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ORIGINAL RESEARCH

Effect of prebriefing in cardiopulmonary resuscitation education for laypeople on educational effectiveness and satisfaction

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Abstract

Bystander cardiopulmonary resuscitation (CPR) is important for improving survival rates and neurological outcomes in out-of-hospital cardiac arrest. However, laypeople often have psychological barriers to performing CPR, even if they have received training. Prebriefing provides psychological stability to the participants, enabling them to concentrate more comfortably during simulation. However, previous studies have mainly focused on simulation-based education for medical professionals, and no study has focused on prebriefing for laypeople. Therefore, we developed a structured prebriefing for laypeople and applied it to their CPR education to investigate its effect on educational effectiveness and satisfaction. This group randomization study was conducted from 09 November 2022 to 09 December 2022. Individuals aged $\geq$18 years who participated in CPR training as non-medical personnel were included. A 60-min CPR education focusing on hands-on skills was conducted. The Prebriefing Experience Scale for laypersons (PESL) was developed and surveyed using a 5-point Likert scale by modifying the Prebriefing Experience Scale for medical personnel based on existing research. During the study, a total of 382 people applied for education in 29 classes. Owing to logistical constraints resulting in randomization failure within the cohort of 10 classes, 82 participants were affected and subsequently excluded. In addition, 12 participants were excluded because of incomplete responses in the PESL survey. Ultimately, the experimental cohort consisted of 139 participants distributed across 10 classes, and the control group comprised 149 participants within the 9 classes. No difference in age and sex was found between the two groups. No statistically significant differences were observed between the two groups across all categories of the PESL assessment. In this study, when structured prebriefing was conducted on the general public, no statistically significant differences were found in PESL compared with conventional prebriefing. However, more improved research is needed.

Keywords

Heart arrest; Education; Public Health

1. Introduction

Sudden death due to cardiac arrest is a major concern in global public health. Despite advancements in the field of medicine, the global out-of-hospital cardiac arrest survival rate upon discharge from 2010 to 2019 remains at 8.8% [1]. Numerous studies have emphasized the importance of bystander cardiopulmonary resuscitation (CPR) in improving the survival rate and neurological outcomes of out-of-hospital cardiac arrests. Performing bystander CPR effectively plays a crucial role in enhancing these outcomes [2–9]. Out-of-hospital cardiac arrests (OHCAs) occur outside of medical facilities, making bystander CPR crucial for improving outcomes. To ensure better performance of bystander CPR, CPR training targeting the general public is necessary. However, many individuals face psychological barriers when performing CPR, and even if they receive training, they may not actively participate [10–12].

Prebriefing refers to explaining the educational content to the participants before simulation-based training. This provides psychological reassurance to the participants, allowing them to focus more comfortably on the simulation [13]. However, previous studies on prebriefing have focused on simulation-based training for healthcare professionals, and no study has specifically focused on prebriefing in CPR education targeting the general public. Existing CPR education for the general public has been conducted following the education guidelines of the American Heart Association (AHA). Although the mentioned guidelines do not address prebriefing, they emphasize efforts to alleviate CPR-associated psychological barriers. However, in existing CPR education for the general public, prebriefing tends to vary depending on the instruc-

tor given the lack of standardized prebriefing structure. Thus, this study aimed to investigate the effect of implementing a structured prebriefing, developed considering the participants' levels, on their satisfaction and educational outcomes [13–15].

2. Materials and methods

This study was conducted from 09 November 2022 to 09 December 2022, targeting residents of a specific urban area. The study included individuals aged ≥18 years and were non-medical professionals participating in CPR education. Individuals who did not provide consent for data usage, did not complete the entire education program, or had missing data were excluded from the study.

This study was conducted as a part of a community health center program in an urban area, where participants were recruited voluntarily. The education was funded through a local government program. Therefore, the participants did not incur any fees for the educational sessions.

In each training class, two types of prebriefing, namely, conventional unstructured and structured, were randomly selected. The selection process was carried out through group randomization and was overseen by a neutral author (JOP) who did not teach in the class. The instructor of each class was only informed of their prebriefing assignment just before the class started. Thus, participants were unaware of which prebriefing they would receive when applying for the training class. In addition, participants of a class were all given the same prebriefing. This approach ensured fairness throughout the training process. Ten classes were excluded because their instructors were not recruited from the research group, as they were scheduled after establishing the randomization strategies.

