Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/22586
DOI URL: http://dx.doi.org/10.21474/IJAR01/22586

ISSN (O): 2320-5407
ISSN (P): 3107-4928

RESEARCH ARTICLE

AWARENESS AND PREVALENCE OF CARDIOPULMONARY RESUSCITATION AMONG TEACHERS OF MAKKAH REGION, SAUDI ARABIA

Mohammed Ibrahim Habadi[1], Layan Khalid Sagga[2] and Shaimaa Mohammed Abdulghani[2]

1. Associate professor/Consultant of Family Medicine,University of Jeddah, Department of Family and Community Medicine, Jeddah, KSA.
2. MBBS, Medical Intern, King Abdulaziz university, Jeddah, KSA.

Manuscript Info

Manuscript History
Received: 04 October 2025
Final Accepted: 06 November 2025
Published: December 2025

Abstract

In a critical situation where someone's heart or breathing ceases, cardiopulmonary resuscitation (CPR) emerges as a vital life-saving intervention.(1,2)This emergency procedure involves applying rhythmi c chest compressions, and oftentimes, rescue breaths, to artificially maintain blood flow and oxygen delivery to the brain and other vital organs until professional medical assistance arrives.(1,2)Sudden cardia c arrest is the leading cause of mortality for millions of people around the world (1). When the heart stops beating, CPR is used to save the patient's life. After a cardiac arrest, immediate CPR can double or triple the chances of survival (2). Providing high-quality CPR to cardiac arrest victims is a critical component of first care, especially in out-of-hospital settings (1). Maintaining blood flow, even if just partially, maximizes the chances of a successful resuscitation once trained medical professionals get on site (2). According to estimates from the world health organization from 2019, cardiovascular diseases were listed in the top 10 leading causes of death worldwide (3). There must be an adequate number of persons trained in CPR in the community in order to maximize the likelihood of having a CPR-skilled person present at the cardiac event (4).

Introduction:-

A cross-sectional study was conducted in the secondary schools in Al-Makkah region in 2015 aiming to determine the current level of knowledge and CPR-skills among secondary school teachers. The second objective was to assess their attitudes and willingness to participate in regular CPR training. (4) 35.7% had completed CPR training previously; but overall, CPR knowledge and skills were low (mean =4.0, sd = 1.62). (4) In fact, the average scores did not differ between those who had training and those who did not.(4).Another research was conducted in a fairly small area (the city of Jeddah) in 2018.Survey was started as a cross-sectional study. CPR Training and Knowledge Status we discovered that just 172 (28.7%) of them took a CPR training (1).In addition, a cross-sectional study was published in 2018. The purpose of this research was to determine the level of CPR awareness in a community-based study in Northern Saudi Arabia. The majority of highly educated individuals in the study exhibited a high degree of

Corresponding Author:- Mohammed Ibrahim Habadi
Address:-Associate professor/Consultant of Family Medicine,University of Jeddah, Department of Family and Community Medicine, Jeddah, KSA.

awareness about CPR, which could be related to their high level of education. To preserve greater understanding and awareness of CPR among the general population, effective and long-term public CPR training programs are required. More research is needed to optimize the demographic factors (5).In another study, they intended to assess students of King Abdulaziz University and Jeddah University's knowledge, awareness, and attitude toward CPR. With a sample of 1053 non-medical students. 90% of participants said they would not hesitate to give CPR to a family member Furthermore, students were most concerned with making a mistake, which deterred them from performing CPR. Despite a positive attitude toward CPR, non-medical university students had poor knowledge and awareness of CPR. A mandatory CPR course could improve the outcomes of out-of-hospital cardiac arrest (OHCA) by increasing awareness and including it in the orientation and first year of undergraduate training (6).

Furthermore Alhussein, et al. conducted a study for Knowledge of non-healthcare individuals towards CPR which was done in Riyadh. Results revealed Knowledge of cardiopulmonary resuscitation was favorably associated with a greater degree of education. The study showed that the level of knowledge of cardiopulmonary resuscitation among non-health care individuals in Riyadh City was found to be insufficient (7).cardiac arrests are the primary cause of death in Saudi Arabia; hence, prompt intervention with CPR can prevent fatalities. For first aid, having sufficient knowledge and awareness of CPR is crucial, especially if the arrest happens somewhere other than an emergency room. Regretfully, there hasn't been much research done to examine school instructors' CPR knowledge and awareness in Makkah region.Thus, the purpose of our study was to determine the prevalence and level of CPR awareness among Saudi Arabian teachers in the Makkah region.

