

Knowledge of Intravenous Injection, Self-Confidence, Performance Ability and Critical Thinking Disposition in Korean Nursing Student

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Abstract:

This study is a cross-sectional study conducted to identify the convergence relationship peripheral intravenous (IV) injection knowledge, self-confidence, performance, and critical thinking disposition in Korean nursing students. Participations were satisfied with practice lecture showed higher score in self-confidence and critical thinking disposition for intravenous (IV) injection. Also, participations were interested in practice lecture showed higher score in self-confidence and critical thinking disposition. There was a significantly positive correlation between self-confidence and performance. Also, critical thinking disposition correlated with self-confidence. In order to improving nursing practice for IV injection of Korean nurse students, it is necessary to develop education program for improving their self-confidence, performance and critical thinking disposition.

Keywords: Nursing student, intravenous catheter, knowledge, Self-confidence, Competence, Critical thinking disposition

1. INTRODUCTION

Intravenous (IV) injection is the best measure that can expect exact and quick effect during the emergency, acute care and transfusion, and is used widely such as the case that the oral administration is difficult, administration for test, anesthesia, etc [1]. Although it is performed on more than 80% of inpatients [2], it is one of the greatest fears for the patient because it is an invasive procedure. For the safety of the patient and the quality of medical care, it should be made within minimum attempt but the failure ratio of the IV inject is reported as 35~50% [2]. If the IV injection is not performed correctly, as diverse complications are caused for the patients such as phlebitis, infiltration, infection related to catheter insertion, etc. it is important to educate

correct IV injection procedure and method to the Korean nursing student [3]

Core Nursing Skill Guidelines of Korean Accreditation Board of Nursing Education demands to perform IV injection within 10 minutes to the Korean nursing students [4]. But in the situation that access to the vein is difficult, various attempts and effort are accompanied. But, 64% of the nurses are implement the IV injection and at least 5-6 hours a day are taken for IV injection [1], [5]. Besides, the medical dispute related to complications of IV injection is being increased and the legal responsibility is increased in the IV injection management [2]. Therefore, to enhance the patient's safety and for legal defense, the nursing student should have the knowledge on the IV injection with clear basis and the enhancement of IV injection

performance skill is required through systematic education.

Although the IV injection is difficult and invasive procedure, most of the nurses have not received the systematic and professional training and are learning by doing in the clinical practice without having substantial education and opportunity to practice it [2], [6]. Meanwhile, the systematic education of IV injection can enhance the knowledge on the IV injection and the performance ability [7], and can more the complication related to the IV injection was reduced [2]. Therefore, before starting the systematic education of IV injection, measuring the knowledge in the Korean nursing student and verifying the degree of IV injection performance ability are important.

Because the patient's safety was emphasized, most Korean nursing students are educated to practice on IV injection through a model in the school practice [7]. And more than 70% of the Korean nursing students just observe IV injection to patients in the clinical practice [8]. Moreover, Korean nursing students want that the actual nursing services (nursing central vein cannulation, chemoport nursing, etc.) related to the IV injection would be applying what they have learned in to the clinical site, but they are experiencing the limitation [9]. This may result in the degradation of self-confidence for the IV injection performance of nursing students. Since the Korean nursing student's self-confidence may have diverse influences on the practice satisfaction, interest, performance ability, etc [10], the change in the curriculum is required to enhance the self-confidence related to IV injection in the Korean nursing student.

The critical thinking disposition refers to the motive and attitude to try to think critically placing the importance on the critical thinking [11]. Korean Accreditation Board of Nursing Education; KABNE) recommends to raise the nursing performance ability based on the critical

thinking as a learning outcome of nursing education, which is because the higher the critical thinking disposition, the more the nursing performance ability can be enhanced [8], [12], [13]. However, in the research related to the IV injection of Korean nursing student, there are lots of researches on the knowledge on the IV injection, self-confidence and performance ability but there are few research on these variables and the critical thinking.

Therefore, this study was intended to provide the basic data to establish the strategy for the efficient application to the IV injection education method for Korean nursing student by identifying the relations with the knowledge on the IV injection, self-confidence, performance ability, and critical thinking disposition of Korean nursing student.

