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Essential Life-Saving Skills for Schoolchildren: A Scoping Review

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ABSTRACT

Background: Teaching lifesaving skills such as first aid and initial cardiopulmonary resuscitation (CPR) to schoolchildren can increase the lifelong ability and motivation of young people to take action in an emergency.

Methods: This scoping review aimed to look for the literature related to the essential life-saving skills for schoolchildren, focusing on first aid and initial cardiopulmonary resuscitation (CPR) before the arrival of medical professionals. A scoping review was conducted by using the PRISMA guidelines to meet the objective of this study.

Results: Fourteen articles published between 2017 and 2024 were analyzed, revealing three main themes: educational approaches for teaching first aid and CPR to schoolchildren, the effectiveness of first aid and CPR Training Programmes for schoolchildren, and barriers and facilitators of First Aid and CPR Training Programmes for schoolchildren.

Conclusion: Findings suggest a crucial need to equip schoolchildren with the necessary skills to respond effectively to emergencies. Recommendations include implementing comprehensive first aid and CPR training programmes as life-saving skills for schoolchildren in schools.

Keywords: First aid; Cardiopulmonary resuscitation; Schoolchildren

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INTRODUCTION

Globally, out-of-hospital cardiac arrest (OHCA) is a major public health issue concerning causes a significant number of deaths. Worldwide, the estimated yearly incidence of OHCA treated by emergency medical services (EMS) varies from 28 to 244 per 100,000 population in North America, Europe, Asia, and Oceania (1). Over 700,000 people in the USA and Europe experience OHCA annually (2). In Malaysia, cardiac arrest is also the leading cause of death (3). Based on 2021 data from the Statistics Department, 18,515 people died of coronary artery disease (4). This indicates that about 50 Malaysians die every day from cardiac arrest. Studies have shown that early intervention (within 3–5 minutes) with cardiopulmonary resuscitation (CPR) and first aid increases the chances of survival in the event of sudden cardiac arrest (SCA) (2, 5-6). It is crucial that all citizens including schoolchildren of age be able to identify a cardiac emergency and provide first aid before advanced life support arrives (2).

In this study, life-saving skills refer to initiating cardiopulmonary resuscitation (CPR) and providing first aid to a casualty in life-threatening emergency situations before professional medical help arrives. A previous study described that CPR performed by bystanders is essential for enhancing the neurological prognoses and survival rates of those experiencing sudden cardiac arrest (7). For a significant increase in survival rates following OHCA, it is estimated that at least 15% of the population would need to be trained in CPR. However, this cannot be accomplished by voluntary training for the lay population alone; thus, schoolchildren's mandatory training would be a crucial measure (8-9).

Studies also pointed out that early childhood education needs to emphasize the value of CPR and first aid since school safety cultures are enhanced and children take on more responsibility for safety which may lead to long-term structural changes (10-11). On the other hand, studies have revealed that the fear of making a mistake really keeps laypersons from acting when there is an emergency, while bystanders who are skilled in lifesaving skills are more willing to act (4-6).

Previous studies have shown that schoolchildren are particularly vulnerable to various types of injuries, including sports injuries and drowning (12-14). These injuries can sometimes lead to sudden cardiac arrest, requiring urgent intervention to ensure survival. Furthermore, a study has demonstrated that first aid training enhances schoolchildren's knowledge, skills, and attitudes in their daily lives (15). Studies involving primary school children who received CPR training found significant improvements in their knowledge, attitudes, and practices related to CPR (13,14). Therefore, school children's age is an ideal time to introduce CPR and first aid training, as these life-saving skills not only equip them with the necessary knowledge but also instil a sense of responsibility and accountability towards their community. Moreover, studies have proof that first aid and cardiopulmonary resuscitation (CPR) are critical life-saving skills that can significantly reduce mortality and morbidity in emergencies (3,4,7,12). Unfortunately, empowering school children with these life-saving skills as a mandatory course or training in the school is still limited in the local setting. Thus, this study aimed to look for available literature related to first aid and CPR as essential life-saving skills for school children.

