SHORT REPORT

Readiness to teach and perform CPR: A survey amongst secondary school teachers in Malaysia

Muhamad Nur Fariduddin[1], Ching Sin Siau[2]

[1]Department of Physical & Health Education, Faculty of Education, Universiti Teknologi MARA (UiTM), Cawangan Selangor, Kampus Puncak Alam, Selangor, Malaysia
[2]Health Education Programme, Centre for Community Health Studies (ReaCH), Faculty of Health Sciences, Universiti Kebangsaan Malaysia (UKM), Kuala Lumpur, Malaysia

Corresponding Author: Muhamad Nur Fariduddin **Email:** fariduddin@uitm.edu.my

Received: 28 September 2021 **Revised:** 15 November 2021 **Accepted:** 16 November 2021 **Available online:** January 2022
DOI: 10.55131/jphd/2022/200121

ABSTRACT

Teachers should be trained in resuscitation techniques as they often teach or perform CPR on children during an emergency in the school setting. Still, it was rarely mentioned in the literature, especially in the Malaysian school setting. This study aims to investigate secondary school teachers' readiness (knowledge, attitude, and willingness) to teach and perform CPR. Through stratified random sampling, 308 secondary school teachers from eleven schools across Petaling Perdana district, Selangor, responded to an online survey. The results showed a low passing rate in CPR knowledge (1.9%), while 84.1% refused to participate in any CPR courses. However, a higher proportion of teachers were willing to teach CPR courses (62.3%). A total of 72.1% of respondents stated that there is no automated external defibrillator (AED) within their school compound. More than half (53.0%) were unwilling to use the AED machine during an emergency. Nevertheless, more than half (65.0%) were willing to start CPR if they witnessed a cardiac arrest incident. A one-way MANOVA analysis showed that there was a significant effect of the courses taught among the secondary school teachers on the knowledge, $F(4, 303) = 4.374$; $p < .05$, attitude, $F(4, 303) = 5.2$; $p < .05$, and willingness, $F(4, 303) = 5.236$; $p < .05$. The teachers who taught language subjects reported significantly higher knowledge ($M = 16.50$) than others, while those teaching applied sciences and technology reported significantly higher attitudes ($M = 9.28$) and willingness ($M = 31.56$) than those teaching humanities and arts, respectively. Secondary school teachers are aware of the importance of CPR, and there is a need to explore how to integrate CPR into the current educational curriculum.

Key words: attitude, cardiopulmonary resuscitation, knowledge, readiness, willingness

Citation:
Fariduddin M.N., Siau C.S.Readiness to Teach and Perform CPR: A Survey Amongst Secondary School Teachers in Malaysia. J Public Hlth Dev. 2022;20(1):267-276. (https://doi.org/10.55131/jphd/2022/200121)

INTRODUCTION

Cardiovascular diseases (CVD) claim around 17.5 million lives annually[1]. Unexpected out-of-hospital cardiac arrest (OHCA) is a major public health issue that causes many deaths. Adult OHCA is expected to affect 55/100,000 people in the US, and 300,000 in Europe, with a 10% survival rate[2]. Bystander CPR improves outcomes after OHCA[3]. CPR should be taught and practised globally as the second link in the survival chain. When correctly performed before the medical intervention, it significantly improves victims' survival rates[4-5]. Bystander CPR increases the survival rate by 2 to 4-fold. A skilled individual's quick response could save a victim's life[6-7].

Training laypeople to perform CPR improves the survival rate. A public health plan aimed at laying the groundwork for CPR training will require society's readiness. Increasing the bystander CPR knowledge and skill is one way to implement elementary CPR training. CPR training is becoming increasingly common in schools worldwide[8]. Given the amount of time students spend in school, basic CPR training is essential[9]. Educating school children is critical to improving bystander CPR. The World Health Organization (WHO) recommends a two-hour CPR course for children 12 years and older. It is an effective method for improving CPR[10]. Basic life support (BLS) is recommended by the American Academy of Paediatrics and the American Heart Association[11-12]. The American Academy of Paediatrics and the American Heart Association have issued guidelines emphasising emergency response procedures for school teachers [9]. Thus, teacher education benefits students.