Subsequently, a practical CPR training session of approximately 60 min was conducted. After the prebriefing session, participants received a brief theoretical education on CPR. This was followed by practical exercises focused on cardiac arrest recognition, activation of the emergency medical system, chest compression techniques, and the use of automated external defibrillators. After completing the training, a modified version of the Prebriefing Experience scale for healthcare professionals was developed, called the Prebriefing Experience scale for laypersons (PESL), and administered using a 5-point Likert scale for survey assessment (Table 1) [15, 16].

The assigned instructors for this study were emergency medicine physicians, nurses and first-level emergency medical technicians, all of whom held AHA BLS (American Heart Association Basic Life Support) certifications. They were informed about the relevant details of the community education project, which served as the background for this study, through documentation before the project commenced. In addition, a researcher provided direct explanations of the related content.

The instructors were unaware of whether they were assigned to the experimental or control group before the education sessions. On the day of each educational session, a script was provided by the researchers, which served as the basis for conducting the prebriefing (**Supplementary material**). For each training session, a minimum of two instructors participated, and the instructor-to-participant ratio was planned to be 1:8 or lower.

To calculate the required sample size for testing the hypothesis based on previous research findings, group-randomized trials (GRT) Sample Size Calculator was used; with $\alpha = 0.05$ and $1-\beta = 0.80$, three groups are required per condition based on the parameter estimates reported in a previous study. During the implementation of the community-based education program, we aimed to include as many groups as possible. By anticipating a high dropout rate from the onset, we initially planned for six groups per cohort. However, we could not assign an equal number of participants to each group in the actual educational sessions. Given that the intervention for the study was not harmful and beneficial to the participants, we filled the planned number of groups but maintained them throughout the educational project.

For continuous variables, the Shapiro-Wilk test was used to test for normality at a significance level of 0.05. In parametric cases, Student's *t*-test was used for comparison, whereas in non-parametric cases, the Mann-Whitney test was used. For categorical variables, the chi-square test was employed, and if the degrees of freedom were less than 5, Fisher's exact test was used for analysis. The significance level for hypothesis testing was set at 0.05. Statistical analysis was performed using IBM SPSS version 25.0 (IBM Corp., Armonk, NY, USA).

3. Results

During the designated study period, we received applications from a total of 382 participants distributed across 29 different classes. Owing to randomization failures from logistics, 82 participants belonging to 10 classes were deemed ineligible and were thus excluded from the study. This left us with a randomized sample of 300 participants, originating from 19 eligible classes. Within this sample, 147 participants from 10 classes were allocated to the "structured prebriefing group". Of these, eight participants were subsequently excluded for failing to complete the PESL survey. Likewise, 153 participants from 9 classes were assigned to the "unstructured prebriefing group", and four of them were also excluded for the same reason. Consequently, the final analysis was conducted with 139 participants from 10 classes in the structured prebriefing group and 149 participants from 9 classes in the unstructured prebriefing group (Fig. 1).

No significant differences in age and sex were found between the two groups (Table 2). For each randomized education session, the location of the training, the number of participants, and participant characteristics were summarized (Table 3). In the item-by-item analysis of the PESL questionnaire, no statistically significant differences were observed between the structured and unstructured prebriefing groups (Table 4). To assess the internal consistency of PESL, Cronbach's alpha coefficient was calculated and found to be consistently high across all items, exceeding 0.9 (Table 5). In addition, when comparing individual summed scores across various PESL categories between the two groups, no statistically significant differences were evident (Table 6). This lack of statistical difference also held true when comparing the group level summed scores across different PESL categories (Table 7).

TABLE 1. PESL survey.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Analyzing thoughts and feelings (PESL-ATF)					
1. The prebriefing helped organize my thoughts.	1	2	3	4	5
2. The prebriefing was made in a physically comfortable position.	1	2	3	4	5
3. I was able to relieve my worries and anxiety about the practice by prebriefing.	1	2	3	4	5
Learning and making connections (PESL-LC)					
1. The prebriefing was related to CPR practice.	1	2	3	4	5
2. The prebriefing helped to proceed with the practice.	1	2	3	4	5
3. The prebriefing was an opportunity for me to learn.	1	2	3	4	5
4. The prebriefing clarified the significance of practice.	1	2	3	4	5
5. My curiosity about conducting the practice was solved by prebriefing.	1	2	3	4	5
6. The prebriefing allowed me to realize my thoughts on CPR better.	1	2	3	4	5
7. The prebriefing allowed me to understand the problem of performing CPR.	1	2	3	4	5
8. The prebriefing allowed me to connect the theory of CPR and its application to actual situations.	1	2	3	4	5
Facilitator skill in conducting the debriefing (PESL-FS)					
1. The prebriefing session facilitator talked the right amount during debriefing.	1	2	3	4	5
2. I had enough time to prebrief thoroughly.	1	2	3	4	5
3. The prebriefing session facilitator was an expert in the content area.	1	2	3	4	5
Appropriate facilitator guidance (PESL-FG)					
1. The facilitator provided adequate guidance during the prebriefing.	1	2	3	4	5

