

A Study on the Effect of Basic Life Support Training on the First Responsive Police Officers

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[Abstract]

The study was conducted to verify the effect of basic life support training on the skill ability of police officers. The subjects of this study were 10 experimental group and 10 comparative group with voluntary consent after explaining the theory and significance of the training experiment at the police station located in K. The education program used in this study consists of theoretical education and practical training, and the theoretical education is 60 minutes and the practical training is 30 minutes. The measurement tool for basic resuscitation performance was measured based on the 'CPR and ECG Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care' presented by the American Heart Association. The results are as follows. The experimental group showed higher performance skills than the traditional control group in field confirmation performance skills, primary evaluation performance skills (A, B, C, medical evaluation), and BLS performance skills (heart compression, artificial respiration, medical evaluation) which are the basic resuscitation performance skills. In conclusion, this study confirmed that the theory and practice education program is more effective in improving the clinical performance of police officers than the traditional lectures and practice education, so it is possible to apply this simulation education program to the cardiac arrest patient emergency treatment.

▶ **Key words:** Basic Life Support(BLS), Police Officers, Cardiopulmonary Resuscitation, First Responder

[요 약]

이 연구는 경찰관에게 실시한 기본인명소생술 훈련의 효과를 증명하기 위해 실시되었고, 연구 대상자는 K 경찰관 중 10명의 실험군과 10명의 대조군으로, 교육프로그램은 60분 이론과 30분 실습을 포함하였다. 기본인명소생술 술기 측정은 미국심장협회에서 제시한 응급 심혈관 치료의 가이드라인을 따랐다. 결과는 다음과 같다. 실험군에서 현장확인기술, 1차 평가수행기술 및 기본인명소생술 능력(심장압박, 인공호흡, 의학적 평가)이 대조군에 비하여 높게 나타났다. 결론적으로, 이 연구결과는 시뮬레이션 교육프로그램이 전통적인 이론실습강의보다 경찰관의 임상술기능력을 향상시키는데 효과적이라는 것을 증명하였다. 그러므로 시뮬레이션 교육프로그램을 심정지 응급 치료에 대한 교육프로그램으로 적용하는 것을 제안한다.

▶ **주제어:** 기본인명소생술, 경찰관, 심폐소생술, 최초반응자

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I. Introduction

CPR education should be designed to be universally conducted in a consistent form and the results can be shown as performance of the general public or medical personnel. The concept of survival chain for cardiac arrest patients was revised in 2015 to five chains: prevention and early detection of cardiac arrest, rapid call, rapid cardiopulmonary resuscitation, rapid defibrillation, effective professional resuscitation and post-cardiopulmonary treatment. Therefore, the educational goal of CPR is to allow cardiac arrest patients to receive the treatment based on the most recent medical knowledge that is constantly present, with the concept of chain of survival. Early CPR, which is performed on the spot until professional CPR is performed by contacting the emergency medical system, plays a very important role in the prognosis of the patient and is usually done by non-medical personnel[1].

It is known that the survival rate of cardiac arrest patients is improved when CPR is performed rapidly by witnesses in the event of cardiac arrest. However, if the basic lifesaving is provided at the sighting site after 8 minutes or more, the success rate of CPR will fall to 0%. The person who performed CPR at the sighting site is called the 'first responder', and since it is usually done by non-medical personnel, CPR education is spreading to the general public[1, 2].

The first responder is a police officer, firefighter, security officer, and security guard who are likely to be frequently contacted with these emergency patients or to be asked for help first in case of emergency patients. In developed countries, the education system for the first responders is well prepared, but the domestic emergency medical law does not define the concept of the first responder. However, Article 14 of the Emergency Medical Care Act (Act on Rescue and First Aid), among the subjects of education, there are police officers who are engaged in road traffic safety work and are

prescribed in Article 5 of the Road Traffic Act. The Minister of Health and Welfare or the City and Governor of the Provincial Office can order the person who comes under one of the following arcs among the person who is not the emergency medical worker to receive the education about rescue and first aid [5,6].