Our society depends on school teachers to educate the next generation. Knowledgeable teachers will educate their students, who will educate the community[13]. This will eventually benefit the person who has learned CPR[11-12]. A study found that teachers must perform CPR on children in an emergency. Teachers should be trained in resuscitation techniques. They often detect cardiac arrests first[14]. Malaysia has around 10,000 schools with 5 million students and 420,000 teachers from pre-school to high school[15]. However, the Malaysian school curricula lack such concepts and materials[16].

The trainer is mentioned during school-based CPR training. Physicians or teachers usually teach CPR. Studies on teachers' BLS/CPR knowledge and attitudes have been conducted globally[17-18]. Teaching CPR has many benefits. It is a long-term commitment for teachers to educate students. Teachers can teach CPR just as successfully as doctors[19]. Over 90% of school teachers who led the program expressed confidence in their students. Nevertheless, only half of 4000 Belgian teachers surveyed felt confident or excited about teaching CPR in school[20]. Nonetheless, the efficacy of teacher or healthcare professional education is unknown. Various surveys showed that roughly half of the teachers refused to teach CPR due to a lack of knowledge and skills[21]. Spain and Greece wanted doctors to teach CPR[22-23]. A similar survey of 553 Hong Kong educators found a lack of support and readiness to teach CPR[24].

Teachers should be thoroughly trained in CPR, but this is rarely mentioned in Malaysian literature. It is also unknown the number of secondary schools in Malaysia that provide CPR training and assessment. This study's goal is to assess teachers' readiness to teach CPR in schools. Teacher readiness is defined as knowledge, attitude, and willingness to teach CPR in schools. Understanding teachers' readiness could help determine the practicality of incorporating CPR education into Malaysian secondary schools' curricula.

MATERIALS AND METHOD

Research Design

From May to July 2021, a cross-sectional survey of 1,194 secondary school teachers from 49 Malaysian public secondary schools was conducted in Selangor, Malaysia [25].

Sampling Procedure

A sample size of 306 was estimated with a 5% attrition rate from 11 separate schools, each representing Petaling Perdana district in Selangor, Malaysia[25]. The criterion for inclusion was Malaysian secondary school teachers from the Petaling Perdana district. The study excluded primary school instructors, private institutions, and secondary school teachers outside of Petaling Perdana. The Faculty Ethics Committee evaluated and approved this study. The questionnaire's structure was discussed in detail, and participants were asked to select a box in an online form showing their informed consent to participate in the study.

Data Collection Procedure

We used a Google form to conduct the survey online. The Registrar helped distribute the questionnaires to all secondary school teachers via email. The researcher reminded all school teachers twice to complete the survey.

Research Instruments

The survey has 30 questions in four areas, including socio-demographics. An 11-item multiple-choice questionnaire assessed CPR knowledge (MCQ). Selected experts previously verified the questions in terms of face, construct, criteria, and content validity and were evaluated for reliability with a value of KR_{20} = .98.[26-28]. The study used the AHA's official MCQ passing grade of 84 % (9 out of 11)[29]. Correct answers were worth one mark, while incorrect answers carry no marks. The attitudes and willingness to teach and perform CPR were measured using a 4-point Likert scale with 6 and 7 items, respectively[30]. The survey's validity and reliability were previously evaluated. A pilot test revealed Cronbach's alpha values of 0.64 (attitude) and 0.86 (willingness), which indicated satisfactory reliability[31].

Data Analysis

All data from the Google form were extracted and analysed using IBM SPSS Version 27. Data on demographics and responses for knowledge, attitude, and willingness were compiled and analysed using descriptive statistics. A one-way MANOVA test was used to compare the teachers' knowledge, attitude, and willingness to teach CPR. The statistical significance level was set at $p < .05$ in a two-tailed test.

RESULTS

A total of 308 out of 321 online questionnaires were returned and analysed, with a response rate of 96%. Most respondents were females (n = 187; 60.7%). There were nine age categories, with most respondents aged 36–40 (19.2%). The study included 11 schools. Most respondents had a bachelor's degree (n = 157; 51%). In terms of teaching experience, (n = 95; 30.8%) teachers had 4–6 years of experience, followed by (n = 78; 25.3%) experience with 10 years or more. Finally, most respondents taught applied Sciences & technology (n = 105; 34.1%).

The second section of the survey looked at all teachers' CPR knowledge. The highest score reported was 10. The number of teachers who passed the test was 6 (1.9%), even though (40.7 %) of teachers have attended CPR courses organised in schools for the past few years.

The third section of the survey focused on teachers' attitudes toward CPR.