PESL: Prebriefing Experience Scale for laypersons; ATF: analyzing thoughts and feelings; LC: learning and making connections; CPR: cardiopulmonary resuscitation; FS: facilitator skill in conducting the debriefing; FG: appropriate facilitator guidance.

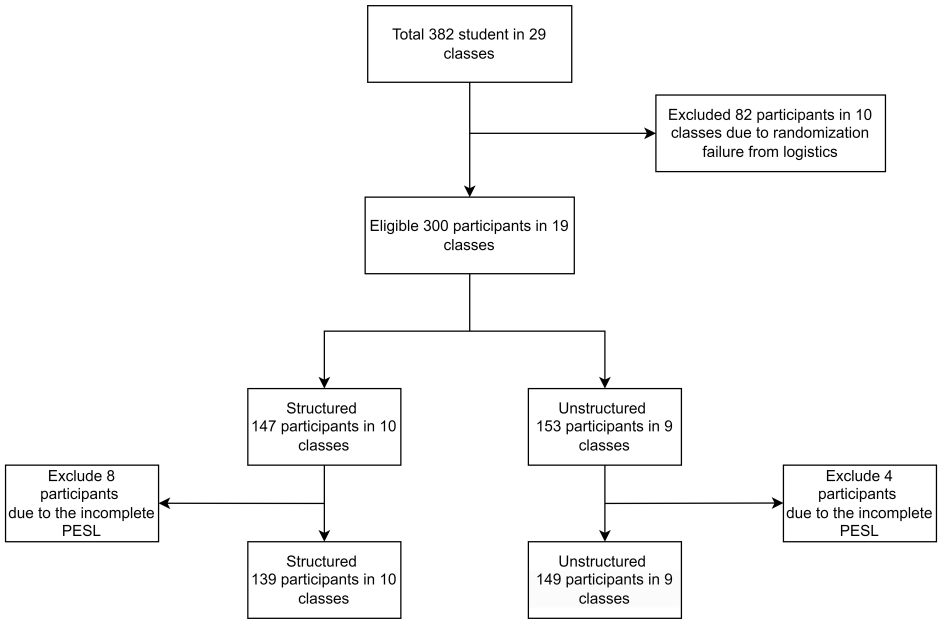

FIGURE 1. Study flowchart. PESL: Prebriefing Experience Scale for laypersons.

TABLE 2. Demographic data.

Variables	Structured prebriefing classes	Unstructured prebriefing classes	Total	*p*-value
	(n = 139)	(n = 149)		
Sex				
M	50 (36.0%)	64 (43.0%)	114 (39.6%)	0.226
F	89 (64.0%)	85 (57.1%)	174 (60.4%)	
Age				
<20	0 (0.0%)	1 (0.7%)	1 (0.4%)	
21–30	42 (30.2%)	42 (28.2%)	84 (29.2%)	
31–40	25 (18.0%)	35 (23.5%)	60 (20.8%)	
41–50	23 (16.6%)	35 (23.5%)	58 (20.1%)	0.188
51–60	40 (28.8%)	33 (22.2%)	73 (25.4%)	
61–70	8 (5.8%)	3 (2.0%)	11 (3.8%)	
>71	1 (0.72%)	0 (0.0%)	1 (0.4%)	

M: Male; F: Female.

TABLE 3. Characteristics of places and participant of classes.

