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Basic Survey on the Knowledge, Performance, Confidence, and Attitude for CPR Education Proposal for Inactive Nurse

Jung-Ha Park

Prof., Dept. of Nursing, Dongseo Univ., Korea
suha2002@gdsu.dongseo.ac.kr

Abstract

Since most of the first witnesses of cardiac arrest in clinical settings are nurses, the ability to perform CPR is important. The purpose of this study is to provide basic data for developing education that strengthens CPR performance in the future by examining inactive nurses' CPR knowledge, attitude, performance confidence, device discomfort, continued use intention, and educational achievement. The final subjects of this study were 88 inactive nurses residing in B city. The study period was from June 23, 2020 to December 24, 2020. The collected data were analyzed by descriptive statistics and Pearson correlation using SPSS WIN 24.0 program. After obtaining the subject's consent for the study, an inactive nurse who understood the purpose of the study and voluntarily consented to the study participated. To investigate the perception of experience, the subjects watched 360-degree virtual reality contents about CPR in the hospital using HMD. The data of this study were analyzed using SPSS WIN 22.0.program. As a result of this 360-degree study on CPR in the hospital, the average score for the inactive nurses on CPR knowledge was 12.70±3.43, the average score for performance confidence was 6.04±2.45, and the average score for attitude was 4.63±0.80. As a result of experience recognition of 360-degree virtual reality contents for CPR in hospitals, the average score for device discomfort was 4.01±0.94, the average score for continued use intention was 2.07±0.85, and the average score for educational achievement was 2.11±0.79. As a result of correlation analysis, educational achievement and continued use intention were significantly positively correlated (r=.77, p<.001). Based on the results of this study, in order to strengthen the CPR performance capability of inactive nurses in emergency situations, it is necessary to increase CPR knowledge and confidence in performing CPR, and to cultivate a positive attitude toward performing CPR. In addition, it is necessary to implement CPR simulation education based on patient cases by applying content that considers educational achievement and continuous use intention.

Keywords: *Attitude, Cardiopulmonary Resuscitation, Experience Awareness, Knowledge, Performance Confidence*

1. INTRODUCTION

1.1 Background of the research

Since nurses provide constant care near patients and are often the first to find an emergency in the hospital [1], the first cardiopulmonary resuscitation(CPR) is likely provided by nurses[2,3]. The survival rate of patients is determined by the quick and accurate performance of CPR[4], which suggests that CPR plays a decisive role

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Corresponding Author: suha2002@gdsu.dongseo.ac.kr
Tel: +82-32-1698, Fax: +82-51-320-2720
Associate Professor, Dept. of Nursing, Dongseo Univ., Korea
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in increasing survival from a sudden heart attack[5].

CPR is a technique designed to maintain oxygen supply to the tissues through artificial ventilation and circulatory assistance, and ultimately restores the heart rate of cardiac arrest patients[5]. Since nurses are required to be able to perform CPR in accordance with an accurate sequence of steps and adapt to a changing condition in patients over the course of a medical situation, they must have the knowledge required to perform CPR[6,7]. Moreover, nurses need to overcome social and psychological stress factors accompanied by performing CPR on cardiac arrest patients. They must also have CPR performance confidence [8], which refers to a conviction in their ability to start and conduct CPR.

Further, since the attitude in which an individual continues to have a cognitive, emotional, and behavioral orientation towards an object or situation[9] is a factor that predicts the conduct of CPR in an emergency where a cardiac arrest occurs, their attitude towards CPR is critical. Hence, nurses must have the competences to quickly and accurately perform CPR when the applicable situation arises[0]; to do so, CPR knowledge, performance confidence, and attitude are required.

A variety of training materials such as songs[11], song videos[12], standardized CPR training videos[13], CPR applications[14], and 360-degree VR content[15] are applied to CPR training; their effects can be identified. However, there are few studies that identify the perceived experience regarding such materials from the perspective of the user, not the training instructor, and then apply the materials to CPR training.

While it is necessary to have knowledge, performance ability, and training experience to perform CPR, a lack of knowledge and experience leads to anxiety in nurses[16]. In this regard, this study intends to identify CPR knowledge, performance confidence, and attitude in inactive nurses who are not currently working and subsequently expected to have less knowledge, performance ability, and training experience than nurses in clinical practice.

CPR has an educational characteristic that cannot be learned through direct experience through cardiac arrest patients. For this reason, 360-degree images are being applied as a way to feel a sense of presence like the real situation [15]. Therefore, it will be possible to establish a basis for providing learning through user experience by first confirming the perception of the experience before applying the 360-degree video to the learner.