Surprisingly, 84.1% refused to attend more CPR classes. Moreover, only half of the schools (50.3%) offered CPR courses in recent years. However, if CPR courses are included in the national curriculum, most teachers agree that teachers, school board members, and professionals are responsible for teaching CPR to students. Teachers were willing to teach CPR courses (62.3%) if instructed, and most agreed (87.1%) that school management would provide the time and resources to assist the students in using digital self-learning platforms to learn CPR.

The final section of the survey asked about teachers' willingness to perform CPR. Surprisingly, 72.1% said their school had no AED. Only half (53%) would use an AED in an emergency. They lack proper CPR and AED training. However, if using an AED was as simple as turning it on and following the instructions, the majority (84.4%) would use it to save a life in an emergency. Also, 66.2 % can distinguish between CPR and AED use. Despite not having seen or witnessed a cardiac arrest before (72.7%), more than half (65%) of teachers are willing to start CPR if they detected one (57.5%). More people would be ready to perform chest compression (76%) or both (73.4%).

A multivariate analysis of variance (MANOVA) was used to compare teachers' knowledge, attitude, and willingness to perform CPR. Univariate normality was assumed via Shapiro-Wilk tests and boxplots. No multivariate outliers were discovered in the data, confirming multivariate normalcy. No excessive correlations between the dependent variables indicated that multicollinearity was not an issue. Also, the dependent variables' relationship was linear. Finally, at $a = 0.001$, Box's M was not significant, showing that variance-covariance matrices were homogeneous. The teachers' courses had a significant effect on the combined dependent variables, $F(4, 303) = 3.56$, $p < 0.001$, partial $\eta^2 = 0.106$. Individual dependent factors demonstrated an effect on the teachers' course groupings. The knowledge, attitude, and willingness were all statistically significant at a Bonferroni corrected alpha level of .017 (Table 1).

Table 1 Multivariate test of knowledge, attitude, and willingness towards CPR from different teaching courses

Source	Value	F	Hypothesis df	Error df	Sig	Partial Eta Squared
Pillai's Trace	0.135	3.56	12	909.00	<0.001	0.045
Wilks' Lambda	0.868	3.63	12	796.63	<0.001	0.046
Hoteling's Trace	0.148	3.69	12	899.00	<0.001	0.047
Roy's Largest Root	0.119	9.00	4	303.00	<0.001	0.106

Source	Dependent Variable	df	Mean Square	F	Sig	Partial Eta Squared
Teaching Course	Knowledge Score	4	11.83	4.73	<0.001	0.059
	Attitude Score	4	16.79	5.20	<0.001	0.064
	Willingness Score	4	194.13	5.23	<0.001	0.065

A pairwise comparison of the mean using LSD revealed a significant difference in knowledge scores between the applied sciences & technology course with four other courses taught by the secondary school teachers. More specifically, the score of knowledge on applied sciences & technology (M = 16.06, SD = 1.62) was significantly lower compared to languages (M = 16.50, SD = 1.53), pure sciences (M = 16.23, SD = 1.83), humanities (M = 16.26, SD = 1.29) and arts (M = 16.35, SD=1.64) respectively. On the other hand, the attitude score on humanities (M = 8.13, SD = 1.84) was significantly lower than applied sciences & technology (M = 9.28, SD =1.69). Lastly, the score of willingness on Arts (M = 27.11, SD = 6.07) was significantly lower compared to the mean score of applied sciences & technology (M = 31.56, SD = 5.51) (Table 2).

Table 2 Comparison of knowledge, attitude, and willingness score from different teaching courses

Dependent Variable	Teaching Course	N	Mean	S. D
Knowledge	**Languages***	78	16.50	1.52
	Pure Sciences*	28	16.23	1.83
	Humanities*	55	16.26	1.28
	Arts*	42	16.34	1.64
	Applied Sciences & Technology*	105	15.56	1.66
** LSD posthoc indicates significant difference at p < .005 between Applied Sciences & Technology and Language, Pure Science, Humanities & Arts*				
Attitude	Languages	78	8.31	1.90
	Pure Sciences	28	8.83	1.75
	Humanities*	55	8.13	1.84
	Arts	42	8.46	1.80
	Applied Sciences & Technology*	105	9.27	1.69
** LSD posthoc indicates significant difference at p < .005 between Applied Sciences & Technology and Humanities*				
Willingness	Languages	78	28.84	6.46
	Pure Sciences	28	29.49	6.95
	Humanities	55	28.49	6.14
	Arts*	42	27.10	6.07
	Applied Sciences & Technology*	105	31.56	5.51

