ORIGINAL ARTICLE

Readiness and Challenges in Cardiopulmonary Resuscitation Teaching: A Preliminary Perspective Amongst Malaysian Secondary School Principles

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ABSTRACT

Introduction: Malaysia has not legalized CPR teaching in the national curriculum, leaving it to school principals to implement the teaching of CPR who may have limited knowledge. This study aims to investigate Malaysian secondary school principals' level of readiness, defined as knowledge, attitude, willingness to teach CPR, and barriers to implementation. **Methods:** Malaysian secondary school principals were invited to complete a survey that consisted of five parts: (1) demographics, (2) CPR knowledge, (3) attitude towards CPR, (4) willingness to teach CPR, and (5) barriers to implementing CPR teaching. **Results:** A total of 54 secondary school principals responded to the survey. Three (5.6%) principals passed the CPR test. More than 80% agreed CPR course is important for students, mandatory to be taken before graduation and best taught by certified teachers. Principals are willing to qualify themselves and teachers with CPR certification and to provide funding to support and hire an outsider to teach CPR courses. Funding, teachers' readiness for skills and knowledge proficiency, and curriculum burden are perceived as potential barriers to successful CPR teaching. One-way MANOVA analysis showed that gender ($p = .257$), age ($p = .108$), qualifications ($p = .321$), teaching experience ($p = .194$), and administrative experience ($p = .193$) did not have a significant effect on the combined dependent variables. **Conclusion:** Malaysian secondary school principals are aware of the importance of CPR and were willing to acquire the knowledge, skills, funds, equipment, and support in ensuring its implementation in the national curriculum.
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Keywords: Readiness (Knowledge, Attitude, Willingness); Barriers, CPR course, School Principals

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INTRODUCTION

Out-of-hospital cardiac arrest (OHCA) is a significant public health concern, responsible for many deaths, with approximately 70% of high-mortality risk cases occurring outside of hospital settings. OHCA affects individuals of all age groups, from adults to infants, contributing to the overall burden of cardiovascular disease (CVD) which accounts for an annual estimated 17.5 million fatalities (1-3). The third link in the chain of survival is early cardiopulmonary resuscitation, a key life-saving procedure that is advised to be taught and performed globally since it enhances a victim's survival rate if appropriately delivered in a cardiac emergency before the arrival of medical personnel. However, studies revealed that only 30% of victims received CPR prior to the arrival of medical personnel (4-5).

Improving survival rates requires the training of laypeople and the readiness of society as part of a comprehensive public health plan. One effective way to increase bystander CPR knowledge and skills is through elementary CPR training (6). Over the years, CPR training in schools has been commonly practiced worldwide. Basic CPR training is crucial since students spend most of their time in school, thus educating schoolchildren is now critical in cultivating bystander CPR (7). As the Children Save Lives declaration was accepted by The World Health Organization (WHO) in 2015, the European Resuscitation Council (ERC), the European Safety Foundation, the International Liaison Committee on Resuscitation, and the World Federation of Anaesthesiologists Societies recommend CPR instructions be taught annually in schools worldwide (8). The American Heart Association (AHA) issued an advisory statement in 2011 advocating mandatory CPR training for schoolchildren (9-10).

Denmark, the first-ever country to approve the mandating legislation of CPR training stated that students should receive CPR training before high school graduation. Based on a survey in 2013, 4 out of 16 European countries had made CPR training an official learning outcome for primary and secondary schools (11). In the USA, CPR training has been successfully incorporated into secondary and high school curricula (12) and it is mandatory for high school graduation in 20 states (13). The British successfully integrated CPR training into the national curricula in 2020 (14).

The American Academy of Paediatrics and the American Heart Association have issued guidelines to address life-threatening emergencies, emphasising the importance of school teachers being knowledgeable about medical emergencies. As a result, well-trained school teachers will facilitate students' learning on medical emergencies (7). As members of society, school teachers are responsible for educating future generations. Increasing teachers' awareness will subsequently improve students' knowledge, creating a ripple effect in which students share with their families and raise community awareness. In the long run, these educational processes will significantly increase the number of bystanders trained in CPR (9-10). In a survey amongst 100 Flemish principals, 86% reported willingness to participate in CPR training with 88% of the principals convinced that schoolchildren should learn how to perform CPR. Additionally, 92% of them expressed willingness to perform CPR in a real-life situation (46).