1.2 Purpose of the research

The purpose of this study was to examine the CPR performance of inactive nurses, who are expected to have relatively little knowledge, performance ability, and educational experience compared to nurses working in the field because they are not currently working as nurses in clinical settings. It is to provide basic data for the CPR education proposal to strengthen it. The specific research objectives are as follows.

First, the CPR knowledge, attitude, performance confidence, and experience perception of inactive nurses are identified.

Second, the correlation between CPR knowledge, attitude, performance confidence, and experience perception of inactive nurses is investigated.

2. METHOD

2.1 Study Design

This study is a descriptive survey that identifies CPR knowledge, attitude, performance confidence, and perceived experience in inactive nurses and the correlations between the variables.

2.2 Participants

The respondents in this study were 90 inactive nurses living in City B; data were only collected from nurses who were informed about the study's purpose and method and voluntarily provided consent to participate in this study. Data from 88 nurses, excluding 2 nurses who provided insufficient responses to the questionnaire, were used for the final analysis

2.3 Study Procedure and Data Collection Method

Before conducting this study, inactive nurses were informed about the study, and informed consent forms were signed. The respondents answered a questionnaire about CPR knowledge, attitude, and performance confidence, used the HMD to watch a simulation video about a cardiac arrest situation in a hospital, and then responded to perceived experience. The researcher explained how to use the HMD to watch a 360-degree video and ensured safety while the respondents were using the HMD. It took 40–45 minutes for the participants to complete the questionnaire survey, including watching a video through the HMD. As a token of gratitude for their participation, a coffee gift voucher was offered.

2.4 Tool

2.4.1 CPR Knowledge

For CPR knowledge, this study used a tool originally developed by Choi[6] and later adapted by Kim[17] to measure the CPR knowledge of nurses in a hospital. CPR knowledge was measured by a total of 24 questions: 2 for principles, 13 for basic life support, and 9 for advanced cardiopulmonary life support. Participants were instructed to answer each question as 'True', 'False', or 'I don't know'. The score in CPR knowledge ranged from 0 to 30 points. Correct answers were awarded 1 point, and wrong answers and 'I don't know' were awarded 0 points; a higher score means a higher level of CPR knowledge. For the tool's reliability, Choi[6] showed Cronbach's α=.68, Kim[17] reported KR-20=.84, and this study showed KR-20=.78.

2.4.2 CPR Attitude

To measure CPR attitude, this study used the tool utilized by Cho[18]. The CPR attitude tool was a response to emotional factors about "For me, performing CPR on cardiac arrest patients is _____." Each question was rated on a seven-point Likert scale consisting of a pair of opposing adjectives, with the most positive response being seven points and the most negative being one point. The score ranged from 10 to 70 points; a higher score means more positive emotions about CPR. For the tool's reliability, Cho[18] showed Cronbach's alpha=.69, which is the same as in this study.

2.4.3 CPR Performance Confidence

For CPR performance confidence, this study used the tool developed by Cho[10] and adapted by Kim[17] to measure CPR performance confidence in nurses in the artificial kidney unit. The performance confidence tool consists of nine questions and analyzes factors for overall CPR performance confidence and CPR knowledge: eight questions, including early assessment, activation of emergency medical services system, airway management, breathing check, artificial ventilation, pulse check, chest compression, and use of the automated external defibrillator(AED), and one question about confidence in CPR in an emergency. Each question was presented on a 10-cm visual analog scale(VAS); a higher score means a higher level of CPR performance confidence. For the tool's reliability, Cho[10] showed Cronbach's α=.91, the same as in this study,

while Kim [17] reported Cronbach's α=.96.

2.4.4 Perceived Experience

In this study, perceived experience consists of device use discomfort, willingness to continue use, and perceived training achievement for a 360-degree CPR video content through the HMD. A tool based on Yoo and Park[19] with additional questions by Yoo and Park[20] was used.

The tool for device use discomfort is measured using a total of two questions on a five-point Likert scale; a higher score means a higher level of device use discomfort. For the tool's reliability, Yoo and Park[20] showed Cronbach's α=.73, which is the same as in this study.

The tool for willingness to continue to use is measured by a total of four questions on a five-point Likert scale; a higher score means a higher level of willingness to continue to use. For the tool's reliability, Yoo and Park[20] showed Cronbach's α=.73, and this study reported Cronbach's α = .78.

The tool for training achievement is measured by a total of three questions on a five-point Likert scale; a higher score means a higher level of perceived training achievement. For the tool's reliability, Yoo and Park[20] showed Cronbach's α= .80, which is the same as in this study.

