Original Article

Learning Outcomes of an International Training Course on Mechanical Cardiopulmonary Resuscitation Device Use for Emergency Medicine Residents

Korakot Apiratwarakul, MD[1], Takaaki Suzuki, MD[2], Alongkone Phengsavanh, MD[3], Kanya Wangsri, MS[4]

[1] Department of Emergency Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand
[2] Department of Emergency and Critical Care Medicine, University of Tsukuba Hospital, Tsukuba, Japan
[3] Faculty of Medicine, University of Health Sciences, Vientiane, Laos
[4] Emergency Medical Services Unit, Division of Nurse, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand

Background: The present study was conducted to assess the learning outcomes of mechanical cardiopulmonary resuscitation device training course for emergency medicine residents from Laos. The course was part of a collaborative project among Tsukuba University in Japan, the University of Health Sciences in Laos, and Khon Kaen University in Thailand.

Objective: To evaluate the learning outcomes a mechanical cardiopulmonary resuscitation device course for emergency medicine residents.

Materials and Methods: The cross-sectional study was conducted in emergency medicine residents from Laos who participated in a training course on the use of mechanical cardiopulmonary resuscitation devices, which took place between January and March 2020 at the Srinagarind Hospital emergency department (ED). Assessment exams for individually with standard checklists for Thais' emergency medicine residents.

Results: A total of eight emergency medicine residents from Laos were enrolled. The mean age was 33.7±3.5 years, and 62.5% (n = 5) of the participants were female. We found that participants' mean score had increased from 4 to 8 points after the training course (p = 0.010). Participants rated the ease of the procedure as 8 out of 10 (1: very difficult).

Conclusion: The mechanical cardiopulmonary resuscitation device training course was successful in terms of sharing both medical knowledge and equipment management techniques.

Keywords: Internship and Residency, Laos, Cardiopulmonary resuscitation, Emergency medicine

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In 2020, Tsukuba University in Japan, the University of Health Sciences in Laos, and Khon Kaen University in Thailand developed a three-year collaborative training program for emergency medicine residents in Laos. In the first phase, medical staff from Khon Kaen University travel to Vientiane to teach participants about caring for stroke patients, ultrasound in emergency patients, and emergency medical services (EMS). In the later stages, participants come to Thailand to practice at the Srinagarind Hospital emergency department (ED) for four weeks, during which they undergo 32 hours of theory lectures, 96 hours of ED practice, and 32 hours of EMS training. Participants receive training in the use of various medical devices via lecture and simulation models. Previous studies have found such international rotational programs to be beneficial to both students and teachers[1] in terms of different patient characteristics, medical equipment, and the treatment guidelines[2-6]. The objective is to enable the local physicians in the field of emergency medicine in Laos to transfer the knowledge they gain from the program to other medical personnel in their country[7-12].

Mechanical cardiopulmonary resuscitation devices have been used for over 60 years to help with chest compressions in patients experiencing cardiac arrest. However, these devices have only recently become widely used in Thailand due to their relatively high cost[13], and physicians in the region require specific training in order to use them efficiently. Emergency medicine residents from Laos who enroll in this program also participate Thailand's emergency medicine curriculum. We aimed to study participants' knowledge and ability with regard to the use of mechanical cardiopulmonary resuscitation devices after completing the program.

Correspondence to:
Apiratwarakul K.
Department of Emergency Medicine, Khon Kaen University, Khon Kaen 40002, Thailand.
Phone: +66-43-366869, **Fax:** +66-43-366870
Email: korakot@kku.ac.th

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Materials and Methods

Study population and design

This was a cross-sectional study conducted in emergency medicine residents from Laos who visited the Srinagarind Hospital ED to undergo training between January and March 2020. Participants who did not attend the course on mechanical cardiopulmonary resuscitation device use were excluded. Ethical approval was provided by the Khon Kaen University Ethics Committee for Human Research (HE631275). The requirement for informed consent from the participants was waived, as participants were not identified by name but by a unique study number, thus guaranteeing confidentiality.

Statistical analysis

Statistical analysis was performed using SPSS for Windows version 17.0 (SPSS Inc., Chicago, IL, USA). Categorical data were presented as percentages, and continuous data were presented using mean and standard deviation. Univariable analysis was performed using a two-sample t-test for numerical data and a Chi-squared test or Fisher's exact test for data comparison between the two groups.