2. MATERIALS AND METHODS

2.1. DESIGN

This study is the descriptive correlated study performed to verify the degree of knowledge on the intravenous (IV) injection, self-confidence, performance ability and critical thinking disposition in the Korean nursing student and to find out the relations among them.

2.2. RESEARCH SUBJECT

The subjects of this study were 158 students who as the nursing student of an university located at K Province in Korea, have heard the explanation on the purpose and process of the research in advance and agreed voluntarily to participate in the study. This study was performed with sophomore students as they were deemed to be appropriate to develop the curriculum of IV injection skills as they learn and practice the IV injection for the first time completing the basic nursing practice course.

The explanatory note explaining that the anonymity of the subject is guaranteed, the collected research data will not be used other than research purpose and although they do not participate in this study, it will not affect the practice evaluation was provided and made them to participate voluntarily. The number of sample was computed using G*Power 3.1. This study was correlation analysis and required at least 111 persons in the results of computing with the effect size of 0.3, significance level of 0.05, and the power level of 0.95. As this study used total 154 questionnaires excluding 4 questionnaires answered improperly out of 158 subjects, this criteria was satisfied.

2.3. MEASUREMENTS

2.3.1 KNOWLEDGE ON INTRAVENOUS INJECTION: To measure the knowledge on the IV injection, the researchers developed total 20 questions based on the basic nursing practice textbooks and the Evidence-based Practice Guidelines-IV Injection Therapy by Hospital Nurses Association and their content validity was verified through the consultation of 2 professors in basic nursing and 3 clinical experts who have more than 10 years of clinical career. The right answer for each question was processed with 1 point and wrong answer was with 0 point, and the range of the score was 0 to 20 points and the higher the score, the higher the knowledge. The reliability of this study was KR (Kuder-Richardson) -20 = .91.

2.3.2 SELF-CONFIDENCE ON INTRAVENOUS INJECTION: For the self-confidence on the IV injection, 1 nurse who was proficient in Korean and English performed the translation and back translation with the questionnaire to measure the self-confidence on the IV injection designed by previous study [6] and 1 professor of basic nursing and 1 nurse

having qualification of critical care APN reviewed. The self-confidence on the IV injection was 5 questions and measured with 5-point Likert scale, and the range of the score was 0 to 25 points showing that the high the score, the higher the self-confidence. Cronbach's alpha at the time of developing the tool was .88 and in this study, it was .92.

2.3.3 INTRAVENOUS INJECTION PERFORMANCE ABILITY: To measure the IV injection performance ability, out of the Core Fundamental Nursing Skills of Korean Accreditation Board of Nursing Education [5], 29 questions in the IV injection checklist were used evaluating the non-performance as 0 point and performance as 1 point based on the theoretical evidence of the Basic Nursing Practice Textbook [14]. Through the checklist, 2 evaluator verified the evaluation item and practiced enough so that they can match with the evaluation results through the practice. Average score was calculated by evaluating at the same time when measuring IV injection performance ability. The preceding research on the IV injection performance ability evaluated the IV injection skills through the 16 questions out of the IV injection skills checklist of Korean Accreditation Board of Nursing Education as same as this and its Cronbach's alpha was .79. In this study, KR (Kuder-Richardson) -20 was .90.

2.3.4 CRITICAL THINKING DISPOSITION: For the critical thinking disposition, the measuring tool of critical thinking disposition developed by previous study [11] was used. This tool has total 27 questions composed of 7 sub-categories of sound skepticism (4 questions), intellectual fairness (4 questions), objectivity (3 questions), system (3 questions), prudence (4 questions), intellectual passion/curiosity (5 questions) and self-confidence (4 questions). Each question was

measured with 5-point Likert scale from 1 point to 'Not at all' to 5 points to 'Absolutely right' and the negative questions were calculated with reverse conversion. The higher the score, the higher critical thinking disposition and for the reliability of the tool, Cronbach's alpha in the previous study [11] was .89 and in this study it was .95.

2.4. DATA COLLECTION

The data has been collected from November 28, 2016 to December 16, the IV injection skill practice period after the theoretical class on the IV injection. During the IV injection skill practice, one of researchers evaluated the IV injection performance ability and measured the knowledge and self-confidence on the IV injection and the critical thinking disposition by distributing the questionnaire after finishing the practice.

