Improving School Teachers' Confidence in Performing Basic Life Support:

Effectiveness of Storytelling About School Accidents

SEKI, Yukiko
Faculty of Education, Saitama University
KIRIBUCHI, Hiroshi
The AED Foundation of Japan

Abstract

Objective: This study explored the effective factors to improve the confidence of teachers in performing BLS, focusing on storytelling about school accidents.

Methods: Quantitative analyses were conducted using data from questionnaires for 2,313 teachers who received BLS training annually in Saitama City where a student's death happened (repeated BLS training group) and 2,647 non-Saitama City teachers who attended BLS lectures which included school accident storytelling from the perspectives of the teachers and families of the students involved in the accidents, but it did not contain BLS skill training (school accidents lecture group).

Results: The percentage of those who answered that they had confidence in performing BLS in an emergency was significantly higher in the repeated BLS training group (41.8%) than those in pre-lecture in the school accidents lecture group (34.8%). After the lectures of the school accidents lecture group, the mode of post-lecture confidence in performing BLS (0–10 Likert-type scales) was three points higher than that of pre-lecture confidence, and the difference was statistically significant. The factors related to the confidence in performing BLS in the school accidents lecture group were "understanding the epidemiology of school accidents", "empathic understanding of school accident victims' families", "understanding to start cardiopulmonary resuscitation (CPR) even if a bystander is not sure about a pulse or breath", "understanding that adverse events associated with CPR are very rare", and "understanding that saving student lives from school accidents is the mission of teachers". Contrarily, the teachers who answered "repeating BLS skill training was important" were related to having lower confidence to perform BLS.

Conclusion: The results indicated that the simple BLS algorithm that does not need to assess for pulse and breathing, and understanding the safety of BLS might improve the confidence in performing BLS. In addition, understanding the victims' feelings through real case stories, the epidemiology of school accidents, and the responsibility for saving student lives were related to high confidence in teachers because this can lead to increased motivation and skills to perform BLS. Hence, for teachers to improve their practical skills, explaining school accidents from the voice of teachers and victims should be included in BLS courses as well as skill training.

Keywords : basic life support, improving teachers' confidence, school accidents, storytelling

1. Introduction

In Japan, sudden death is the leading cause of school student deaths, accounting for approximately half of the deaths in 2019, including deaths by choking and drowning. Furthermore, approximately 70% of deaths are related to cardiopulmonary arrest[1]. Therefore, school teachers are expected to play a key role in cardiopulmonary resuscitation (CPR) to restart hearts in students with cardiopulmonary arrest[2–6]. Moreover, as automated external defibrillators (AED), have increased the survival of individuals with out-of-hospital cardiac arrest[7–9], school teachers must master CPR and AED use to save student lives[4) 10) 11)]. AEDs were made available to the public in 2004 in Japan. They have been installed in airports, train stations, sports clubs, schools, public facilities, businesses, and other places with many gatherings. Thus, the number of AEDs installed in Japan is estimated to be approximately 600,000, and most schools have at least one AED[12].

However, despite the availability of AEDs in schools, teachers have not been performing CPR or using AEDs, resulting in student deaths. For example, in 2011, Asuka Kirita, a sixth-grade student in Saitama City, Japan, suddenly fainted after long-distance running. Teachers rushed over to her but did not perform CPR or use an AED because they misjudged her pulse and breath. As a result, the bereaved family, the Municipal Board of Education in Saitama City staff, and emergency medicine specialists created a textbook on a fast response to life-threatening accidents occurring during activities in a physical education class. This was named the "ASUKA model".[13] The ASUKA model recommends initiating chest compressions and applying the AED immediately, even if bystanders cannot judge whether a collapsed person has a cardiac arrest. In addition, it was confirmed that gasping or agonal breathing indicates cardiac arrest, and if chest compressions were performed on someone with a beating heart, then it is unlikely they will be harmed.

Applying the ASUKA model, the Saitama City Board of Education established a system wherein all Saitama City teachers and staff take basic life support (BLS) courses. The Saitama City Fire and Disaster Management Bureau offer these at least once every three years. Additionally, about 800 teachers qualified as BLS promotion staff by the director of the Saitama City Fire and Disaster Management Bureau were assigned to all 166 schools in Saitama City to undergo BLS training in each school annually. Nonetheless, our study on teachers who belonged to Saitama City in 2018 indicated that only 35% of the teachers answered that they could perform BLS. This percentage was significantly lower than principals, vice principals, and nursing teachers[14]. Moreover, 45% of the teachers who took BLS courses more than ten times answered that they were difficult or unable to implement BLS. Conversely, the teachers who learned the responsibility for saving student lives and the epidemiology of school accidents from BLS courses were significantly more likely to have confidence in performing BLS[15].