Structured prebriefing classes				Unstructured prebriefing classes			
Classes	Participants	Place	Participant	Classes	Participants	Place	Participant
A	12 (8.63%)	sports complex	public official	A	17 (11.41%)	subway station	station employee
B	15 (10.79%)	simulation center	applicant	B	2 (1.34%)	library	library visitor
C	10 (7.19%)	nursing home	nursing care worker	C	24 (16.11%)	company office	employees
D	16 (11.51%)	library	library staff and visitor	D	12 (8.05%)	simulation center	applicant
E	2 (1.44%)	apartment office	management office staff	E	27 (18.12%)	public health center	public official
F	12 (8.63%)	library	library staff	F	21 (14.09%)	simulation center	applicant
G	11 (7.91%)	simulation center	applicant	G	17 (11.41%)	elementary school	school parent
H	31 (22.3%)	public health center	public official	H	25 (16.78%)	district office	public official
I	18 (12.95%)	district office	social service worker	I	4 (2.68%)	apartment office	management office staff
J	12 (8.63%)	library	library visitor				
Total	139 (100.00%)			Total	149 (100.00%)		

TABLE 4. PESL categories.

Questions	Structured prebriefing classes (n = 139)					Unstructured prebriefing classes (n = 149)					*p*-value
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Analyzing thoughts and feelings (PESL-ATF)											
1. The prebriefing helped organize my thoughts.	0 (0.0%)	1 (0.7%)	4 (2.9%)	15 (10.8%)	119 (85.6%)	1 (0.7%)	0 (0.0%)	8 (5.4%)	16 (10.7%)	124 (83.2%)	0.606
2. The prebriefing was made in a physically comfortable position.	1 (0.7%)	1 (0.7%)	3 (2.2%)	20 (14.4%)	114 (82.0%)	1 (0.7%)	0 (0.0%)	6 (4.0%)	22 (14.8%)	120 (80.5%)	0.833
3. I was able to relieve my worries and anxiety about the practice by prebriefing.	0 (0.0%)	1 (0.7%)	5 (3.6%)	14 (10.1%)	119 (85.6%)	1 (0.7%)	0 (0.0%)	8 (5.4%)	18 (12.1%)	122 (81.9%)	0.676
Learning and making connections (PESL-LC)											
1. The prebriefing was related to CPR practice.	0 (0.0%)	1 (0.7%)	3 (2.2%)	15 (10.8%)	120 (86.3%)	1 (0.7%)	0 (0.0%)	8 (5.4%)	14 (9.4%)	126 (84.6%)	0.380
2. The prebriefing helped me proceed with the practice.	0 (0.0%)	1 (0.7%)	3 (2.2%)	16 (11.5%)	119 (85.6%)	1 (0.7%)	0 (0.0%)	8 (5.4%)	13 (8.7%)	127 (85.2%)	0.312
3. The prebriefing was an opportunity for me to learn.	0 (0.0%)	1 (0.7%)	3 (2.2%)	17 (12.2%)	118 (84.9%)	1 (0.7%)	0 (0.0%)	7 (4.7%)	19 (12.8%)	122 (81.9%)	0.519
4. The prebriefing clarified the significance of practice.	0 (0.0%)	1 (0.7%)	2 (1.4%)	17 (12.2%)	119 (85.6%)	1 (0.7%)	0 (0.0%)	9 (6.0%)	14 (9.4%)	125 (83.9%)	0.101
5. My curiosity about conducting the practice was solved by prebriefing.	0 (0.0%)	1 (0.7%)	3 (2.2%)	16 (11.5%)	119 (85.6%)	1 (0.7%)	0 (0.0%)	9 (6.0%)	14 (9.4%)	125 (83.9%)	0.246
6. The prebriefing allowed me to realize my thoughts on CPR better.	0 (0.0%)	1 (0.7%)	4 (2.9%)	14 (10.1%)	120 (86.3%)	1 (0.7%)	0 (0.0%)	7 (4.7%)	15 (10.1%)	126 (84.6%)	0.783

TABLE 4. Continued.