According to studies, school teachers are expected to play an important role in performing CPR on students in the event of a medical emergency. This implies that teachers must gain the necessary knowledge and skills to provide effective resuscitation (15). To date, teachers' CPR knowledge and attitudes have been studied globally (16). In Japan, teachers can teach CPR just as successfully as medical personnel and 90% of school teachers in European countries who led the CPR program expressed confidence in their students (17-18). Contrariwise, half of the 4000 Belgian teachers surveyed felt confident or excited about CPR teaching in school (19). Nonetheless, the efficacy of successful teaching on CPR among teacher or healthcare professional education remains unclear. Various surveys showed that roughly half of the teachers refused to teach CPR due to a lack of knowledge and skills. Spain and Greece wanted doctors to teach CPR (20). A similar survey of 553 Hong Kong educators found a lack of support and readiness to teach CPR (21).

Malaysia has over 10,000 schools, approximately 5 million students, and 420,000 teachers from pre to high school. CPR training has been provided in Malaysian schools as part of co-curricular activities by professionals such as doctors, firefighters, medical students, and paramedics over the years. Currently, certain subjects and tools to enforce them are lacking in Malaysia's national school curriculum (22). Due to the limited content associated with CPR in the secondary Physical and Science Education textbooks, students were able to learn the theoretical aspect of CPR during the Physical (Form 2 & 4) and Science (Form 4) education periods with no practical skills training. However, this is inadequate as per the World Health Organization's (WHO) recommendation that each school student should receive at least 2-hours of CPR training annually using a manikin and to conduct the assessment to evaluate their knowledge and skills in CPR. In addition, exposure to these topics varies according to education level, as do gaps in techniques and procedures (23).

The knowledge, attitude, and willingness to teach CPR were evaluated from different perspectives. Malaysian student teachers reported high interest to join CPR training if offered at the university level despite a lack of information and resources to obtain it. Nevertheless, the level of knowledge and willingness to perform CPR was low due to several circumstances regardless of CPR training history (24). In a survey among Malaysian school teachers, a low passing rate in CPR knowledge was reported with the majority refusing to participate in any CPR courses. A higher proportion was willing to teach CPR courses in school if they were instructed and the majority were willing to start CPR and utilise the AED machine during a cardiac arrest incident (25).

As in other countries, Malaysia has yet to legalise the need to integrate CPR teaching into the national curriculum. To date, there is no specific guidance on training mechanisms and implementation. The significance of a framework that provides such guidance has been underscored. The schools receive no benefit for complying with the international mandate to provide CPR training, and there are no formally sanctioned repercussions for failing to comply. Nonetheless, it is the responsibility of the school administration to put such practices in place. A nationwide survey in Denmark following 8 years of mandating CPR legislation also lacks a framework for how CPR training should be implemented. Danish legislation did not specify who should conduct CPR training or who was responsible for ensuring that students were trained but stated that school leadership should decide in which subject CPR training should be included and that it was reasonable for homeroom teachers to be responsible for ensuring CPR training (47).

School principals, often former teachers who have undergone formal training, play a crucial role in the educational system as they choose to advance their careers into leadership positions. With their extensive teaching experience and expertise, principals serve as key figures in transferring knowledge and training to both educators and students alike. Their perspectives, shaped by years of practical classroom experience, provide

valuable insights into the challenges and opportunities within the educational landscape. To date, little is known about the readiness of CPR teaching, challenges, and barriers to implementing it across Malaysian schools. Therefore, this study aimed to explore the level of readiness which is defined as knowledge, attitude, and willingness to teach CPR, together with the barriers to implementing it among Malaysian secondary school principals.

MATERIALS AND METHODS

Sampling and participants

A cross-sectional survey study on secondary school principals was conducted in Malaysia across 14 states between June 2022 and October 2022 (26). A two-stage stratified random sampling took place, and G*Power (version 3.1) was used to calculate the minimum sample size required. Based on the F-test category, MANOVA Global Effects statistical test, medium effect size, α = .05, P = .80, an estimation of 108 Malaysian secondary school principals was randomly selected if there were groups and five response variables. The criteria for inclusion were Malaysian secondary high school principals under the Ministry of Education (MOE). Pre and primary school principals and those who were holding school administrative positions were excluded.