Data collection

Before starting the session, we worked on the test before studying then, studying the mechanical cardiopulmonary resuscitation devices, with a demonstration of using and group practice for a total of three hours. After that, participants took practice examinations with standard checklists for Thais' emergency medicine residents, and the results were analyzed.

Results

A total of eight emergency medicine residents from Laos were enrolled between January and March 2020 (Table 1). The first two groups underwent four weeks of training and the third group underwent three weeks.

Participant characteristics are shown in Table 2. The mean age was 33.7±3.5 years, and 62.5% (n = 5) were female. Three of the participants had 3 to 6 years of experience in cardiopulmonary resuscitation, and two each had 1 to 3 years and more than 6 years. Most had no experience with mechanical cardiopulmonary resuscitation devices (87.5%). Participants' scores significantly improved on an exam designed to test knowledge in mechanical cardiopulmonary resuscitation device use, with a mean score of 4 on the pretest and 8 on the posttest ($p = 0.010$; Table 3). Particular improvement was noted on the practical sections that involved simulation cases ($p = 0.014$). The majority of participants rated the ease of the procedure as 8 out of 10 (1: very difficult) after the course.

Table 1. Training time periods

Students	Periods in 2020	Duration
A	6th to 31st January	4 weeks
B	6th to 31st January	4 weeks
C	3rd to 28th February	4 weeks
D	3rd to 28th February	4 weeks
E	3rd to 28th February	4 weeks
F	2nd to 20th March	3 weeks
G	2nd to 20th March	3 weeks
H	2nd to 20th March	3 weeks

Table 2. Characteristics of the participants (n = 8)

Characteristics	Number (%)
Age (years), mean ± SD	33.7±3.5
Sex: female	5 (62.5)
Experience in cardiopulmonary resuscitation (years)	
<1	1 (12.5)
1 to 3	2 (25.0)
3 to 6	3 (37.5)
>6	2 (25.0)
Experience with mechanical cardiopulmonary resuscitation devices	
Yes	1 (12.5)
No	7 (87.5)

Table 3. Assessment of mechanical cardiopulmonary resuscitation device use

Assessment area	Median (IQR)		95% CI	*p*-value
	Pre-test	Post-test		
Knowledge	4 (2, 5)	8 (7, 10)	3 to 8	0.010*
Practice with simulation cases	1 (0, 2)	8 (7, 10)	4 to 9	0.014*
Self-assessment#	1	8		

* Statistical significance, # Scale of 1 to 10 (1: very difficult; 10: very easy)
IQR = interquartile range, CI = confidence interval

Discussion

The present study analyzed the effectiveness of a mechanical cardiopulmonary resuscitation device training course as part of an international rotational program of emergency medicine residents from Laos. As mentioned above, the project was a collaboration between three universities in Japan, Thailand, and Laos. Thailand was selected as the practice site for this course, due to its linguistic and cultural similarities with Laos, as well as its geographic

proximity (Srinagarind Hospital is only about 200 kilometers from Laos - about three hours by bus). Participants were divided into three groups, each of which were to undergo four weeks of training. However, due to the COVID-19 outbreak and subsequent travel restrictions, the third group was only able to undergo three weeks of training. Despite this setback, all participants were able to complete the course on mechanical cardiopulmonary resuscitation device use. For the doctors who come to train from Laos found that the age is nearly to emergency medicine residents in Thailand with previous studies[5,8,11].

After training, participants' scores were higher on both the theory and practice sections of the standard Thai checklist for emergency medicine residents. In addition, participants rated the equipment as being easy to use, meaning they are likely to be able to train others. Although mechanical cardiopulmonary resuscitation devices are not currently available in Laos, it is important that doctors are trained in their use in case they are adopted in the future. In 2020 to 2022 this program will focus on training physicians, nurses, and emergency medical services staff[10,12,14].

Our study has certain limitations. First, Thai law does not allow non-Thai citizens to treat patients, meaning that simulations had to be used for practical training. Another limitation is that some of the medications about which participants in this course learn are not available in Laos[14-18].

Conclusion

The mechanical cardiopulmonary resuscitation device training course was successful in terms of sharing both medical knowledge and equipment management techniques.

What is already known on this topic?

International rotational programs benefit both students and teachers in terms of different patient characteristics, medical equipment, and the treatment guidelines.

What this study adds?

The mechanical cardiopulmonary resuscitation device training course for emergency medicine residents from Laos was successful in terms of sharing both medical knowledge and equipment management techniques.

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Conflicts of interest

The authors declare no conflict of interest.

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