2.5 Data Analysis Method

This study used SPSS 22.0 WIN. The demographic characteristics, CPR knowledge, attitude, performance confidence, and perceived experience of the respondents were analyzed by descriptive statistics. The correlations between the variables were confirmed by the Pearson correlation coefficient

3. RESULTS

3.1 Demographic Characteristics

Table 1 provides the demographic characteristics of the respondents. Women accounted for 98.9% of the respondents; the mean age was 39.9 years. For years of clinical practice, 5 years accounted for 47.7%, 1 to 3 years and 3 to 5 years accounted for 18.2%, and 1 year accounted for 15.9%. For educational attainment, a bachelor's degree accounted for 52.3%, followed by a junior college degree(45.5%), and a master's degree or higher(2.3%). A total of 92% of respondents had CPR training experience. In terms of the preferred training method, 62.5% preferred simulation, followed by offline lectures(30.7%), virtual reality(8%), online lectures (4.5%), and others(2.2%). Of the respondents, 90.9% had no certificate, while 8% and 1.1% had BLS provider and BLS instructor certificates, respectively.

3.2 CPR Knowledge, Attitude, Performance Confidence, and Perceived Experience

Table 2 describes the CPR knowledge, attitude, performance confidence, and perceived experience of the respondents. The mean score of CPR knowledge in the respondents was 12.70±3.43 points. For the specifics in CPR knowledge, the score was 1.60±0.58 points for principles, 6.90±2.03 points for basic life support, and 4.20±1.92 points for advanced cardiopulmonary life support. The mean score for CPR performance confidence was 6.04±2.45 points, while the mean score for attitude was 4.63±0.80 points. The results of perceived experience about 360-degree VR content for CPR in the hospital showed 4.01±0.94 points for device use discomfort, 2.07±0.85 points for willingness to continue to use, and 2.11±0.79 points for training achievement.

Table 1. Education Satisfication of the Subjects (N=88)

Categories		n(%) or M±SD
Gender	Female	87(98.9)
	Male	1(1.1)
Age		39.90±11.89
Clinical career(year)	≤1	14(15.9)
	1-3	16(18.2)
	4-5	16(18.2)
	6≤	42(47.7)
Educational level	College	40(45.5)
	University	46(52.3)
	Master's degree≤	2(2.3)
CPR training experience	Yes	81(92.0)
	No	7(8.0)
Preferred teaching method*	Off-line lecture	27(30.7)
	On-line lecture	4(4.5)
	Situation	55(62.5)
	Virtual reality	8(8.0)
	Others	2(2.2)
Certification	BLS provider	7(8.0)
	BLS instructor	1(1.1)
	None	80(90.9)

* Multiple choice

Table 2. CPR Knowledge, Attitude, Performance Confidence, Perceived Experience

Categories		M±SD
Knowledge of CPR I	Total	12.70±3.43
	Principles	1.60±0.58
	Basic resuscitation	6.90±2.03
	Professional resuscitation	4.20±1.92
Confidence in performing CPR		6.04±2.45
Attitude towards CPR		4.63±0.80
Experience perception	Inconvenience of using the device	4.01±0.94
	Intention to use continuously	2.07±0.85
	Educational achievement	2.11±0.79

3.3 Correlations between CPR Knowledge, Attitude, Performance Confidence, and Perceived Experience of Respondents

The correlations between the variables in this study analyzed CPR knowledge with the overall mean and perceived experiences in terms of device use discomfort, willingness to continue to use, and training achievement. Table 3 shows the correlations between CPR knowledge, attitude, performance confidence, and the perceived experience of respondents. The correlations between the variables revealed that there was a significant negative correlation between CPR performance confidence and training achievement, and between

CPR attitude and training achievement (r =-.27, *p*.012; r =-.34, *p*=.001); there was a significant positive correlation between willingness to continue to use and training achievement(r=.77, $p < .001$).