METHODS

This study used a scoping review adapted from a previous study's method (16). Online databases such as ProQuest Health, Willey Online Library, and PubMed were used to search for articles. The review comprises a thorough search, selection, and synthesis of the body of research on first aid and CPR instruction for students. The articles search strategy uses the search mode 'find all my search terms' within the full text of articles while limiting the results to full text and peer-reviewed. The article search keywords used included combinations of "first aid," "CPR," "cardiopulmonary resuscitation," "schoolchildren," "training," "education," "skills," and "emergency response."

Inclusion Criteria

- Study articles published in English between 2017 to 2024.
- First aid and CPR training for schoolchildren was the subject of research articles, review papers, and reports.
- Studies that evaluate the effectiveness of training programs' instructional strategies, obstacles, facilitators, and efficacy.

Exclusion Criteria

- Articles not accessible in full text.

- Research not directly targeting CPR or first aid training for students.
- Opinion essays and articles without peer review.

Using the above mentioned keywords, inclusion and exclusion criteria, the literature search was systematically conducted by using a PRISMA flow search 2020 guideline (17). A total of 3700 articles in total were discovered at first. Subsequently, the literature search is followed by a review of the abstracts of the publications that were discovered and the articles that did not align with the objective of this study were removed throughout the screening process for the chosen articles. Finally, only 14 papers that met the aforementioned inclusion criteria were selected for this literature analysis. The systematic article search flow for this scoping review is shown in **Figure 1.**

Study Selection

In this study, two reviewers separately checked the abstracts and titles of the selected papers. In accordance with the inclusion and exclusion criteria, the full texts of possibly pertinent studies were obtained and their eligibility was evaluated. By consensus and discussion, disagreements were settled. However, for some of the included articles, the opinion of the third reviewer was sought for the selection.

Appraisal of Quality and Data Extraction

The Critical Appraisal Skills Programme (CASP) checklists were used to evaluate the quality of the included studies. The appraisal procedure aided in determining the reliability and rigour of the results. Relevant data was gathered from the included studies using a standardized data extraction form as shown in **Table 1**. Key findings and study characteristics (author, year, country, study design) were among the extracted data, along with population details (age group, sample size), intervention specifics (training kind, length, content), and outcomes examined.

Data Analysis

A narrative technique was used to synthesise the gathered data, with a focus on thematic analysis to find recurring themes and patterns throughout the studies. Based on the review's objectives, the findings were categorized into three themes: educational approaches for teaching first aid and CPR to Schoolchildren, The Effectiveness of First Aid and CPR Training Programmes for schoolchildren, and Barriers and Facilitators of First Aid and CPR Training Programmes for schoolchildren. The emergence of these themes was discussed among authors.

FINDINGS

Cardiopulmonary resuscitation (CPR) and first aid are vital abilities that have a huge impact on survival chances in emergency scenarios (1,3). When taught to schoolchildren, these life-saving skills enable them to react appropriately in emergency situations, potentially saving lives and fostering a culture of safety and readiness (18). As mentioned above, there were three themes categorized based on the data analysis of the included articles in this study, the following session explains further findings on each of the themes.