** LSD posthoc indicates significant difference at p < .005 between applied sciences & technology and arts*

DISCUSSION

The differences between various courses offered in schools throughout the Petaling Perdana district were investigated. In summary, this study demonstrates low CPR knowledge scores, although less than half of teachers have recently completed regular CPR training. According to the study, only 2% of all teachers were trained in CPR. The majority of teachers received a score of three to six, falling short of the standard AHA minimum[29]. Despite having received CPR training several years ago, all teachers failed the knowledge assessment. The findings corroborated numerous studies demonstrating insufficient CPR knowledge among teachers[32-33]. Furthermore, as shown in this study, not having been exposed to cardiac arrest-related emergencies or a person in need of emergency CPR may result in limited knowledge and knowledge loss[32, 34].

At times, knowledge retention is critical. The current school curriculum incorporates CPR concepts into subjects, such as science and physical education. While some teachers had received CPR training for one to three years or longer, their knowledge retention was low. Numerous professions have demonstrated a deficiency in declarative information retention. For instance, studies indicated that healthcare practitioners' knowledge and skills deteriorate three months after training. Despite a genuine medical emergency, the loss of information was obvious[35-36]. Teachers demonstrated significantly less expertise than the public, despite recent CPR certification or years of classroom instructions. In Malaysia and Pakistan, a student-teachers survey revealed low knowledge retention two months after CPR instruction[37-38]. This entails determining the appropriate duration of CPR training, the frequency of refresher courses, and the types of training programs, resources, and implementation for teachers.

The study's second section examined teachers' attitudes toward CPR. While most teachers disagree with the frequency of CPR training, the authors believe this is a widespread misconception. Since this survey was conducted during the COVID-19 pandemic, all Malaysian schools were teaching remotely. Teachers must overcome several stressors to transition to a new norm, including an abnormally high workload, regular online meetings with students, parents, and administrators, and possibly tense encounters[39]. As a result, many teachers may have felt drained and burned out during the COVID-19 pandemic[40]. Nonetheless, most teachers expressed willingness to offer CPR classes to all students if they were included in the national curriculum.

Additionally, teachers agreed that teachers and administrators should teach CPR courses to students in collaboration with other experts, consistent with the process by which standards were established. Most of the CPR training was conducted by various professions, such as firefighters and healthcare workers[41]. Additionally, because teachers spend most of their time in the classroom, it is expected that they will be primarily responsible for administering effective CPR to students during an emergency while also imparting knowledge and skills to students[42].

Information and communication technologies (ICT) have been incorporated into the educational pedagogy's new teaching and learning concept known as cybergogy. Because most students learn via electronic devices and gadgets, the school administrators agreed to deliver the CPR courses via a digital self-learning platform. The American Heart Association (AHA) and Laerdal Medical have developed a new method for teaching students CPR education through a digital resuscitation portfolio. This approach ensures the continuity of high-quality CPR education by providing students with safe, distanced,

and self-directed CPR programs, particularly during a pandemic[43].

Despite the widespread ignorance regarding the use of AEDs, defibrillation is a critical component of the survival chain. As a result, it is necessary to educate teachers about the use of AED[30]. In Malaysia, AEDs have been installed in various locations, including malls, airports, and even specific sports complexes and schools. Several studies confirmed that school principals were aware of the value of AEDs on school grounds and were willing to install one[20]. Budget constraints and a lack of support from the authorities contributed to the AED program's limited implementation and availability in school compounds across Malaysian schools[14].

The willingness to perform CPR is the first step toward enhancing the chain of survival. Nearly half of the teachers in this study were unwilling to perform CPR during medical emergencies. Fear is developed because many of them lack knowledge and experience dealing with cardiac arrest incidents. Additionally, a lack of knowledge about proper CPR techniques results in ineffective chest compression and mouth-to-mouth ventilation[44]. Together, these flawed theories and skills eroded their confidence and instilled fear, contributing to medical negligence. In comparison, when professionals guided teachers via phone during an emergency, their level of willingness increased. The authors believe that these fears and doubts among teachers can be overcome by acquiring the necessary knowledge, skills, exposure, and ongoing training under the supervision of professionals, which will increase their willingness to perform CPR in medical emergencies[45].

