

Factors Affecting the Performance of Healthcare-Associated Infections (HAIs) control- Focus on Empowerment and Awareness of General Hospital Nurses

Jeoung-Mi Kim¹, Young-In Han²

¹Associate Professor, ²Assistant Professor, department of nursing, Kaya University

E-mail : Jeoung66@kaya.ac.kr, hyihi@kaya.ac.kr

Abstract

The aims of the study to investigate the relationship between awareness, empowerment and performance of healthcare associated infections (HAIs) control and to identify factors influencing performance of HAIs among general hospital nurses. Data were collected from 230 nurses in two general hospitals in B city, with the questionnaire of an empowerment, awareness and performance of infection control tool. The data were analyzed by t-test, one-way ANOVA, Pearson's correlation coefficient and multiple regressions. The performance of infection control was significantly correlated with empowerment and awareness of infection control. The empowerment had a positive correlation with an awareness of infection control ($r = .233, p < .001$) respectively. The infection control performance was influenced by infection control awareness, empowerment and number of annual job training, which explained 42.2% of the performance of infection control. Infection management performance of general hospitals nurses is affected not only by infection awareness but also by empowerment and job education. Therefore, it suggests that HAIs management program could develop for the nurses and provide empowerment with job training to improve the management and performance of HAIs, also to reinforce via constant support by the hospital.

Key words: Infection control performance, Infection control awareness, HAIs(healthcare associated infections), hospital nurse

1. Introduction

Health care delivery services are encountered with a major problem of infection worldwide. It is one of the important causes of morbidity and mortality related to clinical, diagnostic and therapeutic procedures [1]. Healthcare-associated Infections (HAIs) is a term referring to an infection of any disease that may occur within a hospital or health care setting [2]. The Centers for Disease Control and Prevention (CDC) estimates that 2 million patients suffer from HAIs every year and nearly 100,000 of them die [3]. In addition, the CDC reported almost 10% of all hospitalized patients would affect with an infection directly or indirectly during their hospitalization. South Korea has been leading the healthcare-associated infection surveillance system (KONIS),

starting from the intensive care unit of 44 general hospitals and university hospitals nationwide since 2006 and there have been some changes since 2016 [4]. Korean Association of Infection Control Nurses (KONIC) reported, there were 7.6 cases (7.5%) of healthcare associated infections between 2006 and 2007 (95% confidence interval, CI, 7.34-8.17) 3.80 in 2013 and 2.87 in 2016 and 2017, respectively [5].

Koch et al [6] noted most of the HAIs are caused by the transmission of pathogens from person to person, especially by health care workers who failed to follow the basic hygienic protocol properly and the same result was found in the study related to HAIs [7]. The incidence of HAIs can increase the severity of the patient, the cost of healthcare associated expenses by prolonging the duration of additional treatment, hospitalization and increase the mortality rate of the patient [8]. Kennedy et.al [9] reported several studies were performed to assess the knowledge, attitudes, and practice due to not following the hand hygiene guidelines. Yuan and colleagues revealed that compliance with hygiene protocols by health care workers are poor due to several circumstances like heavy workload, a number of clinical procedures and skin conditions of health care workers [10]. In another hand, HAIs would have been mostly avoidable by strictly following the Infection Prevention and Control (IPC) practices [11]. In HAIs nurses are the first person of directly providing the care and they play a key role in effective IPC activities such as assessing, diagnosing or identifying signs and symptoms of infection [12].

In order to minimize the incidence of infection, the nurse should have empowered to actively control the interaction of various factors affecting their own practice [13]. Nurses must fulfill their duties faithfully and take pride in their work efficiency in the prevention of HAIs with Self-efficacy, organizational commitment, and empowerment. In order to achieve these goals, nurses are required to have empowerment [14][15]. However, the prevention of HAIs is possible when all the healthcare personnel remember the importance of HAIs while contacting the patient and the need to prevent infection. Especially the nurses who are providing direct nursing care to the clients and handle the closest place to the patient. If an effective nursing practice related to prevention of HAIs implemented, it can be possible to minimize the occurrence of HAIs.