Instrumentation

The questionnaire (English Language) included 42 questions grouped into five categories, starting with demographics (9 items), followed by Multiple Choice Questions on CPR and AED knowledge (10 items). The MCQs were developed based on the AHA's Heartsaver Theory and previously validated by selected professionals in terms of face validity, construct, criterion, and content validity, as well as tested for reliability in several studies (25). In this study, a passing mark of 80% (8 out of 10) for the MCQs was used, in accordance with the official AHA guidelines. The following categories were assessed using a four-point Likert scale: 1 = "No", 2 = "Probably No", 3 = "Probably Yes", and 4 = "Yes" ; attitude (7 items), willingness (7 items), and barriers (7 items). These scales have previously been validated, with internal consistency values of 0.81 (27) and 0.72 (28).

Data Collection & Analysis

The questionnaire was distributed online through a Google form. Several school principals were identified using the snowball method based on each state. The URL containing the questionnaire information was then introduced to each of these principals. They were asked to distribute this URL to the respective principals within each state using the principal association's WhatsApp group. These representatives were then reminded twice to complete the questionnaire within the time limit specified. The data from the Google form was then transferred to SPSS and analysed with IBM SPSS version 28 (2022). Using mean and standard deviation, descriptive statistics were used to describe demographic details and responses on knowledge, attitude, willingness, and barriers. A one-way MANOVA test was used to determine the differences in principals' level of knowledge, attitude, willingness, and barriers to implementing CPR teaching in school based on demographic (gender, age, educational level, and experience as a teacher and administrator). Prior to performing the analyses, univariate normality was assumed using the box plot and the Shapiro-Wilk test. The remaining assumptions of no multivariate outliers, no multicollinearity, and variance-covariance matrix homogeneity were met. The statistical significance level was set at $p \leq .05$.

Ethics

Each respondent consented before the submission of the questionnaire. This research was conducted in accordance with the Helsinki procedures and was reviewed and approved by the ethical committee with the research ethic number ED/REC/CF10149.

RESULTS

A total of 54 secondary school principals completed the survey. The respondents were male (n = 29; 53.7%), and 25 (46.3%) females. There were three age categories, with the most respondents aged 51-55 (70.4%). The respondents originated mostly from Central (n = 18; 33.3%) and Northern (n = 12; 22.2%) regions, followed by Southern region, East Coast (n= 9; 16.6%) and East Malaysia (n = 6; 11.1%). Most respondents had a bachelor's degree (n = 38; 70.45%). As for teaching experience, (n = 3; 5.6%) had 11-15 years of experience, followed by (n = 15; 27.8%) with 16-20 years, (n = 14; 25.4%) with 21-25 years and (n = 22; 40.7%) with more than 26 years. Principals' experience as an administrator was (n = 20; 37%) for 1-5 years, (n = 21; 38.9%) for 6-10 years, (n = 4; 7.4%) for 11-15 years, and (n = 9; 16.7%) with 16 years or more. Lastly, (n = 25; 46.3%) attended a CPR course and passed the test in the past several years ago (Table I). Knowledge of schools' principals regarding CPR is shown in Table II. The number of principals who passed the test was 3 (5.6%), even though nearly half (46.3%) have attended and passed the CPR course in the past few years.

The third section of the survey looked at the principals' attitudes toward CPR. More than 80% agreed to make it compulsory for students to participate in CPR courses more often as these courses are important for all students. In support of this, 44.5% agreed that teachers need to be qualified with sufficient experience before teaching CPR to students. Despite no legislation being made, 94.4% agreed CPR courses should be mandatory before high school graduation. Though the CPR course is not integrated as part of the Malaysian national curriculum, 42.6% of the principals had organized the course at their respective schools. In addition, 77.8% agreed that

