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Effects of basic life support training program on knowledge, perceived self-efficacy, and basic life support performance of village health volunteers

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Abstract

Out-of-hospital cardiac arrest is the leading cause of death worldwide. Performing basic life support immediately can decrease the mortality rate. The purpose of this quasi-experimental, one group pre-post-test design was to compare knowledge related to basic life support, perceived self-efficacy in a basic life support and basic life support performance among village health volunteers before and after participating in the basic life support training program which applied self-efficacy theory. The participants were 37 village health volunteers of Nong Ngu Luam sub-district, Nakhon Pathom Province. These volunteers met the inclusion criteria and were purposively selected into the study during September to October 2018. The participants received the basic life support training program including receiving classroom lectures related to basic life support and receiving training for promoting perceived self-efficacy via the following methods. These were through life role model, practical CPR training, verbal persuasion and identification of symptoms indicating conditions which need treatment. The knowledge related basic life support, perceived self-efficacy in basic life support, and basic life support performance were evaluated at baseline and immediately following the training. The data was analyzed using descriptive statistics and the paired samples t-test. Results showed that a mean score of knowledge related basic life support, perceived self-efficacy in basic life support performing, and basic life support performance after participated the program were significantly higher than before participating the program (p-value < 0.001). The results also revealed that all participants passed the minimum test criteria for basic life support performance. The results demonstrated that the basic life support training program is an effective program. It is therefore concluded that this program should be implemented in another similar contexts in the community in order to save the life of casualties who experience out-of-hospital cardiac arrest.

Keywords: Basic life support, village health volunteer, perceived self-efficacy, quasi-experimental study
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1. Introduction

Worldwide, an out-of-hospital cardiac arrest is the leading cause of death and neurological deficit [1] and also in Thailand [2]. During cardiac arrest, an immediate basic life support (BLS) provides perfusion and oxygenation to the tissues which resumed cardiopulmonary function. BLS composed of airway support, breathing support, and circulation support which not quite difficult to perform if an individual had trained. A recent study revealed that prompt delivery of basic life support by bystander increased over 2-fold of a probability of survival [3]. However, just only 3.6% of bystander performed BLS [4].

The recent study found that the majority of arrests occurred at home [1] then BLS performance of bystander is crucial. A village health volunteer is one of person who delivered caring for community residents at home and has quite big of numbers in Thailand. Moreover, the village health volunteers have more chance of a bystander of out-of-hospital cardiac arrest. An effective basic life support performance is essential for better patient survival, but whether this practice is helpful there is no evidence support that they have sufficiently trained. Even though adult people participated in BLS training, only half of them reported feeling confident about administering bystander BLS. [5].

Previous studies revealed that application of self-efficacy theory for cardiopulmonary resuscitation or basic life support training increased knowledge, perceived self-efficacy, and chest compression skill or performance of nursing student [6-7], and health care providers [8]. Unfortunately, the application for health

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volunteers training cannot be found. Therefore, the purpose of this study was to determine whether the basic life support training program, which designed based on Bandura's self-efficacy theory [9] was able to improve knowledge related BLS, perceived self-efficacy in BLS performing and BLS performance among village health volunteers.

2. Method and materials

2.1. Design

A quasi-experimental, one group pre-post-test design was employed in this study. All data were collected for two times: before and after joining the program.

O_1 —— X —— O_2 Experimental group

Figure 1: Research design

O_1 refers to evaluated the knowledge related BLS, perceived self-efficacy in BLS performing, and BLS performance at before intervention.

X refers to implementation the basic life support training activities for 180 minutes.

O_2 refers to evaluated the knowledge related BLS, perceived self-efficacy in BLS performing, and BLS performance at after intervention immediately.

2.2. Ethical Considerations

Participants were given verbal information explaining the purpose of the study, procedures, confidentiality and anonymity preserved. They were also informed about their right to withdraw from the study at any time without losing any benefits of their health care service.