2.5. DATA ANALYSIS

The collected data was analyzed using SPSS 20.0. For the general characteristics of the subject, descriptive statistics was performed and the difference in the dependent variables according to the general characteristics was analyzed with t-test, one-way ANOVA. For the post hoc analysis, Scheffe test was used. In addition, to find out the relations among the knowledge, self-confidence, performance ability of the IV injection and the critical thinking disposition, Pearson's correlation analysis was performed.

2.6. ETHICAL CONSIDERATION

This researcher explained the purpose of this study and that the collected data is encoded anonymously by computer and will not be used other than the research purpose. And after explaining that participating in the study is

voluntary and those who do not participate or stop answering the questionnaire in the middle of study will not be affected, the data collection started.

3. RESULTS

3.1. GENERAL CHARACTERISTICS OF SUBJECT

The results of analyzing the general characteristics of the subject are shown in Table I. The subjects who participated in this study were mostly female (87.7%). In the grade of previous semester, 3.5 to 4.0 was 57 (37.0%), 3.0 to 3.5 was 48 (31.2%), less than 3.0 was 25 (15.6%) in order. The students who satisfied with basic nursing practice were 110 (71.4%) occupying majority and students who did not satisfy with the practice were 6 (3.9%). And there were no students who do not have interest in the practice. In addition, The students who showed the active attitude on the practice were 95 (61.7%) and those who were inactive were 3 (1.9%).

Table I. General Characteristics of Participants (N=154)

Characteristics		N	%
Gender	Male	19	12.3
	Female	135	87.7
Age(year)	20~25	126	81.8
	26~30	13	8.4
	over 31	15	9.7
	Mean ± SD	23.9 ± 6.35	
Previous Semester Credits	< 3.0	25	16.2
	≤ 3.0 ~ <3.5	48	31.2
	≤ 3.5 ~ <4.0	57	37.0

	≥ 4.5	24	15.6
Practice Satisfaction	Not satisfied	6	3.9
	Moderate	38	24.7
	Satisfied	110	71.4
Practice Interest	Moderate	35	22.7
	Interested	119	77.3
Practice Attitude	Passive	3	1.9
	Moderate	56	36.4
	Active	95	61.7

Self-Confidence	23.56 ± 3.81	15 ~ 30
Performance Ability	26.56 ± 2.07	16 ~ 28
Critical Thinking Disposition	101.62 ± 14.55	67 ~ 135

3.2. MEAN AND STANDARD DEVIATION OF MAJOR VARIABLES

The results of analyzing the subject's knowledge, self-confidence, performance ability on the IV injection and the critical thinking disposition are shown in Table II. The subject's average score of the knowledge on the IV injection was 10.16±2.24 points the average score of the self-confidence was 23.56±3.81 points. The average score of the subject's IV injection performance ability was 26.56±2.07 points and the average score of the subject's critical thinking disposition was 101.62±14.55 points.

Table II. Descriptive Statistics of Variables (N=154)

Variables	Mean ± SD	Range
Knowledge	10.16 ± 2.24	6 ~ 20

3.3. DIFFERENCE IN MAJOR VARIABLES ACCORDING TO GENERAL CHARACTERISTICS

The difference in the knowledge, self-confidence, performance ability of the IV injection and the critical thinking disposition according to the general characteristics of the subjects is shown in Table III. The knowledge and the performance ability of IV injection did not show significant difference according to the gender, age, grade of previous semester, satisfaction with practice, interest in the practice, and attitude toward the practice out of the general characteristics.

The self-confidence of the IV injection was shown significant difference in the satisfaction with practice (F=9.78, $p<.001$), interest in practice (t=17.43, $p<.001$), attitude toward the practice (F=10.66, $p<.001$). The critical thinking disposition showed he significant difference in the satisfaction with practice (F=6.43, $p=.002$), interest in practice (t=14.77, $p<.001$), attitude toward the practice (F=8.83, $p<.001$).