Table I: Respondents' Profile

Demographic	Description	N (%)
Gender	Male	29 (53.7)
	Female	25 (46.3)
Age (Years)	46-50	7(13)
	51-55	38 (70.4)
	56-60	9 (16.7)
Location (working area)	East Coast	9 (16.7)
	Northern Region	12 (22.2)
	Central Region	18 (33.3)
	Southern Region	9 (16.7)
	East Malaysia	6 (11.1)
Highest Educational Level	Professional Certificate / Diploma	7 (13)
	Bachelor's Degree	38 (70.4)
	Master's Degree	5 (9.3)
	PhD	4 (7.4)
Experience as a school teacher (Years)	11-15	3 (5.6)
	16-20	15 (27.8)
	21-25	14 (25.4)
	> 26	22 (40.7)
Experience as a school administrator (Years)	1-5	20 (37)
	6-10	21 (38.9)
	11-15	4 (7.4)
	> 16	9 (16.7)
Certified and participated in CPR courses in the past years	Yes	25 (46.3)
	No	29 (53.7)

teachers would be the best instructors to teach CPR within the school setting. Lastly, 79.6% support the usage of the digital platform as an equivalent medium to deliver the CPR course.

The fourth section of the survey focused on the willingness to teach CPR at school from the principals' perspective. To begin with, 92.6% of the principals are willing to enrol and equip themselves with CPR certification as an example to other teachers. Furthermore, 96.3% will send their respective teachers to a CPR course for certification. In terms of funding, 94.4% are willing to provide the funding to support the teaching of CPR course and 92.6% are willing to implement and hire an outside person to cater to the need for the course.

The final section of the survey asked about the barriers to implementing CPR teaching as perceived by the principals. 92.6% agreed funding from the ministry could be the main barrier to implementing CPR teaching. In terms of teachers' readiness, more than 80% of the principals felt that the teachers would have insecurity about their knowledge and skills in CPR. Nonetheless, regardless of their background, merely 78% of school teachers stated that they will oblige if the implementation of the CPR course were to be mandatory. In addition, more than 80% of the principals felt that the parents will consent to the teaching of CPR even though 63% felt that the students may not be interested to learn this course as it can be considered a curriculum burden as

Table II: Respondents' knowledge, attitude, willingness, and barriers toward CPR

Knowledge of CPR		
Description		N (%)
Pass		3 (5.6)
Fail		51 (94.4)
Total		54 (100)
Mean (SD)		4.48 (1.92)
Attitude towards CPR		
Items	Scale	N (%)
Do you agree to oblige students to participate in CPR courses (more often)?	No Yes	8 (14.8) 46 (85.2)
Do you agree CPR courses are important for students?	Yes Probably yes Probably not	37 (68.5) 15 (27.8) 2 (3.7)
Do you agree with a teacher without any qualified certificate courses and experience can teach CPR to students?	Yes Probably yes Probably not No	17 (31.5) 13 (24.1) 9 (16.7) 15 (27.8)
Do you agree that CPR courses are mandatory for all students before they graduate from high school?	Yes Probably yes Probably not No	33 (61.1) 18 (33.3) 2 (3.7) 2 (1.9)
CPR courses are not integrated into the Malaysian educational curriculum. Were there any CPR courses organized at school recently?	Yes Probably yes No	19 (35.2) 4 (7.4) 31 (57.4)
In your opinion, if CPR courses were mandatory and part of the national school curriculum, who you will ask to teach the CPR courses? (You may tick (/) more than 1)	A teacher Someone from the school board Someone else working at school Someone who does not work at school	42 (77.8) 29 (53.7) 21 (38.9) 21 (38.9)
Besides teaching CPR by instructors, there are other equivalent methods to teach CPR which is by digital self-learning. This comprehends knowledge transfer and skills training by computer. Do you support this?	Yes Probably yes Probably not No	27 (50) 16 (29.6) 9 (16.7) 2 (3.7)
Total		54 (100)
Mean (SD)		5.65 (1.53)
Willingness to teach CPR		
Would you be willing to hire an outside person such as *Angkatan Pertahanan Awam* or Red Crescent Society to organize CPR courses for students?	Yes Probably yes Probably not	36 (66.7) 13 (24.1) 5 (9.3)
Would you be willing to implement CPR courses in your school?	Yes Probably yes Probably not	35 (64.8) 15 (27.8) 4 (7.4)
Would you be willing to send several teachers to a certificate course for CPR instructors for them qualified to teach the students CPR?	Yes Probably yes Probably not	36 (66.7) 16 (29.6) 2 (3.7)
Would you be willing to provide funds for the school to have the proper equipment for performing CPR such as AED, Ambu bag, and others?	Yes Probably yes Probably not No	33 (61.1) 18 (33.3) 2 (3.7) 1 (1.9)
Do you agree to provide time and resources to let children use such a digital self-learning platform?	Yes Probably yes No	28 (51.9) 25 (46.3) 1 (1.9)
Would you be willing to provide funds for the school to have the proper equipment for teaching CPR such as a mannequin?	Yes Probably yes Probably not No	31 (57.4) 18 (33.3) 3 (5.6) 2 (3.7)
Would you be willing to learn and take qualified certificate CPR courses to show an example to the other teachers?	Yes Probably yes No	33 (61.1) 17 (31.5) 4 (7.4)
Total		54 (100)
Mean (SD)		8.97 (2.98)

