provide comprehensive nursing for eco-friendly nursing," "I engage in eco-friendly health maintenance and improvement activities," and "I conduct eco-friendly job training." The 10-point Likert scale ranged from 0 for "strongly disagree," 2 for "moderately disagree," "5 for "average," "8 for "moderately agree" and 10 for "strongly agree." The score ranged from 0 to 100 points, with higher scores indicating a higher degree of carrying out eco-friendly nursing practices. CIV and Cronbach's alpha were both 0.85 for the present study.

2.3 Statistical analysis

SPSS 18.0 was used to analyze the data. Differences in the practice of eco-friendly nursing based on personal profiles were analyzed using t-test and one-way ANOVA; awareness of environmental problems, eco-friendly attitude and eco-friendly nursing practice were analyzed using average and standard deviation. Correlations between awareness of

environmental problems, eco-friendly attitude and eco-friendly nursing practice were analyzed sing the Pearson correlation coefficient, with multiple stepwise linear regression analysis employed to explain eco-friendly nursing practice.

3. Results

3.1 Demographical profiles of subjects and eco-friendly nursing practice

A total of 113 subjects were aged between 20 and 29 (59.2%), with 49 subjects between the ages of 30 and 39 (25.7%). In education and experience, 101 subjects graduated from technical college (52.9%) while 80 subjects had worked for five years or less (41.9%) and 50 subjects between six and nine years (26.2%). As for departments, 111 nurses were assigned to internal medicine (58.1%) and 44 to surgery (23.0%).

Seventy-five respondents (26.3%) had received environmental training, and 128 subjects (67.0%) had a high interest in medical waste management while 61 subjects (31.9%) showed average interest. A total of 153 subjects (80.1%) were highly interested in environmental preservation, while 150 subjects (78.5%) had average knowledge of environmental hormones and 22 subjects (11.5%) were unaware of the issue <Table 1>.

In testing for the difference between eco-friendly nursing practice based on general subject profile, statistically meaningful differences were found in age (F=3.68, p=0.027), educational level (F=6.41, p=0.035), experience in undergoing environmental training (t=7.92, p<0.001), level of interest in environmental preservation (t=2.46, p<0.015), and knowledge about environmental hormones (F=4.95, p=0.008). A post-hoc test of the variables revealed that differences in practicing eco-friendly nursing were found among

〈Table 1〉 Demographic profiles of subjects and eco-friendly nursing practice

Characteristics		Categories	n(%)	Eco-friendly nursing practice	
				M±SD	t or F(p)
Demographic profiles	Age (year)[+]	20-29[a]	113(59.2)	54.26±69.85	
		30-39[b]	49(25.7)	50.51±17.39	3.68(.027)
		40 or older[c]	29(15.2)	55.79±10.80	b<c
	Education level[+]	College	101(52.9)	49.90±77.71	6.41(.035)
		University	60(31.4)	55.00±39.57	a<c
		Graduate school	30(15.7)	55.20±10.07	
	Career as RN (year)	<5	80(41.9)	54.79±10.36	1.21(.301)
		6- 9	50(26.2)	52.44±49.33	
		≥10	61(31.9)	52.77±78.60	
	Working department	Special ward	27(14.1)	51.29±98.42	1.21(.301)
		Emergency room	9(4.8)	59.00±9.27	
		Surgical ward	44(23.0)	54.08±10.35	
		Medical ward	111(58.1)	53.36±69.33	
Eco-friendly nursing practice	Environment education	Yes	40(20.9)	52.20±10.84	7.92(<.001)
		No	151(79.1)	50.86±7.30	
	Medical waste management concern	High	128(67.0)	61.00±15.55	.76(.468)
		Middle	61(31.9)	54.19±9.61	
		Low	2(1.0)	54.00±9.38	
	Environment preservation concern	Yes	153(80.1)	54.37±9.98	2.46(.015)
		No	38(19.9)	50.16±6.85	
	Endocrine Knowledge[+]	High[a]	19(9.9)	58.79±10.93	4.95(<.008)
		Middle[b]	150(78.5)	56.30±28.15	b<a
		Low[c]	22(11.5)	52.40±59.34	

subjects aged 40 and over with graduate degrees and high knowledge of environmental hormones.

3.2 Levels of awareness of environmental problems, eco-friendly attitude and eco-friendly nursing practice

Analysis of the subjects' responses in awareness of environmental problems, eco-friendly attitude and eco-friendly nursing practice revealed an average score of 29.92 out of 60 points for awareness of environmental problems and 39.10 points out of a possible 50 for eco-friendly attitude. The average score for eco-friendly nursing practice was 53.53 out of a possible score of 100 <Table 2>.

〈Table 2〉 Degree of environment problem awareness, eco-friendly attitude, and eco-friendly nursing practice

Variables	M±SD	Possible range	Observed range
Environmental problem awareness	29.92±4.37	15-60	16-47
Eco-friendly attitudes	39.10±6.36	10-50	13-45
Eco-friendly nursing practice	53.53±9.57	0-100	20-74

3.3 Correlations between awareness of environmental problems, eco-friendly attitude and eco-friendly nursing practice

Correlation analysis between variables on eco-friendly nursing practice among the subjects revealed a positive correlation between awareness of environmental problems (r=0.46, p<0.001) and eco-friendly attitude (r=0.36, p<0.001). Eco-friendly attitude had a correlation with awareness of environmental problems (r=0.29, p<0.001) <Table 3>.