Subjects and Methods:-

This cross-sectional survey study was initiated after receiving ethics committee approval from the Unit of Biomedical Ethics at King Abdulaziz University (reference no. HA-02-J-008).Our sample size was 432 persons, all of the selected participants live in Makkah region. All participants were provided with an explanation of the study's objectives and granted their virtual consent prior to completing the questionnaire. The inclusion criteria were Teachers from Makkah region. And the exclusion criteria were all other people from Makkah region, or who refused to participate were excluded.The questionnaire was distributed to teachers from Makkah, Saudi Arabia, between May 2023 and September 2023. The survey contained 10 questions that test participant knowledge in cardiopulmonary resuscitation. Each correct answer gives the participant 1 point.In the two multiple choice questions, three answers were correct among the answer list, in both questions. Participant gains one point only if he / she chooses all the given three correct answers. If he/she chose only two or one of the three correct answers, a fraction of 1 point would be given, i.e., 0.67 and 0.33 respectively. Note that the number of correct answers chosen by a participant is subject to a penalty if he/she also chose incorrect answers. Example: if he/she chose 3 correct answers, but also 1 incorrect answer, then the total correct answers for the multiple-choice question would be considered 3-1 = 2 instead of 3.The knowledge score of a participant is the sum of his/her points.If the score was < 5, the participant is considered to have low-knowledge, while if the score was in the range 5-6.49, the participant is considered to have moderate-knowledge, and if the score was 6.5+, the participant is considered to have high knowledge.

Results:-

Demographics Data:-

Most of the sample participants may be described as follows: being still in service (77%); being 40+ years old (74%); being femalec (74%); holding bachelor's degree (88%).

Variable	Categories	N (N = 359)	%
Still in service	Yes	261	76.5
	Retired	80	23.5
Age (Mean = 47.2, SD = 8.5)	20-29	4	1.2
	30-39	59	17.3
	40-49	131	38.4
	50-59	120	35.2

	60+	27	7.9
Gender	Male	90	26.4
	Female	251	73.6
Education	Primary	1	0.3
	Intermediate	5	1.5
	Secondary	21	6.2
	Bachelor	299	87.7
	Higher education	15	4.4

Knowledge and awareness about cardiopulmonary resuscitation:-

•In five (out of 10) of the knowledge-based questions, less than 50% of the participants knew the correct answer, namely:

-In your opinion, what does the word heart massage mean? (only 39% answered correctly, i.e., choosing "strong pressure on the chest for specific periods").

-If you saw someone whose heart stopped, which of the following first aid measures would you give? (only 35% answered correctly, i.e., choosing "artificial respiration and chest compressions").

-What is the rate of cardiac massage (chest compression) and artificial respiration during cardiopulmonary resuscitation? (only 15% answered correctly, i.e., choosing "30").

-What is the rate of chest compressions? (only 17% answered correctly, i.e., choosing "100").

-How much force is applied to chest compressions? (only 26% answered correctly, i.e., choosing "with moderate force, so that the rib cage descends 5-6 cm").

•In the two multiple choice questions, there are three correct choices in both questions. In both questions, two of the three correct answers were chosen by most of the participants, while one is chosen by approximately the half.

Let's explain this:

-Q1: Which of the following could be a sign of sudden cardiac arrest? The correct answer "loss of consciousness" was chosen by 63%, while the correct answer "stop of breathing" was chosen by 73%, and the correct answer "stop of blood flow" was chosen by 47%. Each of the other incorrect six choices was chosen by 2-48% of the participants.

-Q2: How can we verify an individual's state of consciousness? In this question, all of the listed answers were correct except "I don't know." The answer "not responding when called" was chosen by 68%, while the answer "not moving at all" was chosen by 71%, and the answer "not responding to touch" was chosen by 52%. The only answer expressing low-knowledge is "I don't know," and it was chosen by 10% of the participants.

•For the question "how can we ensure that blood flow has stopped?", approximately half of the participants (51%) have responded correctly, i.e., chosen "lack of feeling of pulse in the neck."

In only two questions, most of the participants have responded correctly, namely:

- Which area in the chest should be compressed? (62% answered correctly, i.e., choosing "the middle part").

-What do you know about the electric shock device? (69% answered correctly, i.e., choosing "it is a device that restarts a stopped heart").

