Original Article

Basic Life Support Knowledge among Compulsory Education Students in Thailand

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Background: Basic life support (BLS) is pivotal for the survival of patients in cardiac arrest outside the hospital. Knowledge about BLS in compulsory schools' students practically reflects the curriculum in teaching BLS.

Objective: To investigate the level of basic knowledge on BLS among pre-university students as well as to determine the characteristics of prior BLS training received.

Materials and Methods: A prospective cohort study was done in pre-university students attending the University orientation in 2017. An online-access questionnaire was distributed. One thousand fifty-one questionnaires were completed.

Results: Most respondents had previous BLS training (90%), with 67% receiving BLS training in their basic core curricular education. A mean BLS knowledge score of 6.4 from 14 was revealed. Less than half (46.1%) passed the minimal passing level (MPL). Among BLS course characteristics, only one type of extracurricular training, One District One Doctor camp (ODOD), showed an association with passing the MPL of BLS assessments (odds ratio of pass MPL 10.06; 95% CI 1.18 to 85.53, p=0.035).

Conclusion: Although most of the students had previous BLS training as a part of their basic core curricular education, it did not affect their success in passing the BLS assessments.

Keywords: Cardiopulmonary resuscitation, Public health, Nonprofessional education

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Sudden cardiac arrest is one of the leading worldwide causes of death[1]. Many studies reported a two to three-fold increase in survival rates among cardiac arrest patients who received bystander cardiopulmonary resuscitation (CPR)[2]. Obviously, basic life support (BLS) is pivotal for the survival of patients in cardiac arrest outside the hospital.

Currently, studies have been conducted on knowledge and attitudes towards BLS in many countries. In Norway[3], where BLS is a compulsory part of the school curriculum, young Norwegians are motivated to perform bystander CPR and are knowledgeable about BLS. In the United States, 32 states have passed legislation that requires high school students to be trained in CPR techniques prior to graduation[4]. However, the students do not have to understand the physiology or mechanisms of action behind the chest compressions and are not required to perform CPR nor use an automated external defibrillator (AED) when unassisted[5]. Students in Japan[6,7], Brazil[8], and New Zealand[9] were found to have poor levels of knowledge on BLS, attributed to a lack of compulsory resuscitation training. In Germany, while there is no compulsory CPR training in high school, first aid and BLS classes are a prerequisite in obtaining a driver's license[10]. In Thailand, according to the Basic Education Core Curriculum A.D. 2008, the Safety in Life section stated that students in grades 9 to 12 must be able to perform BLS correctly[11]. However, there is no standardized BLS teaching for every school. A study in Thailand found that having a standardized BLS program can improve BLS knowledge among high school students[12].

Currently, there is no data of knowledge about BLS in pre-university students. The aim of the present

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study was to investigate the level of basic knowledge on BLS among pre-university students as well as to determine the characteristics of prior BLS training received.

Materials and Methods

The present study was a cross-sectional study performed on pre-university students who attended Chiang Mai University's orientation on August first and second 2017. The present study was approved by the Institutional Ethical Committee of the Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand (Permit no. EME-2560-04860). An electronics online-access questionnaire (Google form) was distributed using a quick response (QR) code. Students who underwent BLS learning by faculty before the study were excluded. The participants voluntarily responded to the questionnaire consisting of three parts. Part 1 collected general participant information, characteristics, methods of BLS training programs, previously BLS training level, and confidence in performing BLS. Part 2 assessed knowledge on BLS by performing the MCQ (multiple choice question) test, modified from the standard BLS course exam. Each part of the questionnaire was a filled-in form and choices. The minimal passing level (MPL) score considered to pass the test is 6 out of 14, reviewed by two experienced BLS instructors. Part 3 assessed confidence in performing BLS by oneself and attitudes towards BLS learning programs.

Statistical analysis

Descriptive data were presented as frequency and percentages. Continuous data were presented as mean with standard deviation (SD) or median with interquartile range (IQR). To assess factors associated with passing BLS assessments, the authors used univariate and multivariate logistic regression analyses with IBM SPSS Statistics for Windows, version 23.0 (IBM Corp., Armonk, NY, USA). Significant p-values were recorded as less than 0.05.