The survival rate of cardiac arrest patients is 8.7% in Korea, and the survival rate of cardiac arrest patients outside the hospital in Korea is increasing recently, but it is still low compared to advanced countries such as the US, Europe and Japan. Cardiopulmonary Resuscitation (CPR) and Automated External Defibrillator (AED) are the most difficult causes of cardiac arrest in the three major causes of deaths every year due to emergency situations. However, various studies have shown that if appropriate first aid is performed in the field in a short period of time, the survival rate can be increased, which means that the benefits of following the resuscitation guidelines are greater than the potential risks [7, 8].

More than 80% of patients with acute cardiac arrest are known to have heart disease, and the cause of cardiovascular change is quickly identified at the same time as CPR because it becomes unconscious within one hour of the change of cardiovascular state. If the blood flow to the tissue is not smooth due to cardiac arrest, the oxygen in the tissue is depleted, especially the oxygen in the cerebral brain is depleted within 10 seconds, and irreversible brain damage begins after 5 minutes. If the cycle stop is not corrected after 4-10 minutes, the heart rate will recover, but serious brain damage will remain. In the case of a cardiac rhythm requiring defibrillation in a cardiac arrest situation, the survival rate decrease by 7-10% per minute as defibrillating is delayed as the defibrillating is the only treatment. Therefore, cardiopulmonary resuscitation for the patient treatment of police officers is very important and should be performed effectively.

This study aims to compare and analyze the job performance before and after the rescue and first aid training for the first responder police officers.

II. Methods

1. Subjects of this study Related works

The subjects of this study were 20 new police officers who were assigned to K police station.

To secure the homogeneity between the experimental group and the comparison group, the score of the basic life resuscitation knowledge and performance skills before the experiment was added up and grouped at 5 point intervals, and the subjects within the same range were mated between the experimental group and the comparison group. The experimental group consisted of 10 people and the comparative group consisted of 10 people. After explaining the teaching method to the subjects, the study was conducted only for those who recognized the purpose of the study and agreed through written documents.

After the questionnaire was prepared before the start of the education, simulation education was prepared based on the questionnaire after the questionnaire was prepared for general characteristics, and the training was conducted for 60 minutes of theory and 30 minutes of practice.

2. Research design

This study is a similar experimental design before and after the non-equivalence comparison group to verify the effect of basic lifesaving education on the educational effect. The general characteristics of age, education level, and experience of CPR education in the experimental group and the comparison group are as follows in Table 1.

The development process of the basic life support intervention program is as follows. The development process of this program is primarily

composed by the researcher reviewing, modifying, and supplementing the draft to two basic life resuscitation instructors for the basic life resuscitation program. The training time of this program is 60 minutes for theoretical education and

Table 1. The subject of general characteristics

characteristics	category	experimental (N=11)	control (N=10)
		Mean(SD) or N(%)	Mean(SD) or N(%)
Age		38.62(7.54)	37.55(6.70)
Education N(%)	high school	2(9.52)	5(25.00)
	college	7(33.33)	5(25.00)
	university	12(57.14)	10(50.00)
CPR Carrier N(%)	yes	12(57.14)	13(65.00)
	no	9(42.85)	7(35.00)

1 group of 4 people for basic resuscitation(BLS) for 3 minutes, 30 minutes for each person, and 90 minutes for debriefing.

The team consists of two people as a leader, and the first two people get off the ambulance, and two more people appear after 5 cycles of basic resuscitation chest compression. The educational materials were prepared as audiovisual materials and educational contents handouts for theoretical education, and the practical training was prepared as a Laerdal mannequin used for practical training. The instructors possessed the BLS certificate and were in charge of the professional instructors who had trained the contents of the program before the program was performed.

The evaluation sheet was modified and modified by BLS and AHA and the evaluation items using simulation equipment for objective evaluation were developed. The evaluation sheet was composed of two professional instructors after reviewing the draft.

The detailed evaluation items were composed of field confirmation, primary evaluation (A, B, C), BLS (breast compression, artificial respiration,

medical evaluation), and transfer evaluation.

The score of prehospital specialist resuscitation evaluation was 5 points, which is "very excellent", "4 points excellent", "3 points normal", "2 points insufficient" and "1 point very insufficient".