Meanwhile, the Saitama City superintendent of education, who contributed to creating the ASUKA model, started providing lectures on the model in schools all over Japan after his retirement. The lectures included explaining the details of cardiac arrest cases in schools (including the Asuka

cases) and the importance of teachers performing BLS while introducing school accident data and the survey data of teachers on the implementation of teaching BLS. As a result, several teachers answered that they had increased their confidence in performing BLS, although the lectures did not include CPR and AED practical training. Moreover, some of them reported later that they saved the lives of their students using the ASUKA model.

Hence, this study explored effective ways to improve teachers' confidence in performing BLS and compared BLS lectures, including school accident storytelling for non-Saitama City teachers (school accidents lecture group), with the annual BLS training for Saitama City teachers (repeated BLS training group).

2. Method

2.1 Participants

In this study, secondary data analysis was performed using the questionnaire surveys of a part of the study titled "Development of a Teacher Training Curriculum that Contributes to the Promotion of Basic Life Support Education in Schools and the Improvement of School Safety".[14)]

The school accidents lecture group of non-Saitama City teachers

From 2016 to 2019, questionnaire surveys were conducted before and after the 47 lectures hosted by the boards of education at different places in Japan. Of the 6,292 teachers who attended the lectures, the teachers who were principals and vice-principals (1,410), nursing teachers (1,260), and teachers who were responsible for health and safety in schools (1,260) were excluded from the analysis because they underwent special BLS training in previous years. Finally, after excluding teachers who did not answer job titles (42) or all questions (77), data from 2,647 teachers were analyzed.

The contents of the lecture included detailed statistics on sudden death in schools; the Asuka case; voices of the bereaved families; theory and method of BLS, CPR, AED, and the ASUKA model; survivors of sudden cardiac arrest in schools; and lifesaving stories of teachers who learned the ASUKA model.

The repeated BLS training group of Saitama City teachers

In 2018, seven years after the accident, a questionnaire survey was conducted among 4,405 teachers from all 166 schools in Saitama city. Of the 3,026 respondents from 150 schools, 2,313 teachers, excluding principals and vice-principals (243), nursing teachers (152), teachers responsible for health and safety (258), teachers with unknown job titles (22), and teachers who did not answer some questions (38), were analyzed. The BLS simulation training was conducted yearly using the ASUKA model in schools in Saitama city. However, the Saitama City Board of Education had not held a school accidents lecture, including voices of the bereaved families or lifesaving stories of teachers who learned the ASUKA model, as of 2018.

2.2 Measures

Personal and BLS-related characteristics

The questionnaire included the number of previous BLS training (0, 1–4, 5–9, and over 10

times), the host of previous BLS courses (teacher education schools, boards of education, fire department or Japan Red Cross, and driving school), confidence in performing BLS in an emergency (confident and not confident), and age (20–29, 30–39, 40–49, and 50 and older). The above items were asked before the lectures in the school accidents lecture group.

Improvement in self-reported confidence in performing BLS

An 11-point Likert scale of pre and post-lecture confidence in performing BLS (range 0–10; 0 = not at all confident, and 10 = extremely confident) was asked after the lectures in the school accidents lecture group.

Valuable items for improving confidence in performing BLS

Regarding the valuable items that improved confidence in performing BLS, participants were asked whether they felt 11 items classified into four major categories were crucial. The school accidents lecture group was asked these questions after the lectures.

- Understanding the status of school accidents through real cases: "the epidemiology of school accidents, including sudden deaths," "an empathic understanding of the families of school accident victims," and "the effects of BLS through survival cases in schools."
- Acquiring the knowledge and skills of BLS: "learning the steps and skills of BLS," "repeating BLS skill training," and "simulation-based training on BLS using emergency school accident cases."
- Understanding of the efficacy and safety of BLS: "start CPR even if a bystander is not sure about a pulse or breath," "adverse events associated with CPR are very rare," and "the use of the AED by a layperson is safe and effective."
- Understanding the legal responsibility of the mission of bystanders and teachers: "the law protects bystanders who attempt to save the life of an individual using CPR or AED" and "saving student lives from school accidents is the mission of teachers."