Results

The respondents' characteristics

One thousand fifty-one questionnaires were completed (12.14% of the total Student population). The characteristics of the respondents are shown in Table 1. Sixty-seven percent were female, and the median age was 18 years. Most respondents were from the Faculty of Medicine (23%). Almost all respondents graduated from a school in northern

Table 1. Student characteristics (n=1,051)

Variable	Value; n (%)
Demographic characteristic	
Sex: female	704 (67.0)
Age (year); median (IQR)	18 (18 to 19)
Faculty	
• Medicine	243 (23.1)
• Education	175 (16.65)
• Pharmacy	132 (12.55)
• Science	121 (11.5)
• Humanity	94 (8.9)
• Agriculture	79 (7.5)
• Nursing	41 (3.9)
• Business Administration	30 (2.9)
• Agro-Industry	24 (2.3)
• Economics	21 (2.0)
• Political Science and Public Administration	18 (1.7)
• Mass Communication	17 (1.6)
• Architecture	15 (1.4)
• Dentistry	13 (1.2)
• Social Sciences	10 (1.0)
• Associated Medical Sciences	6 (0.6)
• Veterinary Medicine	6 (0.6)
• Engineering	5 (0.5)
• Fine Arts	1(0.1)
Region	
• Northern	736 (70.0)
• Central	206 (19.6)
• Eastern	21 (2.0)
• Northeastern	35 (3.3)
• Western	21 (2.0)
• Southern	31 (3.0)
• Abroad	1 (0.1)
Top 50 school	174 (16.0)
BLS learning characteristic	
Have been learned	955 (90.8)
Type of learning	
• Basic Core Curricular Education	647 (67.0)
• Social media ex. internet newspaper	199 (20.8)
• Extracurricular BLS training	83 (8.6)
• Reserve Officer Training Corps camp	8 (0.8)
• One District One Doctor camp*	8 (0.8)
• Others	9 (1.5)
Method of learning	
• Lecture	210 (20.0)
• Lecture and practice	518 (49.3)

IQR=interquartile range; BLS=basic life support

* Standard BLS training course by faculty of medicine

Table 2. Knowledge and attitude of student in BLS

	Value; n (%)
BLS knowledge	
Total score (max 14); mean±SD	6.40±0.06
• Part step of BLS (max 5)	2.97±0.05
• Part chest compression and AED (max 6)	2.22±0.04
• Part others (max 3)	1.34±0.02
Pass MPL	
• Total score	484 (46.1)
• Part step of BLS	555 (49.7)
• Part chest compression and AED	405 (38.5)
• Part others	920 (87.5)
Attitude towards BLS	
Self-assessment on BLS knowledge; median (IQR)	6 (5 to 8)
Self-confident to perform BLS; median (IQR)	4 (3 to 5)
Self-confident to perform BLS	
• Low (score 0 to 3)	404 (38.4)
• Medium (score 4 to 7)	587 (55.9)
• High (score 8 to 10)	60 (5.7)
If you come across cardiac arrest patient	
• Perform BLS by yourself	425 (40.4)
• Call others for help	626 (59.6)

SD=standard deviation; BLS=basic life support; AED=automated external defibrillator; MPL=minimal passing level; IQR=interquartile range

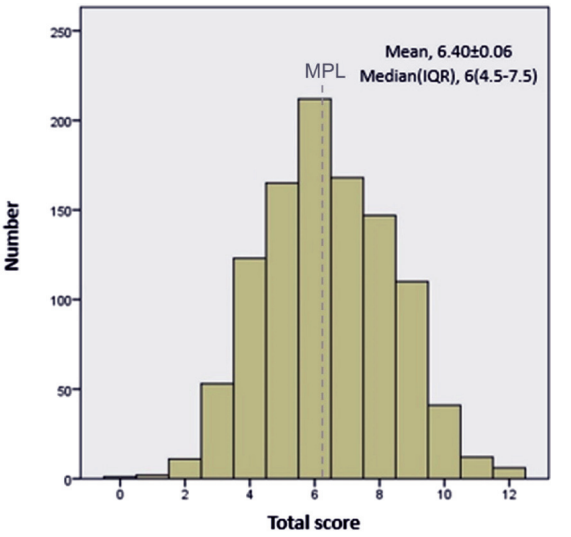

Figure 1. Multiple-choice question score of students.