Table III. Difference in Major Variables according to General Characteristics (N=154)

Characteristics		Knowledge		Self-Confidence		Performance Ability		Critical Thinking Disposition	
		Mean±SD	t/F(p)	Mean±SD	t/F(p)	Mean±SD	t/F(p)	Mean±SD	t/F(p)
			post-hoc		post-hoc		post-hoc		post-hoc
Gender	Male	10.21±2.09	0.11 (0.910)	24.95±4.30	1.71 (0.090)	25.74±2.83	-1.88 (0.062)	108.84±20.35	1.71 (0.102)
	Female	10.15±2.27		23.36±3.71		26.68±1.92		100.60±13.33	
Age	20~25	10.22±3.24	0.51	23.40±3.79	0.82	26.49±2.25	0.47	101.51±15.02	0.06

(year)	26~30	10.15±2.23	(0.599)	23.69±3.79	(0.441)	26.77±0.83	(0.625)	101.23±11.88	(0.939)
	over 31	9.60±1.24		24.73±4.06		27.00±0.85		102.87±13.31	
Previous Semester Credits	<3.0	10.56±2.97	1.07 (0.364)	22.40±4.00	1.22 (0.308)	25.92±2.47	2.56 (0.057)	99.16±14.86	0.48 (0.699)
	≤3.0~<3.5	10.27±2.37		23.42±4.03		26.19±2.74		101.25±15.70	
	≤3.5~<4.0	9.75±1.41		24.11±3.24		26.96±1.36		101.98±12.50	
	≥4.5	10.46±2.69		23.75±4.33		27.04±0.91		104.04±16.75	
Practice Satisfaction	Not Satisfied ^a	10.83±4.58	2.56 (0.081)	20.00±6.23	9.78 ($<.001$)	27.17±0.98	0.34 (0.710)	94.58±13.17	6.43 (0.002)
	Moderate ^b	10.79±2.71		21.32±3.14		26.66±1.95		101.66±16.80	
	Satisfied ^c	10.10±1.83		24.31±3.59		26.50±2.15		104.06±14.22	
Practice Interest	Moderate	10.17±2.61	2.85 (0.094)	21.31±3.46	17.43 ($<.001$)	26.80±1.13	0.58 (0.446)	3.66±13.26	14.77 ($<.001$)
	Interested	9.99±2.11		24.22±3.66		26.50±2.27		103.96±14.13	
Practice Attitude	Passive	15.33±0.57	2.44 (0.091)	19.33±3.79	10.66 ($<.001$)	27.00±1.73	2.35 (0.099)	88.67±4.04	8.83 ($<.001$)
	Moderate	13.35±2.12		22.08±3.47		25.95±2.72		95.86±12.43	
	Active	13.85±1.65		24.54±3.44		26.75±1.62		104.32±12.85	

3.4. CORRELATION OF MAJOR VARIABLES

The correlation analysis results among the knowledge, self-confidence, performance ability of IV injection and the critical thinking disposition are shown in Table 4. The self-confidence of IV injection showed the strong positive correlation with the performance ability ($r = .70, p < .001$). In addition, in the relation between the critical thinking disposition and the self-confidence, it showed weak positive correlation ($r = .17, p < .05$).

Table IV. Correlation of Major Variables (N=154)

Variables	KL	SC	PA
	r		
KL			
SC	-0.08		
PA	0.07	.70**	
CTD	-0.01	.17*	0.02

KL: Knowledge SC: Self-confidence CT: Performance Ability CTD : Critical thinking disposition

** $p < .001$, * $p < .05$

4. DISCUSSION AND CONCLUSION

As the demand on the good quality nursing service is increased, the professional and dynamic clinical performance ability is emphasized and to enhance it, the needs of improve the practice education of Korean nursing student are raised. This study was performed to identify the degree of knowledge, self-confidence, performance ability of the IV injection and the critical thinking disposition in the Korean nursing student, and the relation among them.

First, in this study, the self-confident of IV injection was significantly different in the satisfaction with practice, practice interest and the attitude of practice according to the general characteristics of the subjects. Which is similar to the previous studies [10], [12] results performed with the Korean nursing students showing that there is correlation between the self-confidence and the satisfaction with the practice when perform the clinical practice, and

that the more active the attitude of practice the high the self-confidence.