2.3 Data Analysis

The descriptive data were presented as frequencies and percentages. The chi-square test was used to test the differences in frequencies between the two groups. For the school accidents lecture group, the Wilcoxon signed rank sum test was employed to identify the differences in the confidence level of the 11-point Likert scale between the pre-and post-lectures. To confirm the valuable factors that affected the confidence in performing BLS in the school accidents lecture group, univariate and multivariate ordinal logistic regression analyses were performed. All independent variables were entered into the equation simultaneously because the purpose of this study was to find variables that affected the confidence in performing BLS, not build a good predictive model. The dependent variable was the 11-point Likert scale of the post-lecture confidence in performing BLS. Further, the independent variables were the 11 valuable items for improving the confidence in performing BLS. In the multivariate analyses, all the 11 independent variables were entered, adjusting for age, the amount of previous BLS training, and the pre-lecture confidence in performing BLS. Before multiple analyses, the variance inflation test (VIF) was utilized to check the multicollinearity problem for each independent variable (VIF: 1.10-1.16). Statistical analyses were performed using IBM

Statistical Package for the Social Sciences (SPSS) 25.0. The statistical significance was set at 5%.

2.4 Ethical Considerations

This study did not involve primary research; therefore, it was exempted from the approval requirement from an institutional review board. The authors of this study received the primary questionnaire survey data sets without personally identifiable information. The primary surveys of teachers in non-Saitama Cites were conducted for evaluating the lectures, not for academic research. Therefore, there was no IRB approval. The primary survey in Saitama City was exempted from the approval requirement from an institutional review board because it did not include personally identifiable information. These voluntary, anonymous, and self-administered surveys were approved, conducted, and collected by the host of the lectures and the Saitama City Board of Education.

3. Results

3.1 Personal and BLS-related Characteristics

Table 1 exhibits the personal and BLS-related characteristics of the teachers. There were age differences between the two groups; the school accidents lecture group consisted of younger teachers. The repeated BLS training group had a higher percentage of teachers who answered that they received BLS training >10 times (44.4%) than those in the school accidents lecture group (26.9%). Both groups mainly took BLS courses previously offered by the boards of education; however, the percentages were significantly higher in the BLS practical training group (92.6%) than in the school accidents lecture group (89.0%). The percentage of those who answered that they had confidence in performing BLS in an emergency was significantly higher in the repeated BLS training group (41.8%) than in the school accidents lecture group before the lectures (34.8%).

Table 1. Personal and BLS-related characteristics

	School accidents lecture group[1] (before the lectures) n = 2,647		Repeated BLS training group[2] n = 2,313			
	n	(%)	n	(%)	Chi-square value	p
Age, years					36.50	<0.001
20s	994	(37.6)	699	(30.2)		
30s	701	(26.5)	704	(30.4)		
40s	414	(15.6)	343	(14.8)		
≥50s	538	(20.3)	567	(24.5)		
Number of previous BLS training					168.25	<0.001
0	17	(0.6)	6	(0.3)		
1–4	664	(25.1)	413	(17.9)		
5–9	1253	(47.3)	868	(37.5)		
≥10	713	(26.9)	1026	(44.4)		
Host of previous BLS course						
Teacher education school	470	(17.8)	323	(14.0)	13.21	<0.001
Boards of education	2357	(89.0)	2141	(92.6)	18.10	<0.001
Fire department or Red cross	545	(20.6)	164	(7.1)	183.60	<0.001
Driving school	1179	(44.5)	894	(38.7)	17.60	<0.001
Confidence in performing BLS in an emergency						
Confident	922	(34.8)	966	(41.8)	25.16	<0.001
No confident	1725	(65.2)	699	(30.2)		

BLS, basic life support
1: non-Saitama City teachers, 2: Saitama City teachers

3.2 The improvement in self-reported confidence in performing BLS in the school accidents lecture group

The mode of post-lecture confidence (eight points) was higher than that of pre-lecture confidence (five points), and the difference was statistically significant (Wilcoxon signed rank sum test, $z = 41.2$, $p < .001$) (Figure 1). The difference between the pre-lecture and post-lecture confidence was two points (Figure 2). The number of teachers who decreased their confidence level after the lectures were 30 (1.13%). The main reason for this decrease, reported in the original report, is that the teachers realized the importance of performing BLS by teachers much more through the lectures.