2.3. Setting and sample

The study was conducted in the Nong Ngu Luam sub-district, Nakhon Pathom Province. This area has prevalence rate of chronic diseases and elderly higher than the average of the country [10] that might also lead higher chance of health volunteers to face out-of-hospital cardiac arrest. In addition, the research setting was ready for implementation the Basic life support training program regarding the MOU of Nursing practice area and being the setting of academic service of the Nursing faculty. Some of health volunteers had experienced of BLS training, however, it was a lecture based in classroom training. There was no CPR simulation man for all volunteers to practice which limited to evaluate their BLS performance. According to out-hospital-cardiac arrest, it was limited to ensure that health volunteers have enough self-efficacy to perform BLS if exposing with the event. The sample size was based on the calculation for paired sample t-test, an acceptable level of power of 0.80, the significant criterion of 0.05 and effect size of 0.5. It was determined to be 27 participants [11]. Ten participants were added regarding their requirement for participation the intervention. Finally, the 37 of village health volunteers were recruited from their communities.

2.4. Procedure and data collection

The participants who met the inclusion criteria were recruited in the study based on purposive sampling. The inclusion criteria were (a) a village health volunteer for at least one year, (b) a person living in the research setting, and (c) willing to participate during the entire study period. Exclusion criteria were (a) absent the training activities at least one activity, and (b) a person who did not stay in the research setting during the research period.

2.5. The basic life support training program

The program delivered aimed to increase the knowledge related BLS, perceived self-efficacy in BLS performing, and BLS performance among village health volunteers. The program of 180 minutes was developed based on literature review, and the 4 primary sources of information of Bandura's self-efficacy theory including (1) vicarious experiences, (2) enactive mastery experiences, (3) verbal persuasions, and (4) physiological and affective states [9]. The intervention was provided by the researcher and trained research assistants over 180 minutes. The first session consisted of giving BLS information via PowerPoint as a classroom lecture for 20 minutes. The second session, 160 minutes, was activities for promoting perceived self-efficacy through vicarious experiences via life modeling which applied in the program through BLS performing demonstration by using the CPR simulation man. Then, village health volunteers observed and learned symbolic modeling through the handbook that covered BLS topics. Also, promoting perceived self-efficacy through repetitions of successful accomplishments was employed. BLS was demonstrated and returned demonstration in a small group, 9-10 participants in each group with closed to coaching and real time feedback. Then, village health volunteers were persuaded verbally to achieve BLS performing successes and were encouraged to perform when they faced with an out-of-hospital cardiac arrest.

Finally, physiological and affective states were applied to reduce unconfidently states through the provision of anticipatory guidance regarding BLS problems and solutions to ensure that negative physiological and affective states did not undermine BLS self-efficacy. Also, physiological and affective states were applied to enhance participants' self-efficacy to trust their body that they were able to perform quality of BLS for an out-of-hospital cardiac arrest patient.

The content validity of the program and quality of all research instruments were examined by 3 experts,

nursing instructors. The research conceptual framework and contents of the program are listed in Figure II.

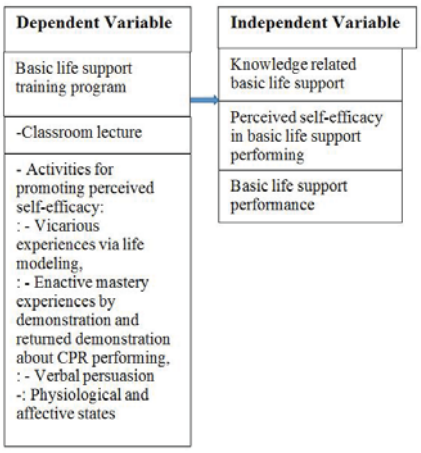

Figure 2: Research conceptual framework.

2.6. Instruments

There were four instruments for this study utilized including (1) demographic characteristics, (2) the knowledge related BLS questionnaire, (3) The perceived self-efficacy in BLS performing scale, and (4) the BLS performance checklist. All research instruments were assessed for content validity by 3 experts before data collection. The reliability was tested with 30 village health volunteers in other community which similar the research setting.

The demographic characteristics questionnaire: the questions focused on demographics of the participants such as age, gender, education level, experience in BLS training, and experience in BLS performing, and the year for working as village health volunteer.