Therefore, the aim of the study was to assess the factors that affect empowerment, awareness, and performance of HAIs among nurses at integrated hospitals.

2. Research Methods

2.1 Research Design

The study adapted descriptive cross-sectional survey design.

2.2 Population and settings

The study participants were nurses selected from two integrated hospital located in B city. Total 245 nurses recruited; finally data was 230 due to missed data. The samples size was calculated by G*Power 3.1. The multiple regression analysis requirements were medium effect 0.15, the level of significance .05 and the power .95. The required samples were 172, so 230 samples were highly appropriate to proceed the study.

2.3 Research Materials

The study materials consisted 7 items of general characteristics, 12 items of empowerment, 37 items of awareness of HAIs control, and 37 items of HAIs control performance. The totals of 93 items were used to collect the data.

2. 3.1 Empowerment

Empowerment measurement tool constructed by Spreitzer [16] and modified by Ku [17] with four dimensions of empowerment such as meaning, competence, self-determination and impact. The tool consists of 12 items and 3 items for each dimension. The tool measured by 5-point Likert scale (5= very strongly and 1=strongly disagree) the higher score indicates high empowerment. The reliability of the tool was Cronbach's $\alpha = .96$ [16], Cronbach's $\alpha = .96$ [17] and Cronbach's $\alpha = .896$ in the study.

2. 3.2 Awareness of HAIs control

The tool was developed by Kim [18] based on the previous research and modified by Hong and colleagues [19]. The scale subdivided in to six dimensions, totally with 37 items measured by 5-point Likert scale. There were hand hygiene (9 items), intravenous catheter infection control (9 items), urine infection control (7 items), pneumonia management (7 items), isolation (4 items), disinfection & sterilization management (3 items). Each item is measured as very important (5), important (4), normal (3), not important (2), not important at all (1) and the higher the score, the higher the awareness of HAIS control. The reliability of the instrument was Cronbach ' $\alpha = .972$ [19] and Cronbach' $\alpha = .975$ in this study.

2. 3.3 Performance of HAIs control

The tool was developed by Kim [18] based on the previous research and modified by Hong and colleagues [19]. The scale subdivided in to six dimensions, totally with 37 items measured by 5-point Likert scale There were hand hygiene (9 items), intravenous catheter infection control (9 items), urine infection control (7 items), pneumonia management (7 items), isolation (4 items), disinfection & sterilization management (3 items). Each item is measured as very important (5), important (4), normal (3), not important (2), not important at all (1) and the higher the score, the higher the awareness of HAIS control. The reliability of the instrument was Cronbach ' $\alpha = .972$ [19] and Cronbach' $\alpha = .938$ in this study.

2. 4 Data collection and Procedure

Data collection was performed from February to March 2017 among nurses working in special and general wards at two integrated hospitals in B city. Each department head was contacted by the first author for prior permission. The purpose and necessity of this study was described and discussed and all the participants were signed in written consent. The selected tools were issued to 245 nurses and they had an equal time to respond to all the questions by the facilitator. The total of 230 data was finalized for further analysis due to the missed data.

2. 5 Ethical Considerations

The Institutional Review Board (IRB) approved by Kaya IRB - 167 from kaya Research Ethics Review Board. It was explained that participation was voluntary and could be withdraw at any time. The purpose and process of study provided in both oral written consent forms. Data collected were stored in compliance with IRB standards.

2. 6 Data Analysis

The collected data were analyzed using IBM SPSS 21.0. The descriptive statistics used to find the difference of the empowerment, awareness and performance of HAIS control according to the general

characteristics of the participants by Frequency, Mean and Standard Deviation, t-test, one-way ANOVA and Scheffe's test. The correlation between the participant's empowerment, awareness of infection and performance of infection control were analyzed by Pearson's correlation coefficient. Factors influencing the performance of infection control was analyzed by stepwise multiple regression.