Since as a invasive nursing, the IV injection has a higher risk of failure and is likely to occur patient safety problem, it is the reality that Korean nursing students are learning mostly through observation and have few opportunity to perform the IV injection skill directly to the patient [12]. This would drop the self-confident for the IV injection and reduce the interest related to the IV injection skills. However, the repetitive practice of basic nursing skills utilizing diverse equipments and simulation could enhance the Korean nursing student skills and self-confidence [5], [15] and could result in the positive attitude [16]. Therefore, to maintain the interest continuously in the IV injection in the Korean nursing student and to enhance the satisfaction with practice through the positive attitude, the change of curriculum that increases the practice frequency of IV injection utilizing diverse practice methods such as simulation, VR (Virtual Reality), etc. is required.

Second, the self-confidence of the IV injection showed the strong positive correlation with the performance ability. Since there is no preceding research on the relations between the self-confidence and the performance ability performed with the Korean nursing student, the comparative analysis is difficult but the research [17] that showed the significant difference in the success of IV injection according to the self-confidence after educating the simulation-based IV injection and the research results [18] that showed the enhancement of self-confidence in the Korean nursing student after clinical practice education and show the significant increase in the critical thinking, would support the results of this study indirectly. According to previous studies, after learning the knowledge, skill on the IV injection and applying the program to the Korean nursing student, the knowledge, self-confidence and the comfort related to the IV

injection were increased [2,9]. Therefore, since making the Korean nursing student to experience diverse and qualitative nursing activities could play important role in performing the nursing related to the IV injection and enhancing the self-confidence, the nursing educators should maintain the research on the teach-learning contents and method in order to continue effective IV injection practice education.

Third, in this study, the critical thinking disposition showed significant with the satisfaction with the practice, interest in the practice and the attitude toward the practice, which is similar to the research by Yoon [19] showing that the critical thinking on the patient safety has significant relations with the satisfaction and attitude toward the practice. In the process of exploring and solving on the IV injection by themselves like the problem-based learning [12,19], Korean nursing students are thinking seriously and introspecting about the skills that they should perform and it is deemed that there would be difference according to its results. And the self-confidence for the IV injection showed to have significant correlation with the critical thinking disposition. Since there is no research on the relations between the self-confidence for the basic nursing skills and the critical thinking disposition, the comparative analysis is impossible but according to the research by Lim [20], the self-confident of ethical decision making can enhance the critical thinking disposition, As Korean student can find and solve the problems by themselves through the IV injection skills and judge more prudently, not only their critical thinking disposition is enhanced and the self-confidence could be enhanced. In the meantime, although in this study, there seemed no correlation between the critical thinking disposition and the performance ability, in the research by Park and Hong [10], there was high correlation between the critical thinking disposition and the basic nursing skills. it is deemed that since the difference in the

learning environment, culture, etc of the Korean nursing student would bring the different results.

Fourth, in this study, there was no correlation between the knowledge on the IV injection and the critical thinking disposition, which is deemed because the discrimination of the tool measuring the knowledge on the IV injection was declined as it is measured with the self-evaluation sheet of professor constructed based on the teaching contents rather than unexpected situation or the actual situation that the decision is made. The knowledge and the clinical application should be integrated matching the step with the expectation of patients and the medical environment being changed [5], and to produce the nurses with ability, integrating the knowledge and the technique through the practice education considering the safety of patient and developing the critical thinking in the Korean nursing student are essential. Therefore, the improvement of curriculum in order to apply diverse education method such as team-based learn, design, thinking on the invasive IV injection, which is important and occurs frequently in the clinical environment, and the effort to provide the opportunity to practice enough are required.

This study has limitation to generalize its results as the results subjects were limited to Korean nursing students in one university. Therefore, based on the results of this study, following suggestions are made. First, to generalize the study, the repetitive research to identify the correlation among the knowledge, self-confidence, performance ability of the IV injection and the critical thinking disposition securing more subjects is required. Second, the follow-up research for education method and education program development that can enhance the knowledge, self-confidence, performance ability of IV injection and the critical thinking disposition is required. Third, the research to verify the knowledge, self-

confidence, performance ability of the IV injection, the critical thinking disposition and the degree of change in the Korean nursing student are required.

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