Table II: Respondents' knowledge, attitude, willingness, and barriers toward CPR (continued)

Barriers to implementing CPR teaching		
Do you agree fund is the main barrier to implementing CPR teaching in schools?	Yes Probably yes No	32 (59.3) 18 (33.3) 4 (7.4)
Do you think school students are not interested to learn about CPR as a subject (compared to core subjects such as Science, Mathematics, etc) as this will add on more subjects in a year??	Yes Probably yes Probably not No	19 (35.2) 15 (27.8) 13 (24.1) 7 (13.0)
Do you agree teachers with no related background in sciences or health education will oblige towards the implementation of CPR teaching in school?	Yes Probably yes Probably not No	19 (35.2) 23 (42.6) 4 (7.4) 8 (14.8)
Do you think parents will consent to the teaching of CPR to their children in the school setting?	Yes Probably yes Probably not No	24 (44.4) 20 (37) 9 (16.7) 1 (1.9)
Do you agree teachers have insecurity about their CPR skills?	Yes Probably yes Probably not No	23 (42.6) 23 (42.6) 5 (9.3) 3 (5.6)
Do you agree teachers have insecurity about their knowledge of CPR?	Yes Probably yes Probably not No	24 (44.4) 24 (44.4) 5 (9.3) 1 (1.9)
Do you think that the teachers may encounter difficulties in getting the necessary support from the school/ ministry if CPR teaching were to be implemented in their school?	Yes Probably yes Probably not No	25 (46.3) 21 (38.9) 3 (5.6) 5 (9.3)
Total		54 (100)
Mean (SD)		11.19 (3.69)

this will add more subjects within a year (Table II).

A multivariate analysis of variance (MANOVA) was used to compare principals' knowledge, attitude, willingness, and barriers to teaching CPR based on principals' gender, age groups, highest qualification level, teaching, and administrative experience. Results showed that gender F (4, 49) = 1.374, p = .257, age F (8, 98) = 1.697, p = .108, qualifications F (12, 147) = 1.155, p = .321, teaching experience F (12, 147) = 1.355, p = .194, and administrative experience F (12, 147) = 1.357, p = .193 did not have a significant effect on the combined dependent variables (Table III).

Analysis of the dependent variables individually showed no effects for gender, age, qualification, teaching, and administrative experience. There were no statistically significant at a Bonferroni-adjusted alpha level of .013 (Table IV). These findings indicate that there are no mean differences between the individual variables (knowledge, attitude, willingness, and barriers towards the teaching of CPR) in each of the demographics.