3. Results

3.1 General characteristics

The mean score of the average age was 28 years old and most of them married (82.2%). In 55.2% of the participants were graduated from colleges were graduates, followed by university graduates. According to the common job position, most of them in general ward (86.5%), Ward incharges (8.3%), and head nurses (5.2%). The mean total clinical experience of the participants was 5 years and the most common was less than 3 years (47%). At present working departments were inpatient wards (53.9%) and special departments (33.9%) such as emergency room, operating room, and specialized room. The number of job training in annual, majority of the participants had 6 times or more and 39.6% of them less than 10 times. The empowerment scores were as follows the age ($F = 7.108, p < .001$), marital status ($t = 4.237, p < .001$), job position ($F = 8.997, p < .001$) and career experience ($F = 8.796, p < .001$). In addition, the performance of HAIS control ($F = 3.235, p < .041$) also shown significantly difference. Whereas, there was no significant difference between general characteristics of the participants and awareness of HAIS control (Table 1).

3.2 Value of empowerment, awareness and performance of HAIS control

The study results showed in table 2 that, the score of empowerment was $3.37 \pm .50$ points on the 5 - point scale. The highest score was meaning ($3.78 \pm .70$), and follows self - determination, competence, and impact in order. The average score awareness of HAIS control ($4.68 \pm .39$) in 5point scale and in that isolation ($4.78 \pm .42$) was highest in 5 points scale as followed by disinfection & sterilization management, pneumonia control, vascular catheter infection management, hand hygiene, and control of urinary tract infections. The average score of performance of HAIS control ($4.30 \pm .43$) in 5point scale and in that isolation ($4.49 \pm .60$) was highest then followed by other dimensions.

3.3 Correlation between awareness and performance of HAIS control

The score of relationship exhibited (Table 3) that, performance of HAIS control was correlated with awareness of HAIS control ($r = .631, p < .001$) and empowerment ($r = .270, p < .001$). There was a positive relationship between the empowerment and awareness of HAIS control ($r = .233, p < .001$).

3.4 Factors influencing performance of HAIS control

The stepwise multiple regression analysis was performed with empowerment, awareness and performance of HAIS control with dummy variables to identify the factors affecting the performance of HAIS control among general hospital nurses with their general characteristics. There was no issue found while testing the assumption of regression analysis on independent variables, because the variance expansion factor (VIF) was below 1.4. The tolerance was below 1.0, which was not more than the referred value of 1.0 and more. The awareness of HAIS control and empowerment influenced by the number of job training per year. It was explained 42.2% factors related to performance of HAIS control ($F = 56.657, p < .001$) and showed of awareness of HAIS control ($\beta = .628, p < .001$), empowerment ($\beta = .147, p = .005$), time of annual job training

($\beta=.135$, $p=.010$) was significantly associated with the performance of HAI control. Also, it exhibited significant positive effect on performance of HAI control (Table 4).

4. DISCUSSION

In this study the average score of the empowerment was $3.37 \pm .50$ increased out of 5 points and significantly associated with the self-determination, competence and impact. In another study conducted among nurses of long-term care hospital showed highest score [20] and Choi [21] reported 2.9 score out of 4 points among operating room nurse. These results revealed that perception of meaning was high followed by competence, impact, and self-determination within the dimensions of empowerment. In the previous study [18],[20] the empowerment showed significant difference between self-determination, competence, and impact. Therefore, the meaning is very important in order to achieve the empowerment. The association between empowerment and the general characteristics of the study participants were as follows: those who had older age, were married, held high positions and had more working experiences showed higher empowerment. The same result was supported by another study that the higher job position and work experience were providing more recognition and authorization to get empowerment [21]. The high level of empowerment was achieved due to educational opportunities as a result of confidence in knowing a lot [22] and showed no significant difference. It suggested that development of various educational programs might be actively motivating the nurses to work independently and improve their decision-making ability.