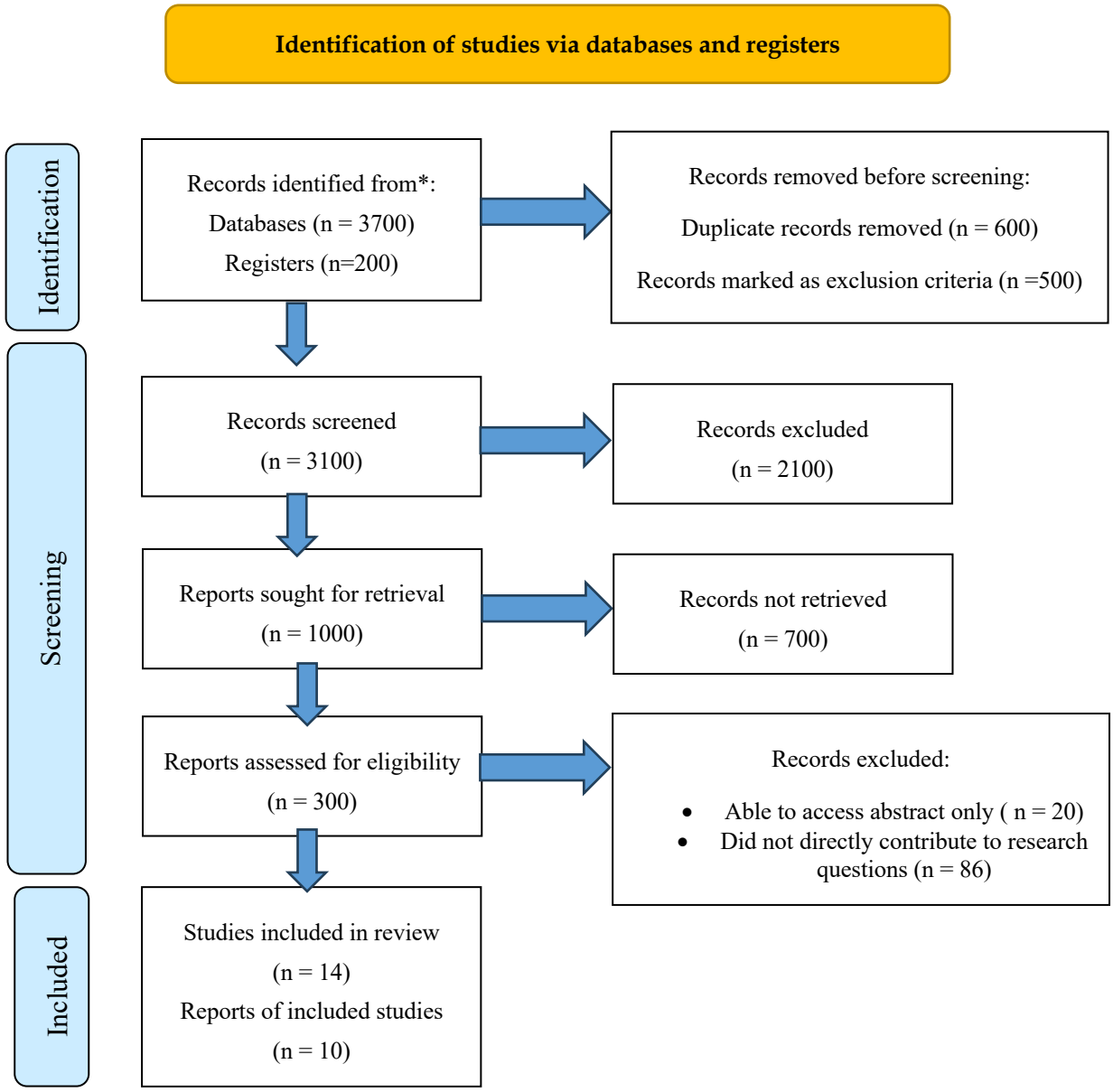
Educational Approaches for Teaching First Aid and CPR To Schoolchildren

First aid and CPR training for schoolchildren plays a crucial role in increasing bystander CPR rates and improving survival after cardiac arrest (2,4,8). Studies have shown that schoolchildren are highly motivated to learn basic life support, with training starting as early as 4 years old and becoming more effective by ages 10 to 12 (19-23). Incorporating a combination of theoretical and practical training ensures sustainable learning outcomes and the ability to perform chest compressions and ventilation adequately (19-21). Moreover, utilizing age-appropriate teaching methods, like digital media such as videos and hands-on practice, can further enhance the effectiveness of first aid and CPR interventions in schoolchildren, ultimately empowering children to respond effectively in emergency situations and potentially saving lives (13,14,22,23). Therefore, teaching first aid and CPR to schoolchildren is essential for several reasons. Children are often present during emergencies, whether at home, school, or in the community, and having these skills can make them valuable first responders. Studies showed that early intervention can drastically improve outcomes in medical emergencies, such as cardiac arrest, choking, and injuries (3,4,18).