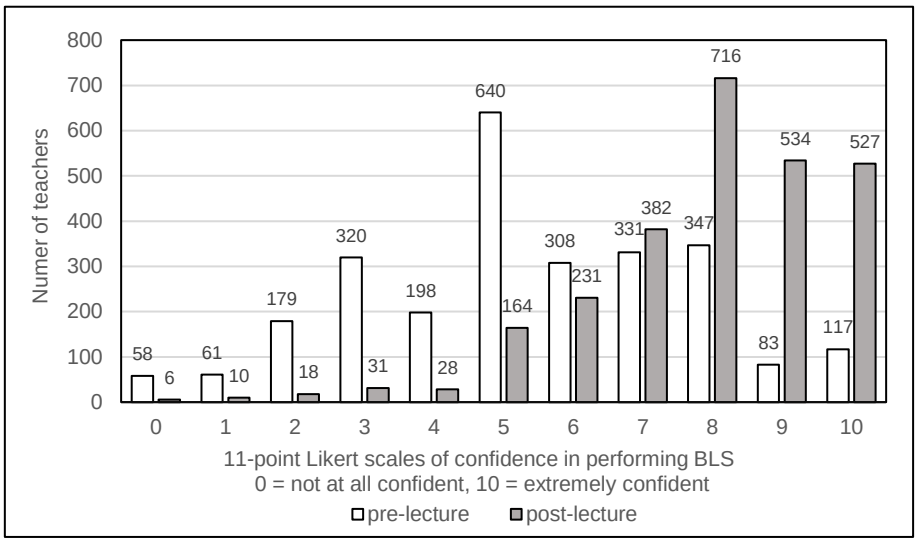

Figure 1. Pre-lecture and post-lecture confidence in performing BLS in the school accidents lecture group (N = 2647)

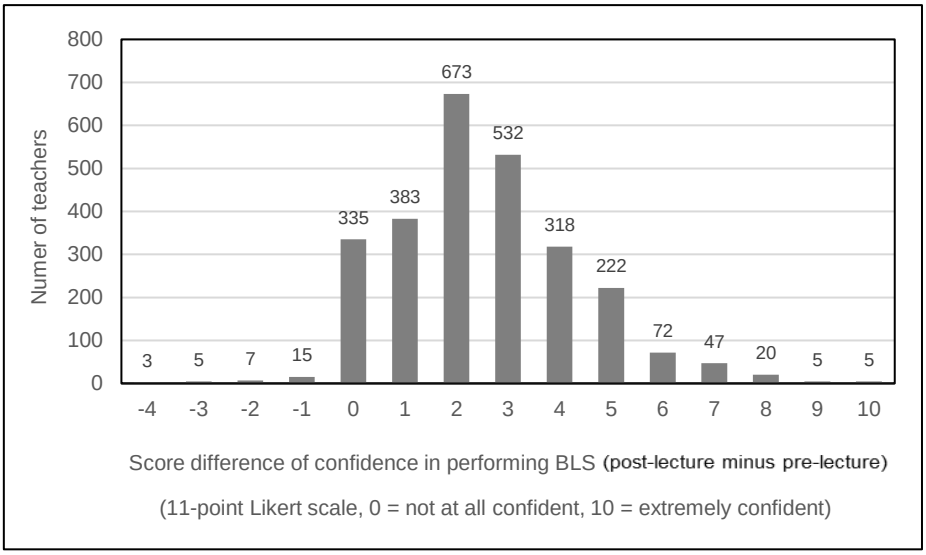

Figure 2. The improvement in self-reported confidence in performing BLS in the school accidents lecture group (N = 2647).

3.3 Differences between valuable items of the two groups for improving the confidence in performing BLS

The percentage of teachers who answered "start CPR even if a bystander is not sure about a pulse or breath" was the highest in the school accidents lecture group (67.4%), followed by "repeating BLS skill training" (58.3%), "simulation-based training on BLS using emergency school accident cases" (53.4%), and "the epidemiology of school accidents including sudden deaths" (51.3%). In contrast, the percentage of those who answered "repeating BLS skill training" was the highest in the repeated BLS training group (71.9%), followed by "Simulation-based training on BLS using emergency school accident cases" (55.6%), and "Learning steps and skills of BLS" (45.7%). In addition, the percentage of those who answered "important" to "learning steps and skills of BLS," "repeating BLS skill training," and "the law protects bystanders who perform BLS" was significantly higher in the repeated BLS training group than that in the school accidents lecture group. Contrastingly, the percentage of those who responded to the three items of "understanding of the status of school accidents through real cases," the three items of "understanding of the efficacy and safety of BLS," and "saving students' lives from school accidents is teacher's mission" was significantly higher in the school accidents lecture group.