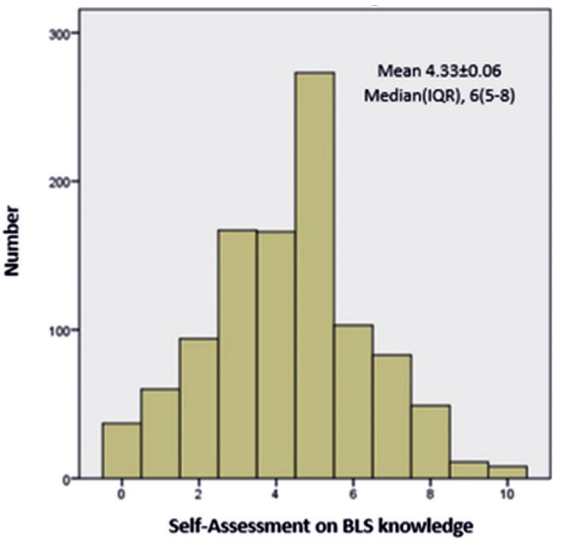

Figure 2. Self-assessment on basic life support knowledge score.

Thailand and about 16% were from the top 50 schools in the ordinary national educational test (ONET) for grade 12 (Table 1).

Most respondents had previous BLS training (90%), and 67% had studied in the basic core curricular education. Only a small percentage of respondents (8.6%) had attended formal BLS training through extracurricular BLS courses. The most common methods of training were through lectures and practices.

Knowledge about BLS

Assessments on knowledge about BLS (Table 2) revealed a mean score of 6.4 from a total score of 14 as shown in Figure 1. Less than half (46.1%) passed the MPL score of six. Only 38.5% of respondents passed the MPL of assessments on chest compression and AED use.

Attitude towards basic-life-support

A median score of self-assessment on BLS knowledge was 6 out of 10 (IQR 5 to 8) (Figure 2). The median score of confidence in performing BLS by themselves was 4 out of 10 (Figure 3). This was divided into three levels, high (8 to10), medium (4 to 7), and low (0 to 3). Most participants had a medium level of confidence (55.9%). Almost 60% would call and wait for help whereas, the others would provide full CPR if they came across a cardiac arrest patient.

Factors associated with achieving the minimum passing level of BLS assessments

Among BLS course characteristics, only the type of training showed an association with passing the MPL of BLS assessments. Participants with prior enrollment in "One District One Doctor (ODOD)"

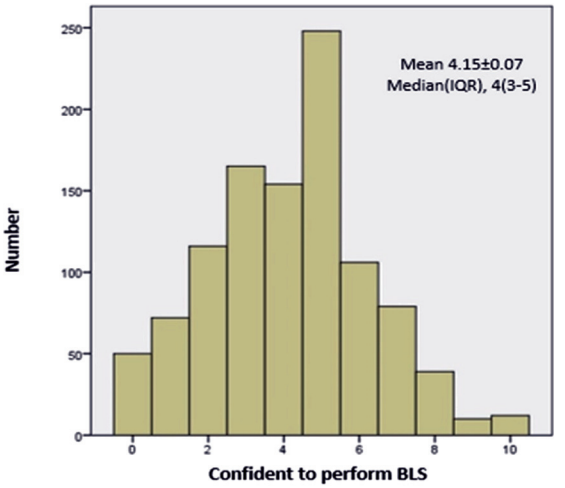

Figure 3. Confidence to perform basic life support by themselves; high (8 to 10), medium (4 to 7), and low (0 to 3).

camp demonstrated better knowledge on BLS compared to other groups, with an odds ratio (OR) 10.06, 95% confidence interval (CI) 1.18 to 85.53, p=0.035 (Table 3). Previous BLS training from basic core curricular education, methods of training, lecture alone, or lecture with practice and studying in 50 Top ONET score schools were not associated with passing MPL level. Higher confidence performing BLS by oneself was associated with better outcomes (OR 1.78, 95% CI 1.00 to 3.17, p=0.049).