DISCUSSION

Based on a survey in this study, the school principals' knowledge, attitude, willingness, and barriers to implementing CPR teaching in Malaysian secondary schools were explored. This study demonstrated a low passing rate on CPR scores among principals who had completed and passed CPR training in the past several years. These findings corroborated several studies demonstrating insufficient CPR knowledge among teachers and principals (29-30, 46). In addition, not being exposed to a medical emergency that requires immediate CPR may result in limited knowledge and skills decay (31). In the Malaysian setting, for this study, the majority of the principals agreed about mandatory CPR education in schools with strong support for the legislation as this course is deemed to be important for all students. This is also supported by several local studies looking into readiness towards the implementation of CPR teaching from the perspective of teachers and student teachers (24-25). In summary, Malaysian educators are supporting the idea of teaching CPR as part of the Malaysian curriculum as this has also been highlighted by the local non-government bodies (22). With the highest prevalence of obesity in Southeast Asia, the Malaysian government foresees this as a risk factor contributing to OHCA within the nation (32). Hence, increasing the number of a bystander within the population is crucial and this can be achieved through the integration of mandatory CPR courses at the school level. Nonetheless, retrospective studies in countries with mandatory CPR curriculums, such as Canada, the United States, and Denmark, revealed a high heterogeneity in implementation rates. Only 50% of responding schools in Canada taught CPR (33), with rates higher in Denmark (60%). In addition, a national survey in the US (34) revealed an implementation rate of 77% despite CPR training in all schools being made mandatory and was part of the curriculum. Therefore, even within school systems that made CPR training mandatory, there was only moderate implementation of compulsory CPR training for schools.

The majority of the Malaysian principals in this study agreed that teachers would be the best instructors to teach

Table III: Multivariate test of knowledge, attitude, willingness, and barriers towards CPR from gender, age, qualifications, teaching, and administrative experience

Variables	Source	Value	F	Hypothesis df	Error df	Sig	Partial Eta Squared
Gender	Pillai's Trace	.101	1.374	4	49	.257	.101
Age Groups		.243	1.697	8	98	.108	.122
Qualifications		.258	1.155	12	147	.321	.086
Teaching Experience		.299	1.355	12	147	.194	.100
Administrative Experience		.299	1.357	12	147	.193	.100

* Significant at $p \leq .05$

Table IV: Test of between-subject effects

Source	Dependent Variable	df	Mean Square	F	Sig	Partial Eta Squared
Gender	Knowledge	1	1.890	.508	.479	.010
	Attitude	1	.129	.503	.818	.001
	Willingness	1	.131	.015	.905	.000
	Barriers	1	45.64	3.49	.067	.063
Age Groups	Knowledge	2	6.186	1.72	.189	.063
	Attitude	2	9.036	4.29	.019	.144
	Willingness	2	12.179	1.39	.258	.052
	Barriers	2	28.08	2.14	.127	.078
Qualifications	Knowledge	3	8.53	2.51	.069	.131
	Attitude	3	.993	.406	.750	.024
	Willingness	3	10.89	1.24	.304	.069
	Barriers	3	20.85	1.57	.207	.086
Teaching Experience	Knowledge	3	3.07	.825	.487	.047
	Attitude	3	4.01	1.76	.165	.096
	Willingness	3	12.54	1.44	.240	.080
	Barriers	3	10.85	.785	.508	.045
Administrative Experience	Knowledge	3	6.86	1.96	.131	.105
	Attitude	3	2.90	1.24	.303	.070
	Willingness	3	18.09	2.17	.103	.115
	Barriers	3	5.62	.398	.755	.023

*Significant at $p \leq .013$

CPR in the school setting. From different perspectives, principals in Ireland secondary schools estimated that 55% of their teachers are willing to teach CPR (35). As per the study by (37), most teachers in the US who facilitated the CPR training program gave positive feedback such as the ease of CPR training implementation. Contrariwise, Malaysian principals agreed that Malaysian teachers are unwilling to teach CPR due to incompetencies in the aspects of knowledge and skills. As reported by (25), merely 53% of the teachers are willing to utilize AED and 30% would initiate a chest compression during a cardiac emergency. Notably, the most frequently stated reasons for unwillingness were a lack of knowledge and limited skills to perform CPR competently themselves. A lack of willingness was found to be associated with subjectively perceived incompetence in a Danish study. Since most teachers tend to transfer their skills in the classroom, therefore it is important for them to proficiently acquire the knowledge and skills to pass on to the students effectively (38).