In the present study showed, there was a significant difference in number of annual education related to performance of HAIs according to the general characteristics. Choi [23] reported the performance was higher among the participants, who had a more number of educational opportunities. Some of the previous studies insisted on development of continuing education programmes related to HAIs would be improving the performance of HAIs in clinical settings [24]. As a result of this study, the average performance was 4.68 and awareness of HAIs was 4.30 which were lower than the performance. The results were supported by some of the other studies [25-26]. Isolation (4.78) showed the highest score in terms of awareness of HAIs followed by disinfection management (4.73), pneumonia management (4.71), vascular catheter infection control (4.67), and hand hygiene (4.65) and urinary infection control (4.61). In terms of performance of health care associated infection also showed highest rate in isolation (4.49) followed by disinfection management (4.46), pneumonia management (4.44), urinary infection control (4.29), vascular catheter infection control (4.28), and hand hygiene (4.16) also increased [27][28]. This was found in the previous study [27], which showed highest score of isolation in terms of awareness of HAI control and another study showed a significant difference [28]. In another study the higher rate of hand hygiene was also found and there was a difference in performance of the HAIs [29]. In this study, it was found that there was a difference between awareness and performance of HAI control. Annual education was viewed as a challenge among participants [29]. Since training builds capacity, which has a positive association with compliance with HAI performance, there is an urgent need to organize a workshop, seminars and discussion on HAIs for health care workers in order to maintain high quality infection control practices [30]. The studies stated that the factors which influence the low performance compared to awareness were lack of equipment, manpower and excessive work load [31-33]. In order to improve the performance and awareness, the organization should provide proper work environment and recruit more nurses, and should be given enough time.

The results of this study showed that there was a positive correlation between the awareness of HAI control and performance of HAI control. Also it showed statistically significant difference with empowerment. The acquisition of diverse awareness and performance required among nurses to improve their confidence themselves in professional way in their work. Therefore, after analyzing the causes of low performance compared to recognition, specialized education should be implemented continuously for prevention of HAIs. Also, it is necessary to continuously improve the awareness and performance of healthcare associated nurse's infection control management a concrete and desirable solution should be considered. In addition, strengthened empowerment should be made to improve the performance of HAI control.

5. CONCLUSION

The study aims to investigate the factors influencing the performance of HAIs control and to find the relationship between awareness, empowerment and performance of HAIs control. The study participants were nurses who working in special departments and general wards at two integrated hospital located in B city. In this study 245 nurses were recruited and collected data. Final data were analyzed with 230 participants due to the incompleting data. The instruments were empowerment 12 items, awareness and performance of HAIs control tool with 37 items in each. The collected data were analyzed by IBM SPSS Win 21.0 with descriptive statistics, t-test, one-way ANOVA, Scheffe's test, Pearson's correlation, Stepwise multiple regression. The results of this study showed high level of empowerment (3.37/5points) were showed due to number of annual educational training. So, it is necessary to develop a continuing education program which influences the empowerment.

Conflict of interest

The authors declared no conflict of interest.

Table 1. Difference of Empowerment, Awareness and Performance of HAIs Control according to Demographic Characteristics