The knowledge related BLS questionnaire was developed by the researcher from the literature review. The questionnaire consisted of 9 items, four multiple choices related to basic life support knowledge for an out-of-hospital cardiac arrest patient. Participants were required to respond to all of the items. The correct answer assigned 1 score whereas incorrect answer assigned 0 score. The higher scores indicated higher knowledge related BLS. The score was ranged from 0 – 9 in that score of 0.0 – 5.3 (0 – 59.9%) were interpreted as a poor level of knowledge related BLS, the score of 5.4 –7 .1 (60 – 79.9%) was interpreted as a moderate, and the score of 7.2 – 9.0 (80.0 – 100.0%) was interpreted as a high level [9]. The index of item-objective congruence (IOC) was 0.71. Tested for reliability, the Kuder-Richardson Formula 20 was 0.75.

The perceived self-efficacy scale was a 9-item Likert-style self-reports, was developed by the researcher from the literature review. These questionnaire required participants to respond to a series of statements focused on whatever they perceived self-efficacy and outcome expectation in BLS performing. Participants were required to respond to all of the items. The score ranged from 1 (not sure at all) to 5 (very confident), with higher scores indicating higher perceived self-efficacy in BLS. The score was ranged from 9 – 45 in that score of 9.0 – 26.9 (0 – 59.9%) were interpreted as a low level of perceived self-efficacy in BLS, the score of 27.0 – 35.9 (60 – 79.9%) was interpreted as a moderate level, and the score of 36.0 – 45.0 (80.0 – 100.0%) was interpreted as a high level [12]. The CVI of the scale was 0.71, and the coefficient of Cronbach's alpha reliability was 0.93.

The BLS performance checklist

The basic life support performance checklist assessed by structured observation of BLS performance by the researcher during return demonstration with CPR simulation man. It was a 10-item rating-style, was developed from the literature review which based up on the 2015 AHA Guidelines for CPR and ECC [13]. These questionnaire were series of statements focused on whatever they performed BLS correctly regarding to situational and patient assessment, patient positioning, hand position and posture, compression rate, depth, recoil, and duty cycle. The score assigned by 0 (not done), 1 (partial completion), and 2 (absolutely completion), with higher scores indicating higher BLS performance. The total scores were ranged from 0 – 20. The score interpretations were 2 aspects of determination for quality of performance and pass criteria of safety BLS performing. The quality of performance, the score of 0.0-11.9 (0 – 59.9%) were interpreted as a low level of BLS performance, the score of 12.0 – 15.9 (60 – 79.9%) was interpreted as a moderate level, and the score of 16.0 – 20.0 (80.0 – 100.0%) was interpreted as a high level [12]. For the safety BLS performing determination, the score of 0 – 15.9 (0.0 – 79.9%) were interpreted as fail or not pass the criteria, the score of 16 – 20 (80 – 100.0%) was interpreted as pass criteria [12]. The CVI of the scale was 0.67, and the coefficient of Cronbach's alpha reliability was 0.94.

3. Results

3.1. Demographic characteristics of participants

Approximately 89% of the participants were women. Their age range was 32 – 62 with a mean age of 49.37 ± 9.36 years. Around half of the participant (48.7%) aged between 50 – 59 years old. Two of third completed primary school. One third had experience in BLS training before. Almost of them (91.8%) did not experience in BLS performing. The rage of being health volunteer was 1 – 32 years, and mean of 11.46 (SD=9.52) years as shown in Table 1.