Table 2. Teachers' views of the valuable items for improving the confidence of performing BLS

	School accidents lecture group[1] (After the lectures) n = 2,647		Repeated BLS training group[2] n = 2,313			
	n	(%)	n	(%)	Chi-square value	P-value
Understanding of status of school accidents through real cases						
Epidemiology of school accidents including sudden deaths	1357	(51.3)	574	(24.8)	363.21	<0.001
Empathic understanding of school accident victims' families	841	(31.8)	310	(13.4)	233.73	<0.001
Effects of BLS through survival cases in schools	987	(37.3)	552	(23.9)	103.92	<0.001
Acquiring knowledge and skills of BLS						
Learning steps and skills of BLS	1044	(39.4)	1058	(45.7)	20.07	<0.001
Repeating BLS skill training	1543	(58.3)	1663	(71.9)	99.97	<0.001
Simulation-based training on BLS using emergency school accident cases	1413	(53.4)	1285	(55.6)	2.35	0.104
Understanding of the efficacy and safety of BLS						
Start CPR even if a bystander is not sure about a pulse or breath	1784	(67.4)	722	(31.2)	646.47	<0.001
Adverse events associated with CPR are very rare	1064	(40.2)	677	(29.3)	64.70	<0.001
Use of the AED by a layperson is safe and effective	658	(24.9)	408	(17.6)	38.12	<0.001
Understanding of legal responsibility of bystander and teacher's mission						
The law protects bystanders who attempt to save someone's life using CPR or AED	595	(22.5)	640	(27.7)	17.79	<0.001
Saving students' lives from school accidents is teacher's mission	856	(32.3)	616	(26.6)	19.26	<0.001

BLS, basic life support; CPR, cardiopulmonary resuscitation; AED, automated external defibrillator
1: non-Saitama City teachers, 2: Saitama City teachers

3.4 Factors increasing the confidence in performing BLS in school accidents lecture group

The results of the univariate analysis validated that eight items of three categories ("an understanding of the status of school accidents through real cases," "an understanding of the efficacy and safety of BLS," and "an understanding of the legal responsibility of the mission of bystanders and teachers") were significantly related to higher confidence in performing BLS, while all three items of "acquiring the knowledge and skills of BLS" were not.

Multivariate analyses revealed that five items ("the epidemiology of school accidents, including sudden deaths," "an empathic understanding of the families of school accident victims," "start CPR even if a bystander is not sure about a pulse or breath," "adverse events associated with CPR are very rare," and "saving student lives from school accidents is the mission of teachers") were related to having the confidence to perform BLS. Contrarily, the teachers who answered "repeating BLS skill training was important" were related to having lower confidence to perform BLS (Table 3).

4. Discussion

Even though frequent training is necessary to maintain BLS knowledge and skills[16) 17)], repeating BLS training was not sufficient to enhance the BLS performance of the teachers. Compared to the repeated BLS training group results, 58.2% of teachers answered that they had no confidence in performing BLS, and the school accidents lecture was highly effective. The confidence in performing BLS after the lectures significantly increased, although no practical training was conducted.

Additionally, the results of this study revealed some factors building self-confidence in performing BLS, especially for the teachers. The percentage of teachers responding to seven of the 11 items in the school accidents lecture group was significantly higher than in the repeated BLS training group. The results suggested that lectures were efficient for learning overall knowledge about BLS. However, although more than half of the teachers in the school accidents lecture group answered that repeating BLS skill training or simulation-based training on BLS was critical to increasing self-confidence in performing BLS, the multivariate analysis asserted that these teachers had low confidence in performing BLS. On the other hand, identification with "the epidemiology of school accidents" and "the mission of teachers about saving student lives" were related to high confidence. Because sudden cardiac deaths in schools mainly occur during exercise or sports activities[18-20)], teachers overseeing these activities are likely to be bystanders. In Japan, a full-time nursing teacher specializing in first aid (yogo teacher in Japanese) is assigned to all schools[21)]. Thus, many teachers feel that providing first aid is not their duty or responsibility[22)]. Understanding actual school accidents will allow teachers to recognize the role of a bystander, motivate teachers to learn BLS, and enhance their confidence in performing BLS.