HAIs: Healthcare Associated Infections

Variables	Category	N	%	Mean±SD	Empowerment		Awareness of HAIs Control		Performance of I HAIs Control	
					Mean±SD	t/F(p) (Scheffé)	Mean±SD	t/F(p) (Scheffé)	Mean±SD	t/F(p) (Scheffé)
Age(yrs)	^a 23>	44	19.1	28.00±5.477	3.23±.41	7.108 (<.001) a,b,c<d,e	4.74±.36	1.336 (.257)	4.75±.34	2.262 (.063)
	^b 23≤~<25	60	26.1		3.26±.44		4.60±.45		4.54±.52	
	^c 25≤~<30	67	29.1		3.28±.51		4.67±.42		4.65±.45	
	^d 30≤~<40	50	21.7		3.53±.41		4.70±.33		4.69±.33	
	^e 40≤	9	3.9		3.94±.65		4.85±.22		4.85±.22	
Marriage	experienced	41	17.8	3.67±.50	4.237 (<.001)	4.67±.41	-.119 (.905)	4.33±.50	0.446 (.656)	
	inexperienced	189	82.2	3.30±.47		.39±.02		4.30±.42		
Education	3-years course	127	55.2	3.34±.46	1.572 (.210)	4.66±.43	.227 (.797)	4.65±.44	.790 (.455)	
	Bachelor	101	43.9	3.38±.52		4.70±.35		4.66±.42		
	Master degree	2	.9	3.95±1.47		4.74±.36		4.66±.47		
Position	^a Staff nurse	199	86.5	3.31±.47	8.997 (<.001) a<b,c	4.66±.41	1.648 (.195)	4.64±.44	.832 (.437)	
	^b Charge nurse	19	8.3	3.65±.33		4.80±.27		4.69±.33		
	^c Head nurse	12	5.2	3.81±.75		4.80±.24		4.80±.23		
Total Career length (yrs)	^a 3>	108	47.0	5.00±5.080	3.22±.46	8.796 (<.001) a,b,c<d,e	4.69±.37	1.044 (.385)	4.65±.43	.327 (.880)
	^b 3≤~<6	52	22.6		3.39±.51		4.64±.39		4.62±.46	
	^c 6≤~<9	20	8.7		3.23±.38		4.57±.54		4.63±.57	
	^d 9≤~<12	19	8.3		3.63±.40		4.64±.39		4.67±.36	
	^e 12≤	31	13.5		3.72±.49		4.77±.27		4.73±.29	
Type of Unit	Medica Ward	69	30.0	3.30±.51	.974 (.435)	4.64±.45	.785 (.576)	4.65±.45	1.514 (.186)	
	Surgical Ward	55	23.9	3.36±.49		4.64±.38		4.61±.41		
	ER	27	11.7	3.50±.37		4.70±.43		4.76±.42		
	OR	25	10.9	3.31±.43		4.66±.40		4.59±.49		
	ICU	26	11.3	3.33±.66		4.71±.32		4.55±.48		
	Other unit	28	12.2	3.48±.51		4.80±.27		4.80±.27		
Annual Job training (time)	^a 5>	59	25.7	3.26±.46	1.890 (.153)	4.64±.45	.618 (.540)	4.20±.43	3.235 (.041) a,b<c	
	^b 5≤~<10	91	39.6	3.37±.50		4.67±.38		4.30±.43		
	^c 11≤	80	34.8	3.36±.52		4.71±.36		4.39±.42		

ER: Emergency Room, OR Operation Room, ICU Intensive Care Unit

Table 2. Value of Empowerment, Awareness and Performance of HAIs Control

(n=230)

Variables	Category	Mean±SD
Empowerment	Meaning	3.78±.70
	Competence	3.28±.61
	Self-determination	3.30±.64
	Impact	3.13±.66
	Over all Empowerment	3.37±.50
Awareness of HAIs Control	Hand washing	4.65±.43
	Vascular catheter infection management	4.67±.45
	Urinary tract infection control	4.61±.47
	Pneumonia control	4.71±.47
	Isolation	4.78±.42
	Disinfection & Sterilization management	4.73±.48
	Over all recognition	4.68±.39
Performance of HAIs control	Hand washing	4.16±.51
	Vascular catheter infection management	4.28±.55
	Urinary tract infection control	4.29±.55
	Pneumonia control	4.44±.62
	Isolation	4.49±.60
	Disinfection & Sterilization management	4.46±.68
	Over all performance	4.30±.43

HAIs: Healthcare Associated Infections

Table 3. Correlations between Empowerment, Awareness and Performance of HAIs Control

(n=230)

Variables	Performance of HAIs Control	Empowerment	Awareness of HAIs Control
	r(p)	r(p)	r(p)
Performance of HAIs Control	1		
Empowerment	.270(<.001)	1	
Awareness of HAIs Control	.631(<.001)	.233(<.001)	1

HAIs: Healthcare Associated Infections

Table 4. Factors Influencing of Performance of HAIs Control

(n=230)

Variables	β	SE	β	t	p	VIF
Constant	.719	.269		2.676	.008	
Awareness of HAIs Control	.668	.055	.628	12.083	<.001	1.024
Empowerment	.099	.035	.147	2.823	.005	1.026
Annual Job training(time)	.077	.029	.135	2.618	.010	1.012