Table 1. Demographic characteristics of participants

Demographic	Frequency	Percentage
Gender		
: Male	4	10.8
: Female	33	89.2
Age (Year)		
: 30-39	10	27.0
: 40-49	3	8.1
: 50-59	18	48.7
: 60+	6	16.2
: Range = 32-62 Years		
: Mean ± SD. = 49.37 ± 9.36 Years		
Education level		
:Primary school	26	70.3
: Secondary school	11	29.7
Experience in BLS training		
: No	26	70.3
: Yes	11	29.7
Experience in BLS Performing		
: No	34	91.8
: Yes	3	8.2
Year of village health volunteer		
: Range = 1-32 Years		
: Mean ± SD. = 11.46 ± 9.52 Years		

3.2. The results of the implementation of a basic life support training program for village health volunteers

To test the effectiveness of the program, the Kolmogorov-Smirnov Z test was employed to test the normality of all variables, knowledge related BLS, perceived self-efficacy in BLS performing and BLS performance. The results revealed all variables were non-significant indicating that all variables were normally distributed. Therefore, paired sample t-test was used to test the knowledge related BLS, perceived self-efficacy in BLS performing and BLS performance at before and after immediate implementations.

3.3. The knowledge related BLS

Before the program implementation, the mean score of knowledge related BLS was 4.70 (SD = 1.91), which was interpreted as a poor level. Moreover, around two-thirds (67.6%) had the knowledge related BLS at a poor level. After the program implementation immediately, the mean score was 7.22 (SD = 2.10), which was interpreted as the moderate level. In addition, almost of participants (86.5%) had knowledge related BLS at a moderate to high level. However, 13.5% of the participants had the knowledge at the poor level as presented in Table 2.

3.4. The perceived self-efficacy in BLS performing

Before the program implementation, the mean score of perceived self-efficacy in BLS performing was 26.87 (SD = 8.17), which was interpreted as the low level. Moreover, most of them (86.5%) had the perceived self-efficacy in BLS performing at the moderate and low level. After the program implementation immediately, the mean score was 39.05 (SD = 5.51), which was interpreted as the high level. In addition, none of participants had perceived self-efficacy in BLS performing at a low level as presented in Table 2.

3.5. The BLS performance

Before the program implementation, the mean score of BLS performance was 14.05 (SD = 4.95), which was interpreted as a moderate level. However, around one-third (35.1%) of the participants had the BLS performance score at a low level. After the program implementation immediately, the mean score was 20.00 (SD = 0.00), which was interpreted as the high level. In addition, all of participants (100.0%) had BLS performance score at a high level as presented in Table 2.

3.6. Comparison of knowledge related BLS, perceived self-efficacy in BLS performing, and BLS performance before and after implementations

Paired sample t-test was used to analyze the mean scores of the knowledge related BLS, perceived self-efficacy in BLS performing, and the BLS performance at before and after the program implementation. The results showed that the knowledge related BLS mean scores at after implementation were a significantly higher than before implementation (t = -5.65; df = 36; p-value < 0.001).

The results also revealed that the perceived self-efficacy in BLS performing at after implementation was significantly higher than before the implementation (t = -9.06; df = 36; p-value < 0.001), as showed in Table 3.

The results showed that the BLS performance at after implementation was significantly higher than before the implementation (t = -7.31; df = 36; p-value ¡ 0.001), as showed in Table 3.

Finally, after the program implementation, the result revealed that all participants were passed the criteria for BLS performance as showed in Table 4.

4. Discussion

This study revealed that the effect of BLS training program could improve several outcomes such as knowledge related BLS, perceived self-efficacy in BLS performing, and BLS performance that are discussed below.

The knowledge related BLS: The finding of this study showed that the knowledge related BLS scores after intervention was significantly higher than before the intervention. The knowledge related BLS and skills were important for village health volunteers to perform BLS if they faced with cardiac arrest event. The results of this study could be explained

Table 2. Descriptive scores of the knowledge related BLS and perceived self-efficacy (n = 37)

Variables	Mean (SD.)	Interpretation	Frequency (Percentage)		
			Low/Poor	Moderate	High/good
-knowledge related BLS					
: Before	4.70	Poor	25	8	4
	(1.91)		(67.6)	(21.6)	(10.8)
: After	7.22	Moderate	5	17	15
	(2.10)		(13.5)	(46.0)	(40.5)
-perceived self-efficacy					
: Before	26.87	Low	17	15	5
	(8.17)		(46.0)	(40.5)	13.5)
: After	39.05	High	0	11	26
	(5.51)		(0.0)	(29.7)	(70.3)
- BLS performance					
: Before	14.05	Moderate	13	24	0
	(4.95)		(35.1)	(64.9)	(0.0)
: After	20.00	High	0	0	37
	(0.00)		(0.0)	(0.0)	(100.0)