〈Table 3〉 Levels of awareness of environmental problems, eco-friendly attitude and eco-friendly nursing practice

Variable	Environmental problem awareness	Eco-friendly attitudes	Eco-friendly health care
Eco-friendly attitudes	.29 (<.001)		
Eco-friendly nursing practice	.46 (<.001)	.36 (<.001)	1

3.4 Factors influencing eco-friendly nursing practice

A multiple regression analysis was performed to study the influence of demographics, awareness of environmental problems and eco-friendly attitude on eco-friendly nursing practice <Table 4>

Predictors were selected from variables that indicated statistically significance differences in the test between eco-friendly nursing practices based on demographic profiles. Predictors included age, level of education, environmental training, level of interest in environmental preservation, awareness of environmental problems, and eco-friendly attitude. Dummy variables were established for analysis based on nominal variables of ages 20 to 29, educational level of technical college and above, and high interest in environmental preservation. Checking for multicollinearity prior to the multiple regression analysis showed that the correlation coefficient between all variables did not exceed 0.80 with tolerance limit of more than 0.1 and variance inflation factor (VIF) below 10, indicating that multicollinearity was not present for any of the variables.

Predictors that affected the practice of eco-friendly nursing for the subject were awareness of environmental problems (β p<0.001), eco-friendly attitude (β=0.24, p<0.001) and environmental training (β=0.22, p<0.009). The explanatory power on eco-friendly nursing practice of these variables was 34.0% <Table 4>.

〈Table 4〉 Factors influencing eco-friendly nursing practice

Variables	β	t	p	R^2
Environmental problem awareness	.35	4.83	<.001	.21
Eco-friendly attitudes	.24	4.54	<.001	.27
Environment education	.24	3.11	.001	.31
Environment pollution concern	.22	2.15	.009	.35
Adj. R^2=.34, F=22.25, p<.001				

4. Discussion

This study aimed to analyze results of testing differences in eco-friendly nursing practice based on demographical variables, and determine the correlation between awareness of environmental problems and eco-friendly attitude. It was discovered that the higher the age, educational level, degree of environmental training and interest in environmental preservation, the higher the level of practice of eco-friendly nursing was.

The age and educational level variables were in agreement in both the environmental awareness and environmental practice surveys [18,19]. Lower results were found for younger nurses who had reduced awareness of the responsibility of eco-friendly nursing due to the occupational demands placed on them, but additional research will be needed for further evidence. Training can have a positive impact on eco-friendly nursing, as it can enhance the understanding of environmental problems and help subjects adopt a more eco-friendly perspective [20].

The results on environmental training are aligned with the results of Ahn and Lee [12] and Sung [5]. The formulation of environmental awareness based on knowledge and experience had a positive impact on eco-friendly nursing practice.

Among the nurses surveyed for this study, 15.7% had received environmental training, and a need was identified for a variety of training and education on environmental issues in order to reduce the chemical contamination and social burden of disease within the hospital setting.

Positive correlations exist between the awareness of environmental problems, eco-friendly attitude and eco-friendly nursing practice of the subject. A higher degree of performing eco-friendly nursing practice was found for subjects with higher awareness of environmental problems and more positive eco-friendly attitudes [21]. Factors that impact eco-friendly nursing practice include awareness of environmental problems, eco-friendly attitude, awareness of the need for environmental preservation, and environmental training [22]. These variables were found to explain 34% of eco-friendly nursing practice. These results are in alignment with findings on eco-friendly practices based on the awareness of environmental problems in Ahn and Lee [12] and Sung [5]. Awareness of environmental problems entails the recognition of the seriousness of environmental problems including air pollution, global warming, water contamination, soil contamination, resource depletion and energy shortage. The presence of this awareness drives more eco-friendly actions. Nursing is ultimately about people and the environment, the two pillars of the study of nursing; awareness of environmental problems is an important factor in the motivation to carry out more eco-friendly nursing practice. Idea contests and incentives for encouraging eco-friendly nursing practice may help raise awareness of our most serious environmental problems.

Eco-friendly attitude had the second-highest explanatory power, and a positive attitude led to eco-friendly nursing practice [13]. The environmental problems in the community were closely related to health. The results of Sung also agrees. Groups exposed to more environmental training have a higher interest in the environment [14,15]. Hospital nurses operate a variety of medical equipment and products, and environmental training enables nurses to engage in

eco-friendly nursing practice. Higher interest in environmental preservation also leads to a greater effort to provide more eco-friendly healthcare service [16,17]. The optimal strategy for increasing the practice of eco-friendly nursing, therefore, likes in establishing a diverse array of green team systems and providing sustained environmental training.

5. Conclusion and recommendation

This study aimed to provide data and material for developing eco-friendly nursing programs by determining the factors that impact the practice of eco-friendly nursing by hospital nurses. The results of this study indicate that higher awareness of environmental problems, eco-friendly attitude, interest in environmental contamination and level of environmental training led to more eco-friendly nursing practice. The biggest determining factor of eco-friendly nursing practice was found to be the awareness of environmental issues. Based on these results, this study recommends the following: first, a larger random sampling of subjects should be carried out to increase the representativeness of results; second, eco-friendly programs for hospitals should be developed.

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