Questions	Structured prebriefing classes (n = 139)					Unstructured prebriefing classes (n = 149)					*p*-value
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
7. The prebriefing allowed me to understand the problem of performing CPR.	0 (0.0%)	1 (0.7%)	3 (2.2%)	16 (11.5%)	119 (85.6%)	1 (0.7%)	0 (0.0%)	8 (5.4%)	13 (8.7%)	127 (85.2%)	0.312
8. The prebriefing allowed me to connect the theory of CPR and its application to actual situations.	0 (0.0%)	1 (0.7%)	1 (0.7%)	18 (13.0%)	119 (85.6%)	1 (0.7%)	0 (0.0%)	7 (4.7%)	18 (12.1%)	123 (82.6%)	0.140
Facilitator skill in conducting the debriefing (PESL-FS)											
1. The prebriefing session facilitator talked the right amount during debriefing.	0 (0.0%)	1 (0.7%)	3 (2.2%)	15 (10.8%)	120 (86.3%)	1 (0.7%)	0 (0.0%)	6 (4.0%)	16 (10.7%)	126 (84.6%)	0.698
2. I had enough time to prebrief thoroughly.	0 (0.0%)	2 (1.4%)	4 (2.9%)	16 (11.5%)	117 (84.2%)	1 (0.7%)	0 (0.0%)	6 (4.0%)	15 (10.1%)	127 (85.2%)	0.593
3. The prebriefing session facilitator was an expert in the content area.	0 (0.0%)	0 (0.0%)	5 (3.6%)	12 (8.6%)	122 (87.8%)	1 (0.7%)	0 (0.0%)	6 (4.0%)	14 (9.4%)	128 (85.9%)	0.980
Appropriate facilitator guidance (PESL-FG)											
1. The facilitator provided adequate guidance during the prebriefing.	0 (0.0%)	0 (0.0%)	6 (4.3%)	13 (9.4%)	120 (86.3%)	1 (0.7%)	0 (0.0%)	6 (4.0%)	14 (9.4%)	128 (85.9%)	1.000

PESL: Prebriefing Experience Scale for laypersons; ATF: analyzing thoughts and feelings; LC: learning and making connections; CPR: cardiopulmonary resuscitation; FS: facilitator skill in conducting the debriefing; FG: appropriate facilitator guidance.

TABLE 5. Internal consistency of PESL.

		Cronbach's α-coefficient
PESL-Total	Prebriefing Experience Scale for Laypersons (PESL) total score	0.977
PESL-ATF	Analyzing thoughts and feelings	0.918
PESL-LC	Learning and making connections	0.977
PESL-FS	Facilitator skill in conducting the debriefing	0.906
PESL-FG	Appropriate facilitator guidance	-

TABLE 6. Comparison of PESL between the structured and unstructured prebriefing classes.

PESL	Structured prebriefing classes	Unstructured prebriefing classes	*p*-value**
	(n = 139)	(n = 149)	
PESL-ATF	14.4 ± 1.47	14.2 ± 1.76	0.8035
PESL-LC	38.6 ± 3.61	38.1 ± 4.64	0.4153
PESL-FS	14.5 ± 1.42	14.4 ± 1.67	0.8261
PESL-FG	4.8 ± 0.49	4.8 ± 0.57	0.9052
PESL-Total	72.2 ± 6.68	71.6 ± 8.38	0.6161

***p-values for the Wilcoxon rank-sum test. ATF: analyzing thoughts and feelings; LC: learning and making connections; FG: appropriate facilitator guidance; FS: facilitator skill in conducting the debriefing; PESL: prebriefing experience scale for laypersons.*

TABLE 7. Comparison of PESL between the structured and unstructured prebriefing classes.

	Structured prebriefing classes	Unstructured prebriefing classes	*p*-value
	(n = 10 classes)	(n = 9 classes)	
PESL-ATF	14.5 ± 0.60	13.9 ± 1.20	0.234
PESL-LC	38.7 ± 1.52	37.3 ± 3.18	0.368
PESL-FS	14.5 ± 0.53	13.9 ± 1.44	0.743
PESL-FG	4.9 ± 0.22	4.7 ± 0.43	0.451
PESL-Total	72.5 ± 2.75	69.8 ± 6.10	0.307

ATF: analyzing thoughts and feelings; LC: learning and making connections; FG: appropriate facilitator guidance; FS: facilitator skill in conducting the debriefing; PESL: prebriefing experience scale for laypersons.

4. Discussion

In this study, which targeted non-medical individuals for BLS training, no statistically significant differences were observed in the PESL survey between the structured prebriefing group and the conventional unstructured prebriefing group. This absence of statistically significant differences was consistent across all individual items, summed scores for various categories, and overall scores, whether analyzed at the individual or group level.

In this study, the intraclass correlation (ICC) was extremely low, indicating that individual differences had a greater effect on the PESL scores than class-level differences. Thus, a more precise measurement of the effects of prebriefing could be achieved if additional information on individual characteristics and inclinations, such as occupation and educational level, were collected and controlled for.