Table 3. Factors relating to the confidence of performing BLS after the lectures in the school accidents lecture group (N = 2,647)

Things for improving the self-confidence of performing BLS		have confidence in performing BLS. n (%)	Ordinal logistic regression analyses Univariate analysis β	SE	P-value	95%CI upper-lower	Ordinal logistic regression analyses Multivariate analysis[1] β	SE	P-value	95%CI upper-lower
Understanding the status of school accidents through real cases										
Epidemiology of school accidents, including sudden deaths	Important	968 (71.3)	0.40	0.07	<0.001	0.26-0.53	0.32	0.08	<0.001	0.18-0.47
	Not important	809 (62.7)								
Empathic understanding of the families of school accident victims	Important	623 (74.1)	0.44	0.07	<0.001	0.30-0.59	0.21	0.08	0.011	0.05-0.38
	Not important	1,154 (63.9)								
Effects of BLS through survival cases in schools	Important	702 (71.1)	0.28	0.07	<0.001	0.14-0.42	0.00	0.08	0.960	−0.16-0.16
	Not important	1075 (64.8)								
Acquiring the knowledge and skills of BLS										
Learning the steps and skills of BLS	Important	705 (67.5)	0.00	0.07	0.951	−0.14-0.13	−0.03	0.08	0.683	−0.19-0.13
	Not important	1072 (66.9)								
Repeating BLS skill training	Important	1,040 (67.4)	−0.02	0.07	0.749	−0.16-0.11	−0.24	0.08	0.002	−0.39-−0.09
	Not important	737 (66.8)								
Simulation-based training on BLS using emergency school accident cases	Important	800 (64.8)	0.12	0.07	0.094	−0.02-0.25	0.06	0.08	0.465	−0.09-0.21
	Not important	977 (69.1)								
Understanding the efficacy and safety of BLS										
Start CPR even if a bystander is not sure about a pulse or breath	Important	1,228 (68.8)	0.30	0.07	<0.001	0.15-0.44	0.47	0.08	<0.001	0.31-0.63
	Not important	549 (63.6)								
Adverse events associated with CPR are very rare	Important	745 (70.0)	0.20	0.07	0.005	0.06-0.34	0.18	0.08	0.023	0.02-0.34
	Not important	1,032 (65.2)								
The use of the AED by a lay person is safe and effective	Important	479 (72.8)	0.29	0.08	<0.001	0.13-0.44	0.12	0.09	0.196	−0.06-0.30
	Not important	1,298 (65.3)								
Understanding the legal responsibility of the mission of bystanders and teachers										
The law protects bystanders who attempt to save the life of an individual using CPR or AED	Important	411 (69.1)	0.25	0.08	0.003	0.09-0.41	−0.06	0.09	0.541	−0.24-0.13
	Not important	1,366 (66.6)								
Saving student lives from school accidents is the mission of teachers	Important	632 (73.8)	0.53	0.07	<0.001	0.39-0.68	0.31	0.08	<0.001	0.15-0.48
	Not important	1,145 (63.9)								

Dependent variable : 11-point Likert scales of confidence in performing BLS (0 = not at all confident, 10 = extremely confident)

β: understandardized coefficients, SE: robust standard error, 95%CI: 95% confidence interval, BLS: basic life support; CPR: cardiopulmonary resuscitation, AED: automated external defibrillator

1: Cox and Snell R^2: 0.456, Nagelkerke R^2: 0.468

Moreover, understanding “start CPR even if a bystander is not sure about a pulse or breath” and “adverse events associated with CPR are very rare” was also related to having confidence in performing BLS. Detecting cardiac arrest was difficult for bystanders, which might be a reason for the low rate of bystander resuscitation[23]. The simple BLS algorithm, which does not ask bystanders to correctly detect a pulse or normal breathing, such as the ASUKA model, might improve BLS performance. In addition, laypersons were eager to know the safety of CPR because they feared performing CPR incorrectly and causing harm[24-27]. Learning the efficacy and safety of BLS will also increase the confidence and willingness of teachers to perform BLS.

Furthermore, “an empathic understanding of the families of school accident victims” was also related to higher confidence in performing BLS. The lecturer in this study explained the importance of BLS and skills by showing real fatal accident cases. A story is a constructed experience to allow learners to acquire knowledge. Well-told stories have educational power, and accident stories play a role in teaching by creating learning experiences through which learners can acquire threshold concepts in safety science[28]. In addition, people learn better from examples than from logical development, starting with basic principles. According to Jerome Bruner, an American psychologist and educator, there are two distinct modes of thought, namely, the paradigmatic mode, which attempts to fulfill the ideal of a formal, mathematical system of description and explanation, and the narrative mode, which leads to good stories, gripping dramas, and believable historical accounts[29]. While BLS courses usually consisted only of the paradigmatic mode of BLS knowledge and technology, the lectures in this study contained the narrative mode, which included storytelling of actual school accidents. As the two modes of thought are complementary, the BLS lectures in this study can be more effective for learning BLS.