3. Data analysis method

The collected data of this study were analyzed at the significance level $p < .05$ using SPSS/WIN 22.0 program, and the analysis method is as follows. The general characteristics and clinical characteristics of the subjects were calculated by real number, percentage, average and standard deviation. The homogeneity test of the pre-test BLS of the experimental group and the control group was verified by t-test. The difference of BLS between the experimental group and the control group was verified by t-test. The pre-test and post-tests of the bbls of the experimental group and the control group were analyzed by paired t-test.

III. Results

1. Difference verification of field verification performance skill

The total number of field confirmation after the training was 4.70 ± 0.89 in the experimental group and 3.84 ± 0.73 in the comparative group, which showed that the field confirmation performance skill of the experimental group was high ($p = 0.007$).

In the detailed items, the infection prevention was not significantly different ($p = 0.086$) with 4.52 ± 0.93 points in the experimental group and 3.89 ± 0.97 points in the control group. The field evaluation was 4.89 ± 0.35 points for the experimental group and 3.96 ± 0.34 points for the comparison group, which showed significant difference ($p = 0.000$). Medical evaluation was significantly different with the experimental group at 4.50 ± 0.53 and the control group at 3.50 ± 0.53 .

Patient evaluation was 4.67 ± 0.76 points for the experimental group and 4.35 ± 0.66 points for the comparison group, which showed higher scores in performance skill than the comparison group, but there was a significant difference ($p = 0.000$) <Table 2>.

Table 2. The verification of the difference on Safe

skill		experim ental (N=11)	control (N=10)	t	p
		Mean±SD	Mean±SD		
Safe	total	4.70±0.89	3.84±0.73	3.736	0.007
	BSI	4.52±0.93	3.89±0.97	2.247	0.086
	Scene Safe	4.89±0.35	3.96±0.34	9.882	0.000
	patient evaluation	4.67±0.76	4.35±0.66	4.687	0.000
	medical evaluation	4.81±0.29	3.77±0.27	9.751	0.000

2. The Difference of the Primary Evaluation Performance skill

The total score of the first evaluation after the education was 4.71 ± 0.26 in the experimental group and 3.69 ± 0.34 in the comparative group, which showed that the first evaluation performance skill of the experimental group was high ($p = 0.001$).

In detail, airway open was 4.68 ± 0.86 in the experimental group and 3.89 ± 0.67 in the control group, which showed a statistically significant difference ($p = 0.007$). Breathing was 4.88 ± 0.50 in the experimental group and 3.49 ± 0.94 in the control group, which showed a statistically significant difference ($p = 0.000$). The Circulation was 4.75 ± 0.81 in the experimental group and 3.68 ± 0.63 in the control group, which showed a statistically significant difference ($p = 0.000$). Medical evaluation was 4.82 ± 0.36 in the experimental group and 3.73 ± 0.82 in the comparison group, which showed a statistically significant difference ($p = 0.003$) <Table 3>.

Table 3. The verification of the difference on primary evaluation

skill		experim ental (N=10)	control (N=10)	t	p
		Mean±SD	Mean±SD		
prim ary evalua tion	total	4.71±0.26	3.69±0.34	8.973	0.001
	Airway	4.68±0.86	3.89±0.67	3.876	0.007
	Breathi ng	4.88±0.50	3.49±0.94	7.237	0.000
	Circulati on	4.75±0.81	3.68±0.63	3.743	0.000
	medical evalua tion	4.82±0.36	3.73±0.82	3.61	0.002

3. Verification of Differences in BLS Performance skill

After the training, the total BLS of the experimental group was 4.49 ± 0.32 and the comparative group was 3.76 ± 0.43 , which showed that the experimental group performed the BLS highly ($p=0.000$).

In detail, chest pressure was 4.61 ± 0.55 in the experimental group and 4.72 ± 0.61 in the control group, which showed a statistically significant difference ($p=0.000$). Artificial respiration was 4.13 ± 0.52 in the experimental group and 3.34 ± 0.24 in the control group, which showed a statistically significant difference ($p=0.000$). The defibrillation was 4.35 ± 0.75 points in the experimental group and 3.25 ± 0.63 points in the control group, which showed a statistically significant difference ($p=0.009$). The medical evaluation was 4.67 ± 0.57 in the experimental group and 3.74 ± 0.80 in the comparison group, which showed a statistically significant difference ($p=0.000$) <Table 4>.