Table 3. Comparison of knowledge related BLS and perceived self-efficacy before and after implementations (n = 37)

Variables	Mean(SD.)	t-test	df.	p-value
-knowledge related BLS				
: Before	4.70(1.91)	-5.65	36	<0.001
: After	7.22(2.10)			
-perceived self-efficacy				
: Before	26.87(8.17)	-9.06	36	<0.001
: After	39.05(5.51)			
- BLS performance				
: Before	14.05 (4.95)	-7.31	36	<0.001
: After	20.00 (0.00)			

that the BLS training program for village health volunteers (Figure 2) including the necessary BLS information for village health volunteers may have increased knowledge related BLS of them. The PowerPoint, handout, and handbook were useful for the village health volunteers to understand more easily. This finding was congruent with the previous study that found that the lecture-based and basic life support training package, included can enhance knowledge related to BLS of teachers in Iran [14]. However, the results found that 13.5% of the participants in this study still had the knowledge related BLS at the low level. The results found that the majority of them were aged over 55 years old. These can be inferred that the 20-minutes classroom lecture for transferring the knowledge to the village health volunteers was not effective.

The perceived self-efficacy in BLS: the perceived self-efficacy in BLS score of the participants at after the training was significantly higher than before the training. This led to the conclusion that the BLS training program had a positive effect on the perceived self-efficacy in BLS of village health volunteers. Perceived self-efficacy in BLS performing had a direct influence on performance accomplishments of BLS practice. The significance of perceived self-efficacy in BLS has demonstrated frequently to be predictive of BLS performing outcomes. Perceived self-efficacy in BLS performing was influenced by 4 main sources of information including enactive mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states. As such, the intervention of this study was devised based on self-efficacy theory and was expected to increase village health volunteers' confidence in their ability to practice BLS by adjusting 4 main sources of self-efficacy information in the Program. The results found in this study was congruent with the recent studies as a teacher who trained BLS had a higher statistical significance of the self-efficacy score in basic resuscitation than those who had not trained [15].

This finding was in congruence with the previous study that found no significant correlation between self-efficacy of BLS and the correct percentage of chest compression of nursing student [7].

The BLS performance: the results revealed that the BLS performance of the participants passed the criteria of the safety BLS performing which was guided by the 2015 AHA Guidelines for CPR and ECC [13]. This study found that before the participation in the basic life support training program around one-third (35.1%) of the participants had the BLS performance at a low level but finally all of participants could achieve a quality of BLS performing. These can be described that the techniques given during the brief instructions on BLS training regarding hand position, compression rate, and depth according to the current guidelines given and real-time feedback by a researcher and research assistants were successful. The real-time feedback and motivation could make

Table 4. Comparison of Basic Life Support Performance before and after implementations (n = 37)

Basic life support performance	Pass		Fail	
	Frequency	Percentage	Frequency	Percentage
Before	-	-	-	-
After	37	100.0	0	0.0

participants adjust their practice into the correct practicing; also repeated again and again if they could not perform correctly made them more skillful of BLS performance. This finding was congruent with the previous study that found a very brief training supported by hands-on instructor-led advice and visual feedback, laypeople was able to perform good-quality cardiopulmonary resuscitation [16].

Conclusion

The finding showed that the basic life support training program was an effective program for improving knowledge related BLS, perceived self-efficacy in BLS performing, and BLS performance. It is therefore concluded that this training program should be implemented in other similar contexts in the community in order to save the life of casualties who experience out-of-hospital cardiac arrest. Future research is needed to explore more about teaching technique for delivery knowledge to an adult and a sustainability of the program related to measure the outcome at the 6, 8 or 12 months after the program implementation. Based on the major finding, it was recommended that an application should be pushed policy change to the curriculum training of a village health volunteer which more concise with increasing knowledge, self-efficacy, and BLS performing.

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