Besides, in the lectures of this study, the accident stories were told from the viewpoints of the students’ families and teachers involved in the school accident, not from those of BLS specialists such as emergency physicians or paramedics. In medical education, using narratives and storytelling is a means of training medical students. The narrative provides meaning, context, and perspective for patients' predicament, and narrative medicine is practiced with the competence to recognize, absorb, interpret, and be moved by the stories of illness[30]. By making genuine contact with patients through storytelling, narrative medicine leads to more humane, ethical, and effective health care[31]. Thus, storytelling by the people involved in the school accident must turn into subjective and meaningful experiences for teachers. Therefore, BLS training courses must also include teachers' narratives of school accidents to realize accidents can happen to all teachers and turn BLS knowledge into action.

However, our study has several limitations. First, the target teachers in the repeated BLS training group were all school teachers in Saitama city, where Asuka’s case happened; therefore, those in schools where accidents did not occur might have different opinions. Second, contrastingly, in the school accident cases lecture group, teachers who desired to learn BLS might be selected. Thus, those who have no interest in BLS should be included in further studies. Moreover, the data of post-lecture were collected soon after the lectures; therefore, a longitudinal study is necessary to know the long-term effects of BLS lectures.

5. Conclusion

Understanding the epidemiology of school accidents, the simple algorithm, and the safety of BLS through real case stories were related to having confidence in performing BLS. School accident storytelling by teachers involved in the accidents might promote understanding of the victims' feelings and responsibility for saving student lives, and might motivate the teachers to learn appropriate BLS skills and perform BLS immediately, when needed. Therefore, BLS lectures without skill training could improve teachers' self-confidence in performing BLS if the lectures were provided with real-life stories of school accident cases with narratives. Hence, these lectures with narratives should also be included in BLS courses for teachers.

Acknowledgments

The study was partially supported by the Japan Health Academy Research Grant 2019 and JSPS KAKENHI Grant Number JP 22H00961. The bereaved family has approved the use of the real name 'Asuka' in this article. We would also like to express our heartfelt gratitude to the participants of the lectures and Asuka's family for their cooperation in the study.

References

1. Japan Sport Council: Cases of death and disability and points for accident prevention. Disasters under management of a school [Reiwa 2]-Part I. 14-27, 2020. Available at: https://www.jpnsport.go.jp/anzen/Portals/0/anzen/kenko/jyouhou/pdf/R2saigai/R2saigai02_04.pdf. Accessed September 8, 2022 (in Japanese)
2. Boudreaux S, Broussard L: Sudden cardiac arrest in schools: The role of the school nurse in AED program implementation. Issues in Comprehensive Pediatric Nursing 35: 143-152, 2012
3. Hazinski MF, Markenson D, Neish S et al.: Response to cardiac arrest and selected life-threatening medical emergencies: The medical emergency response plan for schools: A statement for healthcare providers, policymakers, school administrators, and community leaders. Circulation 109: 278-291, 2004
4. Patsaki A, Pantazopoulos I, Dontas I et al.: Evaluation of Greek high school teachers' knowledge in basic life support, automated external defibrillation, and foreign body airway obstruction: implications for nursing interventions. Journal of Emergency Nursing 38: 176-181, 2012
5. Mitamura H, Iwami T, Mitani Y et al.: Aiming for zero deaths: prevention of sudden cardiac death in schools-Statement from the AED Committee of the Japanese Circulation Society. Circulation Journal 79: 1398-1401, 2015
6. Gagliardi M, Neighbors M, Spears C et al.: Emergencies in the school setting: Are public school teachers adequately trained to respond? Prehospital and Disaster Medicine 9: 222-225, 1994
7. Pollack RA, Brown SP, Rea T et al.: Impact of bystander automated external defibrillator use