Table 4. The verification of the difference on BLS

skill		experim ental (N=10)	control (N=10)	t	p
		Mean±SD	Mean±SD		
BLS	total	4.49±0.32	3.76±0.43	7.542	0.000
	chest compress ion	4.61±0.55	4.72±0.61	4.352	0.000
	breathing	4.13±0.52	3.34±0.24	8.353	0.000
	AED	4.35±0.75	3.25±0.63	3.56	0.009
	medical evalua tion	4.67±0.57	3.74±0.80	5.32	0.000

IV. Discussion

Cardiopulmonary Resuscitation (CPR) has been introduced to perform cardiopulmonary resuscitation from the place where the patient has occurred, and as the resuscitation rate of the patient with cardiac arrest increases in the place other than the hospital, cardiopulmonary resuscitation is widely distributed as the importance of cardiopulmonary resuscitation is emphasized. With the spread of CPR, the importance and interest of basic cardiopulmonary resuscitation and professional cardiopulmonary resuscitation education for the general public and medical personnel is increasing.

Emergency situations such as cardiac arrest can occur anywhere, and the time until CPR is performed after cardiac arrest is an important factor in determining the patient's life and prognosis.

He said he could increase his resuscitation rate only if he started CPR within 4 minutes after cardiac arrest and a professional cardiac rescue within 10 minutes. Several studies have also reported that on-site CPR by cardiac arrest witnesses increases survival rates [11, 12].

Therefore, in developed countries such as the United States, there is a high possibility of seeing this situation so that CPR can be implemented immediately at the site of cardiac arrest, or because of occupational safety, the first responders are designated as professional workers who can be asked for help in the field. On the other hand, the Korean Emergency Medical Law defines these occupational groups, but the number of people who have completed the education by saying 'structure and first aid education can be implemented' is not large and the people who have received the education are proceeding in formal education. In addition, the survival rate of pre-hospital cardiac arrest patients in Korea is lower than that of the West and there is no significant change compared to the past [14, 15]. Therefore, CPR education and training for the first responders have been pointed out as urgent [16] for this purpose, specific education programs and continuous management of the subjects and contents of education are needed

In this study, 58.8% of the first responders experienced unconscious and fallen patients, and the first responders experienced a loss of consciousness, and the second responder experienced a loss of consciousness.

57.5% of the respondents answered that they were working, suggesting the necessity of CPR education for these occupational groups [17-19]. CPR education is an educational method that can complement the limitations of activities that can not be performed in the field of practice due to the protection of consumers' health rights and the emphasis on safety and rights, and can acquire coping ability against emergency situations. Therefore, simulation-based basic lifesaving education program including basic resuscitation should be developed and applied so that first responders can cope with accidents without being embarrassed in the field of emergency and treat and transfer patients.

Through repeated practice, it is possible to improve the ability to set the priority of patient status judgment ability and treatment, and to communicate with the police officers and rescue team who have been dispatched together and to improve the cooperative ability, thereby helping to improve the overall clinical performance ability. The police officer's field structure and first aid performance ability should be skilled to provide the patient with high quality treatment.

V. Conclusion

This study was conducted to verify the effect of basic life resuscitation training on the skill ability of police officers.

The subjects of this study were 10 experimental group and 10 comparative group with voluntary consent after explaining the theory and significance of the training experiment at the police station located in K. The education program used in this study consists of theoretical education and practical training, and the theoretical education is 60 minutes and the practical training is 30 minutes. The measurement tool for basic resuscitation performance was measured based on the 'CPR and ECG Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care' presented by the American Heart Association. The results are as follows.

The experimental group showed higher performance skills than the traditional control group in field confirmation performance skills, primary evaluation performance skills (A, B, C, medical evaluation), and BLS performance skills (heart compression, artificial respiration, medical evaluation) which are the basic resuscitation performance skills.

In conclusion, this study confirmed that the theory and practice education program is more effective in improving the clinical performance of

police officers than the traditional lectures and practice education, so it is possible to apply this simulation education program to the cardiac arrest patient emergency treatment. Therefore, it is considered that the education system for emergency treatment of cardiac arrest patients should be established so that scenarios can be developed based on various clinical situations and problem solving through critical thinking.

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