Based on the previous literature above, various educational strategies have been employed to teach first aid and CPR to schoolchildren. These include traditional classroom-based instruction, hands-on practice sessions, and the use of digital resources like

videos and interactive components. Studies indicate that a combination of theoretical knowledge and practical skills training is most effective in ensuring competency and confidence in performing these techniques (13,14,23).

Figure 1: The review process using PRISMA 2020



The Effectiveness of First Aid and CPR Training Programmes for Schoolchildren

Training programs for first aid and CPR among schoolchildren have shown significant effectiveness in improving knowledge, skills, and attitudes towards emergency response. A study has highlighted the importance of early CPR training, with adolescents demonstrating improved CPR knowledge post-training (24). Incorporating hands-on practice, theoretical learning, and digital media in training sessions has been found to enhance learning outcomes (13,14,22). Additionally, utilizing medium and low-fidelity simulators in training programs has been effective in improving practical skills and confidence in performing CPR among primary school students (25). Research also indicates that school-based first-aid interventions significantly

enhance children's first-aid knowledge and skills, emphasizing the importance of continuous training and assessment for optimal outcomes (27).

Several studies have evaluated the effectiveness of first aid and CPR training programs for schoolchildren (14,24,25). Evidence suggests that well-structured programs lead to significant improvements in knowledge, skills, and attitudes towards emergency response (13,22,27). Moreover, periodic refresher courses are crucial in maintaining proficiency over time (25,27).

Barriers and Facilitators of First Aid and CPR Training Programmes for Schoolchildren

Barriers and facilitators to implementing first aid and CPR training for schoolchildren involve various factors. The literature identifies various barriers to implementing first aid and CPR training in schools, including a lack of trained instructors, insufficient time in the curriculum, and budget constraints (28,29). On the other hand, facilitators like educational policies, up-to-date equipment, and training of implementation champions can enhance the effectiveness of first aid and CPR training for schoolchildren (30). However, facilitators such as support from school administration, involvement of parents and the community, and integration into existing health education programs can enhance the feasibility and sustainability of these initiatives (28-30). Understanding these barriers and facilitators is crucial for developing tailored strategies to successfully introduce first aid and CPR programs in school settings.

Based on the literature findings above, globally, the approach to teaching first aid and CPR to schoolchildren varies. In some countries, it is a mandatory part of the curriculum, while in others, it is offered as an extracurricular activity (1,2,13,21). International guidelines and best practices from organizations like the Red Cross and the American Heart Association provide valuable frameworks for developing and implementing effective training programs (31).

DISCUSSION

A school-based first aid and cardiopulmonary resuscitation (CPR) training is an important public health program that can have significant impacts on emergency response and community safety. The purpose of this scoping review was to investigate the body of research on instructional strategies, program efficacy, and obstacles and enablers related to first aid and CPR instruction for students. Important insights into these topics were uncovered through the examination of fourteen studies published between 2017 and 2024. This study gave a grasp of how these life-saving abilities might be successfully taught and maintained in school settings. The discussion that follows explores these three major themes and emphasizes the strategies and challenges of providing schoolchildren with fundamental emergency response abilities.

Educational Approaches for Teaching First Aid and CPR to Schoolchildren

Previous studies reveal a variety of educational approaches used to teach first aid and CPR to schoolchildren, each with its strengths and weaknesses (13,22,24). A study highlighted that traditional classroom-based instruction remains a common method, providing structured and detailed theoretical knowledge (27). However, the incorporation of hands-on practice sessions significantly enhances skill acquisition and retention, as these allow students to engage in realistic scenarios, fostering confidence and competence in performing first aid and CPR (32,33). Innovative methods, such as the use of digital resources like interactive videos, have also gained popularity (13,14). These digital tools offer flexibility, cater to diverse learning paces and styles, and have been shown to increase engagement and motivation among students (26). Some studies emphasize the importance of integrating first aid and CPR training into the standard school curriculum, ensuring that all students have access to these vital skills (34,35). The adoption of a blended learning approach, combining theoretical instruction with practical application and digital resources, is suggested as the most effective strategy for teaching first aid and CPR to schoolchildren.