R² = .429, Adj.R² = .422, F=56.657, P<.001, Durbin-Watson =1.673

HAIs: Healthcare Associated Infections

References

- [1] R. A. Lacerda, E. Y. Egry, “Hospital infections and their relationship to the development of hospital care: analysis of current control practices”. *Revista Latino-Americana de Enfermagem*, Vol. 5, No.4, pp.13-23, 1997. <http://dx.doi.org/10.1590/S0104-11691997000400003>
- [2] C. A. Umscheid, R. K. Agarwal, P. J. Brennan PJ, Healthcare Infection Control Practices Advisory Committee. “Updating the guideline methodology of the healthcare infection control practices advisory committee (HICPAC)”. *American Journal of Infection Control*, Vol. 38, No.4, pp.264-273, 2010. <https://doi.org/10.1016/j.ajic.2009.12.005>
- [3] The Institute of Internet, Centers for Disease Control and Prevention, Korean national healthcare-associated infections surveillance system, 2012. Submission of manuscript. <http://www.cdc.go.kr/>
- [4] Korean Society for Nosocomial Infection Control. *KONIS Manual 2016*, 6, Seoul: Ceed Communications, pp. 5-18, Oct. 1-10, 2016.
- [5] Korean Association of Infection Control Nurses (KAICN), *Text of infection control*, Hyunmoon Publishing Co, pp. 381-390, 2012.
- [6] A. N. Koch, R. M. Nilsen, H. M. Eriksen, R. J. Cox, S. Harthug, “Mortality related to hospital associated infections in a tertiary hospital; repeated cross sectional studies between 2004-2011”, *Anti-microbial Resistance and infection control*, Vol. 4, No. 57, pp.2-8, 2015. <https://doi.org/10.1186/s13756-015-0097-9>
- [7] W. O. Adebimpe, E. O. Asekun-Olarinmoye, J. O. Bamidele, O. Abodunrin, A. Olowu, A comparative study of awareness and attitude to nosocomial infections among level of health care workers in South Western Nigeria. *Continental Journal of Tropical Medicine*, Vol. 5. No. 2, pp. 5-10, 2011. <http://www.wiloludjournal.com>
- [8] M. K. Lee, Intensive care unit nurses' knowledge, recognition, and performance of hospital infection control, Master's thesis. Eulji University, Suwon, 2012.
- [9] A. M. Kennedy, A. M. Elward, V. J. Fraser, “Survey of knowledge, beliefs and practices of neonatal Intensive Care Unit health care workers regarding nosocomial infections, central venous catheter and hand hygiene”, *Infection Control & Hospital Epidemiology*, Vol. 25, No. 9, pp. 747–752, 2004. <https://doi.org/10.1086/502471>
- [10] C. T. Yuan, L. M. Dembry, B. Higa, M. Fu, H. Wang, E. H. Bradley. “Perceptions of hand hygiene practices in China”, *Journal of Hospital Infection*. Vol. 71, No. 2, pp. 157–162, 2009.