Table 3. Risk-adjusted odds ratio with achieving MPL of BLS assessments

	Adjusted OR (95% CI)	p-value
BLS learning characteristic		
Type of learning		
• Not trained	Reference	-
• Basic core curricular education	3.29 (0.30 to 36.17)	0.330
• Social media ex. Internet newspaper	1.43 (0.87 to 2.37)	0.153
• Extracurricular BLS training	6.17 (0.55 to 68.99)	0.140
• Reserve Officer Training Cops camp	1.36 (0.32 to 5.84)	0.679
• One District One Doctor camp	10.06 (1.18 to 85.53)	0.035
• Others	5.13 (1.01 to 26.15)	0.049
Method of learning		
• Lecture	Reference	-
• Lecture and practice	0.84 (0.61 to 1.18)	0.333
Lowest level of learning		
• Not trained	Reference	-
• Elementary school	0.50 (0.05 to 5.44)	0.571
• Junior high school	0.42 (0.04 to 4.45)	0.471
• Senior high school	0.43 (0.41 to 4.59)	0.487
Top 50 schools	1.25 (0.89 to 1.74)	0.201
Self-confidence to perform BLS		
Low (score 0 to 3)	Reference	-
Medium (score 4 to 7)	1.27 (0.97 to 1.66)	0.079
High (score 8 to 10)	1.78 (1.00 to 3.17)	0.049

OR=odds ratio; CI=confidence interval; BLS=basic life support

Discussion

Everyone should know BLS, as sudden cardiac arrest is one of the leading causes of death worldwide[1]. A higher survival rate is associated with good BLS[13]. In the present study, almost (90.8%) of pre-university students have been trained in BLS. Furthermore, over half was trained during the basic core curricular education. However, only half of the students had an expected score in the present study.

Having previous BLS education as a part of the basic core curricular education does not affect the success in passing BLS assessments. This reflected that the standard of BLS teaching in the compulsory curricular in Thailand is not standardized and may be due to curricula that are not up-to-date, variations in teaching techniques, as well as the lack of assessments in BLS courses. Compared with the study conducted in Thailand[12], the authors found that the difference in the BLS training did not affect BLS knowledge. Having a small number of participants in the present study with previous BLS training outside basic core curricular may explain this finding. Furthermore, different studies may have different BLS training methods.

The present study was conducted in pre-university students from all faculties; hence, the findings may be applicable and generalizable to all pre-university students in Thailand. The ODOD attendance has an association with BLS test scores, as the ODOD camp prepares students for medical school and includes practical BLS sessions together with the first aid lessons. The authors suggest that students have more knowledge after a well-organized BLS course, which would affect the BLS score, consistent with previous research[12].

Limitation

There were low response rates compared to the total student body number due to being a voluntary questionnaire. Therefore, it may not represent the entire student population. The study was conducted in pre-university students in only one university, thus, may not represent the entire population; however, the students come from all parts of Thailand. Additionally,

this is a pilot study where the questionnaires were generated from the Emergency Physicians' expertise and have not been evaluated.

Conclusion

Although most Thai students had previous BLS training as a part of their basic core curricular education, it did not affect their success in passing BLS assessments. A more standardized training program in BLS should be provided in basic core curricular education.

What is already known on this topic?

BLS is pivotal for the survival of patients in cardiac arrest outside the hospital. Previous studies done in developed countries showed that compulsory BLS teaching had a positive impact on school.

What this study adds?

Although most of the students in the compulsory education in Thailand had previous BLS training as a part of their basic core curricular education, knowledge and attitudes towards BLS did not differ compared to those who did not receive BLS training. Standardized and well-organized BLS education is needed for Thai primary school students.

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Authors' contributions

Vessadapan P, Wittayachamnankul B, Wongtanasarasin W, and Laosuksri W designed the study protocol. Vessadapan P and Wittayachamnankul B reviewed the study protocol and drafted the manuscript. All authors approved the final manuscript.

Availability of data and materials

The data set created and evaluated during this analysis is available from the corresponding author.

Ethical approval and consent to participate

This study was approved by the Institutional Ethical Committee of the Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand (Permit no. EME-2560-04860). No informed consent was required, as this study was waived from the committee.

Conflicts of interest

The authors declare no conflict of interest.

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