Lastly, this study yielded differences in knowledge, attitude, and willingness among different courses taught by the teachers. Despite the differences in the knowledge scores among the different courses, this does not reflect the acquisition level. The majority of teachers failed to pass the knowledge test together with a low retention level. However, the applied sciences & technology and pure sciences teachers acquired the highest scores for attitude and willingness to perform CPR. The teachers within these categories taught different science courses, such as biology, physics, chemistry, applied sciences & technology and physical & health education. A science background and pre-exposure to certain subjects related to health sciences during their undergraduate studies would have prepared these teachers in their readiness to teach CPR[38].

IMPLICATIONS

Behavioural change is one of the effective methods for increasing the trained layperson's CPR knowledge and skills if supported by suitable structural measures, including education and awareness-raising. It is expected that early CPR education incorporated in the school curricula will affect the knowledge, attitude, and willingness towards teaching and performing CPR among teachers and students. In imparting the CPR knowledge among students, teachers need to be fully equipped with the knowledge and trained accordingly in perfecting their skills by trained facilitators, especially from among healthcare professionals. The coalition between the Ministry of Education and the Ministry of Health is crucial in supporting the initiative to develop and implement CPR teaching and learning as part of the national curricula. In the long run, the pivotal role of healthcare professionals in teaching and performing CPR can be shared with teachers, who are now the instructors, coordinators, and policy advocates in the school setting. With the increasing number of trained teachers, a domino effect can be created by increasing the number of trained students. Subsequently, the number of

witnesses to cardiac arrests in public who can provide CPR is raised, increasing the likelihood of the victim receiving bystander CPR, reducing risk, and improving survival rates.

RECOMMENDATION

Based on the findings, it is recommended that secondary school teachers receive periodic CPR training. The Ministry of Education should be more involved in CPR training. As a result, secondary school teachers would be more prepared to perform CPR.

LIMITATIONS

This study has some limitations. First, the study's sample size was small. The sample may also be unrepresentative, resulting in skewed findings. Second, this study only looks at one district in one state, limiting the results' generalizability. Future research should include more school teachers from different states and districts across Malaysia.

CONCLUSION

The purpose of this study is to assess secondary school teachers' readiness to teach and perform CPR. The authors discovered a low passing rate for CPR knowledge (1.9%). Most teachers (84.1%) refused to take any CPR courses. However, 62.3% wanted to teach CPR. More than half (53%) refused to use an AED, and 72% said their school did not have one. However, more than half (65%) would perform CPR if they saw someone in cardiac arrest. The Applied Sciences & Technology teachers knew the least about CPR. This study also found that Arts teachers were less willing to perform CPR. Targeted training should be designed to combat low knowledge and willingness to perform CPR, especially given the increased workload during the COVID-19 pandemic. The Ministry of Education could use the findings to tailor training modules for teachers with arts, humanities, and sciences backgrounds.

ACKNOWLEDGEMENT

The authors thank all teachers from each school for their participation in this study. This research was funded by a special research grant from Universiti Teknologi MARA (UiTM) [600-RMC/GPK 5/3 (270/2020)].

REFERENCES

1. Field JM, Hazinski MF, Sayre MR, Chameides L, Schexnayder SM, Hemphill R, et al. Part 1: executive summary: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2010;122(18 Suppl 3):S640-56.
2. Rea TD, Eisenberg MS, Sinibaldi G, White RD. Incidence of EMS-treated out-of-hospital cardiac arrest in the United States. Resuscitation. 2004;63(1):17-24.
3. Vaillancourt C, Stiell IG. Cardiac arrest care and emergency medical services in Canada. Can J Cardiol. 2004;20(11): 1081-90.
4. International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Part 1: Executive Summary Science with Treatment Recommendations. Circulation. 2010;122(16 Suppl 2):S250-75.
5. Resuscitation. European Resuscitation Council Guidelines for Resuscitation 2010 Executive Summary. 2010.
6. Plotnikoff R, Moore PJ. Retention of cardiopulmonary resuscitation knowledge and skills by 11- and 12-year-old children. Med J Aust. 1989; 150(6):296, 8-9, 302.
7. Cuijpers PJ, Bookelman G, Kicken W, de Vries W, Gorgels AP. Medical students and physical education students as CPR instructors: an appropriate solution to the