on survival and functional outcomes in shockable observed public cardiac arrests. Circulation 37: 2104-2113, 2018
8. Holmberg MJ, Vognsen M, Andersen MS et al.: Bystander automated external defibrillator use and clinical outcomes after out-of-hospital cardiac arrest: A systematic review and meta-analysis. Resuscitation 120: 77-87, 2017
9. Karlsson L, Malta Hansen CM, Wissenberg M et al.: Automated external defibrillator accessibility is crucial for bystander defibrillation and survival: A registry-based study. Resuscitation 136: 30-37, 2019
10. Matsui S, Kitamura T, Sado J et al.: Location of arrest and survival from out-of-hospital cardiac arrest among children in the public-access defibrillation era in Japan. Resuscitation 140: 150-158, 2019
11. Kitamura T, Kiyohara K, Sakai T et al.: Public-access defibrillation and out-of-hospital cardiac arrest in Japan. The New England Journal of Medicine 375: 1649-1659, 2016
12. The School Cardiopulmonary Resuscitation and AED Committee in Japan Society of School Health: Research report on cardiopulmonary resuscitation and AED in schools; 2018. Available at: https://www.gakkohoken.jp/book/ebook/ebook_H300010/index_h5.html#. Accessed September 8, 2022 (in Japanese)
13. Saitama City Board of Education: A textbook of emergency response to life-threatening accidents during exercise or physical education: The ASUKA model. Available at: https://www.city.saitama.jp/003/002/013/002/p019665_d/fil/asuka.pdf. Accessed September 8, 2022 (in Japanese)
14. Kiribuchi H, Seki Y, Tobe H et al.: Development of a teacher training curriculum that contributes to promotion of BLS (basic life support) education at school and improvement of school safety. Research report of grant-in-aid for challenging research (exploratory) JP16K13518. 2020. Available at: https://aed-zaidan.jp/user/media/aed-zaidan/files/download/Kiribuchi_report.pdf. Accessed September 8, 2022 (in Japanese)
15. Seki Y, Kiribuchi H: Basic life support (BLS) training for school teachers: Evaluation of the BLS training system of Saitama City based on the lessons following the death of a child. Japanese Journal of Health Education and Promotion 29: 28-39, 2021 (in Japanese with English abstract)
16. Papadimitriou L, Xanthos T, Bassiakou E et al.: Distribution of pre-course BLS/AED manuals does not influence skill acquisition and retention in lay rescuers: A randomised study. Resuscitation 81: 348-352, 2010
17. Woollard M, Whitfeild R, Smith A et al.: Skill acquisition and retention in automated external defibrillator (AED) use and CPR by lay responders: A prospective study. Resuscitation 60: 17-28, 2004
18. Maron BJ, Doerer JJ, Haas TS et al.: Sudden deaths in young competitive athletes: Analysis of 1866 deaths in the United States, 1980-2006. Circulation 119: 1085-1092, 2009
19. Drezner JA: Preparing for sudden cardiac arrest-The essential role of automated external defibrillators in athletic medicine: A critical review. British Journal of Sports Medicine 43: 702-

707, 2009
20. Yamanaka MS, Hosokawa Y, Ayusawa M et al.: Epidemiology of sports-related fatalities during organized school sports in Japanese high schools between 2009 and 2018. PLOS ONE 16: e0256383, 2021
21. Okada K: The Yogo teacher, the health room, and health education at school in Japan. In: Muto T, Nakahara T, Nam EW eds. Asian Perspectives and Evidence on Health Promotion and Education, 21-30, Springer, Tokyo, 2011
22. Kiribuchi H: Challenges for school crisis management and teacher training courses. In: Development of a teacher training curriculum that contributes to promotion of BLS (basic life support) education at school and improvement of school safety. Research report of grant-in-aid for challenging research (exploratory) 16K13518.2020;124-128. Available at: https://aed-zaidan.jp/user/media/aed-zaidan/files/download/Kiribuchi_report.pdf. Accessed September 8, 2022 (in Japanese)
23. Breckwoldt J, Schloesser S, Arntz HR: Perceptions of collapse and assessment of cardiac arrest by bystanders of out-of-hospital cardiac arrest (OOHCA). Resuscitation 80: 1108-1113, 2009
24. Lubin J, Chung SS, Williams K: An assessment of public attitudes toward automated external defibrillators. Resuscitation 62: 43-47, 2004
25. Bogle B, Mehrotra S, Chiampas G et al.: Assessment of knowledge and attitudes regarding automated external defibrillators and cardiopulmonary resuscitation among American University students. Emergency Medicine Journal 30: 837-841, 2013
26. Savastano S, Vanni V: Cardiopulmonary resuscitation in real life: The most frequent fears of lay rescuers. Resuscitation 82: 568-571, 2011
27. Cho GC, Sohn YD, Kang KH et al.: The effect of basic life support education on laypersons' willingness in performing bystander hands only cardiopulmonary resuscitation. Resuscitation 81: 691-694, 2010
28. Rae A: Tales of disaster: The role of accident storytelling in safety teaching. Cognition, Technology & Work 18:1-10, 2016
29. Bruner J: Actual minds, possible worlds. Harvard University Press, Cambridge, MA, 1986
30. Greenhalgh T, Hurwitz B, eds.: Narrative based medicine: Dialogue and discourse in clinical practice. BMJ Books, London, 1998
31. Charon R: Narrative medicine: Honoring the stories of illness. Oxford University Press, New York, 2006

（Received September 30,2022）
（Accepted November 7,2022）