Effectiveness of First Aid and CPR Training Programs for Schoolchildren

Evaluations on the effectiveness of schoolchildren's first aid and CPR training programmes repeatedly show how effective they are at enhancing students' knowledge, abilities, and attitudes toward emergency response. Based on this scoping review findings, schoolchildren who receive this kind of training show a noticeable improvement in their capacity to correctly administer basic first aid and CPR (13,14,26,27). Interestingly, these programs also boost

schoolchildren's self-esteem, which increases their propensity to step in during crises (24,25). While initial training is quite successful, longitudinal studies indicate that the benefits may fade over time if repeated refreshers are not received (20,21, 30). Therefore, in order to maintain a high level of skill, it is imperative to incorporate frequent retraining sessions. Peer teaching initiatives, in which senior students mentor junior ones, have also produced encouraging outcomes by fostering a culture of cooperation and ongoing education (25,28). Overall, the results highlight how crucial structured, repeated instruction is for ensuring schoolchildren's long-term recall and efficacy in first aid and CPR.

Barriers and Facilitators of First Aid and CPR Training Programs for Schoolchildren

Despite the established advantages, implementing CPR and first aid training programmes in schools is faced with difficulties. Typical barriers include a shortage of qualified teachers, a short curriculum, and financial limitations (34,35). These difficulties may restrict how frequently and how well schoolchildren get instruction. The research does, however, also point to a number of facilitators that can improve these programs' implementation and long-term viability (30). Advocating for and supporting these programs, along with the involvement of parents and the larger community, requires strong support from school administration and policymakers (28,29). Relationships with emergency services and health groups can alleviate some of the financial and logistical constraints by providing essential resources and knowledge (29,30). Furthermore, incorporating CPR and first aid instruction into already-existing health education initiatives helps expedite implementation. Furthermore, incorporating CPR and first aid instruction into already-existing health education programs helps expedite their implementation and guarantee that these vital lifesaving abilities are given top priority in the educational system (31,34). Overall, the findings indicate that breaking through these obstacles calls for a multimodal strategy combining cooperation between educators, medical experts, legislators, and the community.

The discussion emphasizes how crucial it is to give schoolchildren the fundamental life-saving skills they need through organized first aid and CPR training programmes. Schools can strengthen students' emergency response skills and cultivate a safety and preparedness culture by implementing training programs that effectively address identified barriers and leverage facilitators. Adopting thorough, recurring, and integrated training methods will guarantee that students are equipped to respond skillfully and confidently in emergency scenarios, thereby making communities safer.

CONCLUSION

It is advised that schools include thorough first aid and CPR training programs in their core curriculum, based on the scoping review's results. In order to accommodate different learning styles and guarantee skill retention, these programs should use a blended learning strategy that blends theoretical education with practical experience and digital resources. To sustain competence over time, regular refresher courses are necessary.

This scoping review underscores the importance of equipping schoolchildren with essential life-saving skills, including first aid and CPR. By empowering students with the knowledge and confidence to respond effectively in emergencies, we can enhance community resilience and potentially save lives. Moving forward, collaborative efforts among educators, healthcare professionals, policymakers, parents and community stakeholders are essential to ensure the widespread implementation of comprehensive training programs and the cultivation of a culture of preparedness and response among schoolchildren.

CONFLICT OF INTEREST

There are no conflicts of interest among the authors.

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AUTHOR CONTRIBUTIONS

TS@SJ: drafted and finalized the manuscript.
MSN: contribute to the concept development, and design of the article and approve the final version of the article.
ZAS: contribute to the literature review.
MKCH: contribute to the suitability of the tool used for the review.
MKZHF: contribute to the arrangement of data analysis.

CACA: data interpretation for the article.
KKW: contribute to discussion.
RYS: contribute to looking for the articles.

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