CPR-instructor shortage in secondary schools? Neth Heart J. 2016;24(7-8):456-61.
8. Reder S, Quan L. Cardiopulmonary resuscitation training in Washington state public high schools. Resuscitation. 2003;56(3):283-8.
9. Olympia RP, Wan E, Avner JR. The preparedness of schools to respond to emergencies in children: a national survey of school nurses. Pediatrics. 2005;116(6):e738-45.
10. Bohn A, Lukas RP, Breckwoldt J, Böttiger BW, Van Aken H. 'Kids save lives': why schoolchildren should train in cardiopulmonary resuscitation. Curr Opin Crit Care. 2015;21(3):220-5.
11. Adedamola OO. Chukwudi OO. Retention of Cardiopulmonary Resuscitation Skills in a group of Nigerian School Teachers. American Journal of Medicine & Medical Science. 2018;8(6),112-6.
12. Jain M, Sharma L, Meena R. Cardiopulmonary resuscitation training for medical teachers: need of the hour. International Journal of Research in Medical Sciences. 2016;7(7),12655-7.
13. Böttiger BW, Van Aken H. Kids save lives--Training school children in cardiopulmonary resuscitation worldwide is now endorsed by the World Health Organization (WHO). Resuscitation. 2015;94:A5-7.
14. Zinckernagel L, Hansen CM, Rod MH, Folke F, Torp-Pedersen C, Tjørnhøj-Thomsen T. A qualitative study to identify barriers to deployment and student training in the use of automated external defibrillators in schools. BMC Emerg Med. 2017;17(1):3.
15. Statistics of Teachers and Students across Malaysia. Ministry of Education, Malaysia [Internet]. [cited 2021 May 16]. Available from: http://www.moe.gov.my.
16. Make emergency first aid a compulsory subject in schools, gov told. Free Malaysia Today News [Internet]. [cited 2019 Sept 16]. Available from: http://www.freemalaysiatoday.com.
17. Fleischhackl R, Nuernberger A, Sterz F, Schoenberg C, Urso T, Habart T, et al. School children sufficiently apply life supporting first aid: a prospective investigation. Crit Care. 2009;13(4):R127.
18. Sherif C, Erdös J, Sohm M, Schönbauer R, Rabitsch W, Schuster E, et al. Effectiveness of mouth-to-mouth resuscitation performed by young adolescents on a mannequin. Am J Emerg Med. 2005;23(1):51-4.
19. Lukas RP, Van Aken H, Mölhoff T, Weber T, Rammert M, Wild E, et al. Kids save lives: a six-year longitudinal study of schoolchildren learning cardiopulmonary resuscitation: Who should do the teaching and will the effects last? Resuscitation. 2016;101:35-40.
20. Mpotos N, Vekeman E, Monsieurs K, Derese A, Valcke M. Knowledge and willingness to teach cardiopulmonary resuscitation: a survey amongst 4273 teachers. Resuscitation. 2013;84(4):496-500.
21. Tanaka H, Nakao A, Mizumoto H, Kinoshi T, Nakayama Y, Takahashi H, et al. [CPR education in Japan--past, present and future]. Nihon Rinsho. 2011; 69(4):658-69.
22. Patsaki A, Pantazopoulos I, Dontas I, Passali C, Papadimitriou L, Xanthos T. Evaluation of Greek high school teachers' knowledge in basic life support, automated external defibrillation, and foreign body airway obstruction: implications for nursing interventions. J Emerg Nurs. 2012;38(2):176-81.
23. Miró O, Jiménez-Fábrega X, Espigol G, Culla A, Escalada-Roig X, Díaz N, et al. Teaching basic life support to 12-16 year olds in Barcelona schools: views of head teachers. Resuscitation. 2006;70(1):107-16.
24. Fan M, Leung L-P, Leung R, Hon S, Fan KL. Readiness of Hong Kong secondary school teachers for teaching cardiopulmonary resuscitation in schools:

A questionnaire survey. Hong Kong Journal of Emergency Medicine. 2018; 26(3):174-8.
25. Krejcie RV, Morgan DW. Determining Sample Size for Research Activities. Educational and Psychological Measurement. 1970;30(3):607-10.
26. Fariduddin MN, Wee LH, Halim L, Jaafar MJ. Basic- SiM Train-The-Trainer: A model to prepare aviation educators for simulation based first aid learning. ASM Sci Jo. 2018;11(1):24-34
27. Fariduddin MN, Wee LH, Lilia H, Mohd Johar J. Structured debriefing in aviation simulation: A qualitative study on cabin crews' BLS training in Malaysia. Malaysian Journal of Medicine and Health Sciences. 2019;15(3):37-45
28. Fariduddin MN, Wee LH, Lilia H, Mohd Johar J. Basic- SiM Train-The-Trainer : A resuscitation training module for cabin crew in Malaysia. Songklanakarin Journal of Science & Technology. 2020;42(1):73-80
29. International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Part 1: Executive Summary Science with Treatment Recommendations. Circulation. 2010;122(16 Suppl 2):S250-75.
30. Lieven De Smedt, Catheline Depuydt, Eva Vekeman, Peter De Paepe, Koenraad G. Monsieurs, Martin Valcke & Nicolas Mpotos (2018): Awareness and willingness to perform CPR: a survey amongst Flemish schoolchildren, teachers and principals, Acta Clinica Belgica.
31. Hulin NA. Can a Reliability Coefficient Be Too High? Journal of Consumer Psychology. 2001;(10):Nr.1:55-8.
32. Alharbi MM, Horaib YF, Almutairi OM, Alsuaidan BH, Alghoraibi MS, Alhadeedi FH, et al. Exploring the extent of knowledge of CPR skills among school teachers in Riyadh, KSA. Journal of Taibah University Medical Sciences. 2016;11(5):497-501.
33. Yang YJ, Kwon IS: Nursery teachers' knowledge, attitude, and performance ability in CPR. Child Heal Nurs Res. 2014;20, 304-313
34. Lockey AS, Barton K, Yoxall H. Opportunities and barriers to cardiopulmonary resuscitation training in English secondary schools. European Journal of Emergency Medicine. 2016; 23(5):381-5
35. Bukiran A, Erdur B, Ozen M, Bozkurt AI. Retention of nurses' knowledge after basic life support and advanced cardiac life support training at immediate, 6-month, and 12-month post-training intervals: a longitudinal study of nurses in Turkey. J Emerg Nurs. 2014;40(2):146-52.
36. Ouseph B, Mohidin S, Tabsh L, Al-Hebshi A. Nurses' resuscitation performance: Study on the effectiveness of training and support at a teaching hospital in KSA. International Journal of Cardiovascular Disease. 2015;3(4):21-7.
37. Naqvi S, Siddiqi R, Hussain SA, Batool H, Arshad H. School children training for basic life support. J Coll Physicians Surg Pak. 2011;21(10):611-5.
38. Fariduddin MN, Mohd Johar J. Retention of Cardiopulmonary Resuscitation (CPR) Knowledge among Undergraduate Teacher Student in Malaysian University. Malaysian Journal of Medicine and Health Sciences. 2021;17(1):3-9.
39. Panisoara IO, Lazar I, Panisoara G, Chirca R, Ursu AS. Motivation and Continuance Intention towards Online Instruction among Teachers during the COVID-19 Pandemic: The Mediating Effect of Burnout and Technostress. Int J Environ Res Public Health. 2020;17(21).
40. Dworkin AG, Tobe PF. The effects of standards-based school accountability on teacher burnout and trust relationships: A longitudinal analysis. In Trust and School Life: The Role of Trust for Learning, Teaching, Leading, and Bridging; Springer Science + Business Media: New York, NY, USA; 2014. p.121–43.
41. Cheng YC, Yi MW, Shou CH, Chan WK, Chung HS. Effect of population-based training programs on bystander willingness to perform CPR. A J

Intensive Care Emerg Med. 2016;12:63-9.
42. Plant N, Taylor K. How best to teach CPR to school children: a systematic review. Resuscitation. 2013;84:415–21.
43. Medical L. Transforming CPR education. Retrieved from Laerdal Medical [Internet]. 2021. Available from: https://laerdal.com/my/services-and-programs/digital-together/
44. Fariduddina MN, Siau CS. Knowledge, Attitude and Perceptions towards Basic Life Support Training among Student Teachers in a Malaysian University. The European Journal of Social & Behavioural Sciences. 2021.
45. Vasilakis N, Tripolitsioti A, Stergioulas A. Education Level Do Not Affect the Knowledge of Cardiopulmonary Resuscitation of Physical Education Teachers. Int J Curr Res Aca Rev. 2018;6(6):1-8.