Reducing psychological barriers is crucial in civilian CPR. Bystander CPR doubles the survival rate of OHCA patients; however, <40% of bystander CPR rates were reported in many communities. Therefore, the AHA emphasizes the importance of lowering psychological barriers for bystander CPR among the general public [17–19]. Tanigawa *et al.* [20] reported that bystanders with previous CPR training perform bystander CPR three times more often than those without such training. This demonstrates the importance of CPR training in increasing the bystander CPR implementation rates. Currently, methods recommended to raise the bystander CPR rates include conducting mass training, CPR awareness initiatives, and emphasizing hands-only CPR for adult cardiac arrest cases. However, the optimal approach for layperson training remains a knowledge gap [19].

The effectiveness of structured prebriefing has been studied in simulation-based medical education targeting healthcare professionals. It lowers psychological barriers in simulated scenarios [13–15]. In a few previous studies, the effect of structured prebriefing showed inconsistent results in the nursing education [21, 22]. The resuscitation education strategies of AHA suggested that prebriefings should establish a supportive learning environment [23]. However, existing research confirming the effectiveness of structured prebriefing in CPR education for laypersons could not be found.

After examining available evidence, whether structured prebriefing is effective for layperson CPR training remains unclear, which prompted us to conduct this study. In this study, the hypothesis testing for the effectiveness of structured prebriefing in CPR education for laypersons failed, and several limitations may have contributed to these results:

First, the short study duration (about 1 month) limited the time available for training the instructors beforehand. The study was conducted through a contracted arrangement with a public health center in one city for layperson CPR education. Given the administrative constraints and the need to complete a predetermined number of trainings within a very short period, sufficient research time could not be secured. Although scripts were provided for each training to match the assigned groups, the smoothness of the process remains a concern. In situations with inadequate practice, the unstructured prebriefing, left to the discretion of the instructor, may have been conducted more smoothly than structured prebriefing, which was unfamiliar to the instructors.

Second, both groups gave very high scores in the surveys, resulting in significant skewness. The authors speculate that this outcome may be attributed to the fact that, from the participant's perspective, the education was provided free of charge. In addition, out-of the total 22 training sessions, 4 were conducted at simulation centers, and the remaining 18 were held at various locations near participants' residences, such as apartment management offices, schools, fire stations, public health centers and libraries. All necessary equipment, including a projector, portable screen, training mannequin, and automated external defibrillator, were brought to these locations for the sessions. As a result, participants had the opportunity to receive quality education near their homes, which could have contributed to their consistently high survey scores.

Third, the newly developed PESL scale was influenced by factors proposed by Reed and prebriefing experience scores developed by Page-Cutrara for nursing students. While modifications were made to adapt the scale for use with laypeople in this study, it was still lacking. The scale had been previously used in simulation studies targeting healthcare professionals or students, and directly applying it to the general public was challenging. Thus, refining the questionnaire and wording it to be more suitable for laypeople is necessary for future research.

5. Conclusions

Despite several limitations, this study enabled us to develop a structured prebriefing script grounded in educational theories. This process was crucial for community CPR training, as many participants are new to CPR and healthcare simulation training. In addition, we trained instructors to deliver structured or unstructured prebriefing, depending on the class. Before this study, no standardized prebriefing protocols have been established, leaving instructors to introduce topics in their own way. This was challenging for novice instructors who may have struggled to start classes effectively. Our structured prebriefing script can aid these instructors in providing effective training. More studies are needed to address these limitations and overcome them in the future.

ABBREVIATIONS

BLS, basic life support; CPR, cardiopulmonary resuscitation; PESL, Prebriefing Experience Scale for laypersons.

AVAILABILITY OF DATA AND MATERIALS

The dataset for this study contains data from other research studies, so it cannot be shared.

AUTHOR CONTRIBUTIONS

YTO and JOP—designed the research study. JOP—provided assistance and guidance on group randomization and independently oversaw the randomization process. YTO—analyzed the data, supervised the process. SWY—drafted the manuscript; DC, HyeS, KH, HoyS, CAL, HJP and SK—performed training and data collection. All authors contributed to editorial revisions of the manuscript and made revisions. All authors have read and approved the final manuscript. All authors conducted the research.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This group randomized trial was approved by the Research Ethics Committee of Hallym University Dongtan Sacred Heart Hospital (HDT 2022-09-010-001). Participants signed a written informed consent form for the research just before participating in the educational program.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.signavitae.com/mre-signavitae/article/1765985665883750400/attachment/Supplementary%20material.docx.

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