<https://doi.org/10.1016/j.jhin2008.09.017>

- [11] The Institute of Internet, Healthy People.gov. Healthcare-associated infections, Washington: Healthy People.gov, 2018. Submission of manuscript. https://www.healthypeople.gov/2020/topics_objectives/topic/healthcare-associated-infections.
- [12] N. Y. Yang, S. J. Lee, "Awareness and Performance of Healthcare-Associated Infections Control and Psychological Empowerment of Intensive Care Unit Nurses", *Journal of Korean Academic Society of Home Health Care Nursing*, Vol. 24, No. 3, pp. 306-331, 2016.
- [13] H. K. Laschinger, J. Shamian, "Staff nurses' and nurse managers' perceptions of job related empowerment and managerial self - efficacy", *The Journal of nursing administration*, Vol. 24, No. 10, pp. 30-35, 1994. <https://doi.org/10.1097/00005110-199410000-00009>
- [14] Y. W. Jung, Y. H. Lee, B. C. Yu, "The relationship of nurse's awareness, performance for nosocomial infection control and psychological empowerment," *Kosin Medical Journal*, Vol. 23, No. 2, pp.85-91, 2008.
- [15] H. Ku. Clinical nurses's perception of empowerment structural model in nursing organization. PhD Thesis. chungnam University, Deajeon, 2000.
- [16] Spreitzer, G. M. Psychological Empowerment in the Workplace: Dimensions, Measurement, and Validation. *Academy of Management Journal*. Vol. 38, No. 5, PP.1442, 1995.
- [17] B. D. Ku. An empirical study on the effect of transformational leadership and paternalistic leadership to empowerment and organizational commitment. PhD Thesis. Hankuk University of Foreign Studies, Seoul, 1999.
- [18] B. H. Kim, A study on the degrees of awareness and performance of the hospital infection control among clinical nurses in a small-sized hospital, Master's thesis. Yeonsei University, Seoul, 2003.
- [19] S. Y. Hong, Y. S. Kwon, H. O. Park, "Nursing students' awareness and performance on standard precautions of infection control in the hospital," *The Journal of Korean Academic Society of Nursing, Education*, Vol.18, No. 2, pp.293-302, 2012.
- [20] H. Y. Jung, Y. K. Jung, "Recognition and Performance Level of Hospital Infection Control in Nurses of Long-term Care Hospital", *The Korean Journal of Health Service Management*, Vol. 7, No. 4, pp. 131-141, 2013. <http://dx.doi.org/10.12811/kshsm.2013.7.4.131>
- [21] M. H. Choi, The relationship between the awareness and performance regarding to infection management and the psychological empowerment of operating room nurses, Master's thesis. Ajou University, Suwon, 2003.
- [22] S. H. Kim, Study on the Empowerment of Artificial Kidney Center Nurses, Master thesis. Gyeongsang National University, Gyeongnam, 2005.
- [23] M. A. Choi, A study on the level of recognition and performance of the clinical nurses about the management of nosocomial infection, Master's thesis. ChungAng University, Seoul, 2002.
- [24] H. J. Kim, Evaluation on recognition & performance levels for the prevention of nosocomial infection among nurses. Master's thesis. Soonchunhyang University, Asan, 2010.
- [25] S. Y. Park, D. S. Shin, H. G. Lee, H. S. Kim, "Compliance with nosocomial infection control and related factors among emergency room nurses." *Journal of Korean Academy of Fundamentals of Nursing*, Vol. 15, No. 2, pp.153-160, 2008.
- [26] M. J. Kim, Correlation among knowledge, awareness, and performance of the hospital infection control in clinical nurses. Master's thesis. Chodang University, Muan, 2010.
- [27] M. K. Lee, Intensive care unit nurses' knowledge, recognition, and performance of hospital infection control. Master's thesis. Eulji University, Suwon, 2012.
- [28] S. Y. Jeong, "The standard precautions among isolation precaution." Korean Society for Healthcare-associated Infection Control and Prevention 13th conference. pp. 48-56, 2008.

- [29] J. Y. Yoon, Influencing Factors on Practice of Healthcare-associated Infection Control among Clinical Nurses. Master's thesis. Chosun University, Gwangju, 2012.
- [30] H. M. Park, Study on the level of recognition and performance of the clinical Nurses about the management of nosocomial infection, Master's thesis. Chonnam National University, Gwangju, 2014.
- [31] J. M. Yoon and M. H. Song, "The Relationship between Empowerment and Performance of Infection Control by Emergency Department Nurses". *Journal of Korean Academy of Fundamental Nursing*. 2009, Vol.16, No.4, pp. 412-420. UCI : G704-001689.2009.16.4.014.
- [32] J . Y. Yun, S. O. Kim, I. S. Kim, "Influencing Factors on Practice of Healthcare-associated Infection Control among Clinical Nurses, *Korean Journal of Occupational Health Nursing*, Vol. 23, No. 4, pp. 208-218, 2014. <http://dx.doi.org/10.5807/kjohn.2014.23.4>.
- [33] M. H. Lee, I. S. Kim, "A Study on the Awareness and Performance Levels on the Prevention of Hospital Infection among Intensive Care Unit Nurses." *Korean Journal of Maternal & Child health*. Vol.6, No. 2, pp.197-210, 2002.