Table 3. Correlation Analysis of Subject's CPR Knowledge, Attitude, Performance Confidence, Perceived Experience

Categories	1	2	3	4	5	6
1. Knowledge of CPR I	1	.36(.001)	.14(.191)	.28(.008)	-.08(.458)	-.08(.458)
2. Confidence in performing CPR		1	.38(<.001)	.28(.009)	-.20(.067)	-.27(.012)
3. Attitude towards CPR			1	.22(.043)	-.22(.044)	-.34(.001)
4. Inconvenience of using the device				1	-.23(.034)	-.18(.088)
5. Intention to use continuously					1	.77(<.001)
6. Educational achievement						1

4. DISCUSSION

CPR is divided into three functional phases: basic life support(BLS), advanced cardiopulmonary life support (ACLS), and post-cardiac arrest treatment[21]. BLS is intended to supply and maintain oxygen to organs in the body while a witness of a cardiac arrest reports the cardiac arrest to the healthcare system and takes emergency action; ACLS is an emergency response technique that prevents a potential cardiac arrest in patients, recovers the heart rate in cardiac arrest patients and maintains blood pressure at a stable level to provide treatment to resuscitate the brain, identifies a cause of cardiac arrest, and prevents a cardiac arrest from recurring; post-cardiac arrest treatment includes intensive monitoring for the recovered heart rate and an intervention for acute coronary syndrome to prevent the recurrence of a cardiac arrest[21]. This study categorized CPR knowledge into principles, BLS, and ACLS. In a study on nurses in the intensive care unit that applied the same tool as in this study, the score was 6.58±3.06 points for principles, 7.00±1.32 points for BLS, and 7.37±1.46 points for ACLS; the overall score was 20.94±3.95 points[17], which was higher than the score among inactive nurses in this study. Since a previous study reported some differences in the tool for knowledge, the score needed to be converted into a 100 point basis for comparison. The score for knowledge in this study, if converted into a 100-point basis, was 52.9 points, which was lower than the knowledge score of 70 points among nurses in the intensive care unit and general ward in a general hospital[22], and 68 points among nurses in clinics[23]. CPR performance confidence was 6.04 points in this study; a previous study reported a higher score of 7.61 points[17]. Since knowledge and performance confidence among inactive nurses showed a lower score than nurses in clinical practice, it is important to provide various training opportunities. The mean score of CPR attitude was 6.04 points compared to 5.83 points among nurses in the hospital[18], which suggests that inactive nurses had more positive emotions about CPR.

Since it was difficult to find a study that applied the same content as this study, the author compares and discusses a study on user-perceived experience from HMD-based training content[20]. Compared to a study by Yoo and Park[20] where the mean score was 1.80 points for device use discomfort, 4.74 points for willingness to continue to use, and 4.35 for training achievement, the score for device use discomfort was lower and the score for willingness to continue to use and training was higher in this study. It seems to reflect that the content in Yoo and Park[20] was not graphically represented as a 360-degree video produced from the actual settings in this study, and included the interaction between the HMD and a smart stick mock-up, which was used physically.

Hence, to develop content in the future, the author suggests systematically planning and applying the

development procedure as in Yoo and Park[20] so that it can be evaluated by the user in accordance with training purposes.

The correlations between the variables revealed that there was a significant negative correlation between CPR performance confidence and training achievement, and between CPR attitude and training achievement There was a significant positive correlation between willingness to continue to use and training achievement. Since results with a correlation coefficient of < 0.5 in absolute terms have no correlation, this study focuses on results with a correlation coefficient of ≥0.5 in absolute terms[24]. The study respondents watched basic and advanced CPR videos in 360-degrees; their willingness to continue to use the provided videos was found to be strongly correlated to training achievement. As the effect of CPR training wanes over time, it would be important to regularly repeat CPR training at least annually to maintain motor skills after training[25]. Therefore, if 360-degree content for CPR is used regularly for nurses who find it realistically difficult to participate in repeated in-person CPR training, it would help them indirectly maintain their training experience.

5. CONCLUSION AND SUGGESTIONS

This study found that inactive nurses had a lower level of CPR knowledge and performance confidence, but had a more positive attitude about CPR. There was a positive correlation between willingness to continue to use and training achievement regarding a 360-degree CPR video using a HMD. Based on the results of this study, it is necessary to improve CPR knowledge and performance confidence, and develop a positive attitude towards performing CPR for inactive nurses to strengthen CPR performance competences in an emergency.

Moreover, a development procedure needs to be applied to develop content that considers training achievement and willingness to continue to use in inactive nurses. This study is significant as it identified perceived experience about 360-degree content applicable to CPR training designed for inactive nurses, and provided a reference for its practical application.

This study has the following limitations, which a future study should overcome. First, since the study investigated perceived experience about 360-degree video content viewed via a HMD, a future study should use content on different types of devices and confirm its effect. Second, a future study should evaluate the repeated long-term effect of the content provided in this study. Third, since this study was conducted on inactive nurses in only one region and lacked representation, generalizing this study's results requires caution. Despite these limitations, the author suggests conducting a user-oriented evaluation on training content applicable to inactive nurses based on the study results, and subsequently providing education and training, which could improve training experience.

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