The barriers identified by Malaysian principals in implementing the CPR course were grouped into several categories which are funding and support from the Malaysian ministries, teachers' background and specialties, knowledge and skills related to CPR, and student learning time. Although CPR courses are not part of the curriculum, this study found that the principals have taken the initiative to offer CPR courses as part of school activities. However, the majority of the principals agreed that funding from the Ministries together with the resources would be the main barriers to the implementation of CPR courses. Adequate funding is crucial as this ensures the availability of external instructors and training materials such as CPR manikin and AED devices. Moreover, local engagement from the healthcare sector such as the Ministry of Health, and other non-governmental bodies such as St John is also required in supporting the CPR course in school (22). Since the majority had suggested teachers would be the best instructors for CPR courses, and some studies have shown that lack of willingness and perceived incompetence could hamper effective CPR training, these issues require immediate attention. One such solution is to provide opportunities for the teachers to be trained by certified instructors (39). Thus, specialized training is inevitable to increase the knowledge and CPR proficiency among teachers (40). Teachers will also need special training to develop and assess teaching methods for CPR education in order to provide high-quality CPR education to school students (23, 41). In addition, despite not having related science or physical health backgrounds among the teachers, the majority would agree to the implementation of CPR teaching at Malaysian schools since they are aware of the importance of this course (25). This is also supported by Saudi Arabian teachers, with 78% willing to take free CPR courses, 40% agreeing that it should be mandatory

in schools, and 54% agreeing that certification is required before teaching CPR (42). Finally, the principal agreed that this course may not be in the best interests of the students at school because the topics and learning objectives of the main school subject consume the majority of the teaching time. If the CPR course is implemented as a school subject, more time is required to teach CPR, which will eventually burden the students and decrease their interest (34).

Specialized teacher training programmes, adequate funding, and legal obligations are common organisational key factors in promoting successful implementation of CPR teaching in Malaysian school settings. The professional training for school teachers in Malaysia including student teachers in higher institutional settings lacks medical content except for science and physical health-related courses (43). Thus, implementing mandatory attendance or inclusion of medical-related subjects such as first aid or emergency resuscitation courses as part of the curriculum for student teachers or teachers' professional training becomes imperative. By making it compulsory for teachers to attend and learn these courses and ensuring they pass them before graduation, we can effectively enhance teachers' CPR knowledge and skills. This proactive approach has the potential to alleviate the stress and unwillingness often experienced by teachers when faced with emergencies (19, 36). Secondly, in providing mass teacher training, teachers as a facilitator for CPR education would be an easy and commonly available resource if the train-the-trainer concept is used. By using this concept, teachers who are trained in turn train the other teachers thus creating a ripple effect in promoting mass teacher training in each school. Preliminary studies of the developed modules could be one of the programs that can be executed in the Malaysian setting (23). With the selected teachers professionally trained by the healthcare sectors using modules that train the teachers at school, there is a greater chance of acceptance and teachers feeling more at ease. The AHA also established this concept with self-instruction kits and teaching materials, which can help with implementation and increase their willingness to teach CPR (37). As funding is a key factor, the establishment of the train-the-trainer program could reduce the cost as external organizations do not have to be paid for courses. Nevertheless, the cost for teacher training and materials incurred such as manikin is expensive. Therefore, the potential collaboration with local partners such as universities and non-government organization is useful (30, 39; 44-45). To ensure support for all schools, funding by the government for the program is necessary to comprehend (30). Lastly, the Malaysian Ministry of Education (MOE) should address the need to execute the legislation of CPR training as part of the agenda in the National Educational Blueprint (22). If CPR training is enforced in schools by the MOE, then implementation through the top-down approach will be possible, with a standardised action plan for schools that includes details about CPR, programmes for teacher training, and its instructional content as well as suggested equipment. The introduction of such educational policy decisions may increase the focus of school personnel, including teachers and principals towards CPR teaching.

The main limitation of the study is the limited number of principals that participated in the survey which is below the minimum sample size required. Therefore, the results obtained should be interpreted cautiously and cannot be generalized to Malaysian secondary school principals. Secondly, all of the participants are secondary school principals, thus extending the sample to all school principals in Malaysia including primary schools could eliminate this limitation and further confirm the results.

CONCLUSION

The study results showed that Malaysian secondary school principals were aware of the importance of CPR and were willing to acquire the related knowledge and skills, and provide funds, equipment, and support for the teachers' training in ensuring the CPR course is implemented as part of the Malaysian curriculum. However, the majority indicated that lack of funding and resources from ministries, training opportunities for teachers, and student learning time could be the potential barriers to executing the CPR course. Further research including integrating more medical-related subjects and extra-curriculum courses for student teachers or teachers' professional training may enhance teachers' CPR knowledge and skills.

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