Question	**Answers**	**N (N = 359)**	**%**
Which of the following could be a sign of sudden cardiac arrest? (You can choose more than one answer)	**Loss of consciousness**	215	63.0
	Stop of breathing	248	72.7
	Stop of blood flow	161	47.2
	Blueness	131	38.4
	Difficulty in breathing	122	35.8
	Pain in chest	152	44.6
	Pale skin	83	24.3
	Stop of movement	164	48.1

	Other	8	2.3
How can we verify an individual's state of consciousness? (You can choose more than one answer)	**Not responding when called**	232	68.0
	Not responding to touch	176	51.6
	Not moving at all	242	71.0
	I don't know	33	9.7
How can we ensure that blood flow has stopped?	No signs of blood flow	38	11.1
	Lack of feeling of pulse in the neck	173	50.7
	Not feeling the pulse in the arm	73	21.4
	I don't know	57	16.7
In your opinion, what does the word heart massage mean?	Rub the chest at specific intervals	51	15.0
	Strong pressure on the chest for specific periods	134	39.3
	Rub the heart directly with the rib cage open	26	7.6
	Strong pressure directly on the heart while the rib cage is open	44	12.9
	I don't know	86	25.2
If you saw someone whose heart stopped, which of the following first aid measures would you give?	Open the airway	32	9.4
	Chest compression	50	14.7
	Artificial respiration and chest compressions	120	35.2
	I don't know	139	40.8
What is the rate of cardiac massage (chest compression) and artificial respiration during cardiopulmonary resuscitation?	5	72	21.1
	15	129	37.8
	30	52	15.2
	Other	88	25.8
Which area in the chest should be compressed?	The upper part	50	14.7
	The middle part	211	61.9
	The lower part	39	11.4
	Other	41	12.0
What is the rate of chest compressions?	150	25	7.3
	100	57	16.7
	50	83	24.3
	Other	176	51.6
How much force is applied to chest compressions?	As much as the rib cage descends 1-2 cm	103	30.2
	With moderate force, so that the rib cage descends 5-6 cm	88	25.8
	With high force, so that the rib cage descends 6-10 cm	23	6.7
	As powerful as possible	48	14.1
	Other	79	23.2
What do you know about the electric shock device?	I've never heard of it before	47	13.8
	I've heard of it before but never seen it	47	13.8
	It is a device that supports breathing	13	3.8
	It is a device that restarts a stopped heart	234	68.6

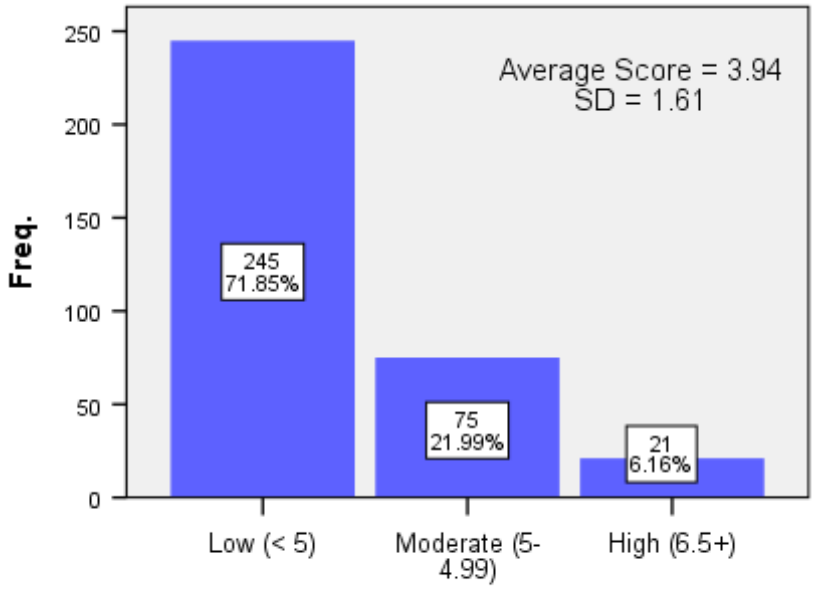
Response to Other Questions Related to Cardiopulmonary Resuscitation (Not Used in Testing Participant Knowledge, i.e., Score Calculation)11% of the participants (n = 38) have experienced sudden death in other people, and it was mostly one of their family members.The reaction that most participants would do if they witness a sudden death is calling the ambulance (59% of them). If they witness fainting situation (or sudden death) in their friends or one of their family, still most of them (64%) would do the same reaction (i.e., calling the ambulance). That (i.e., calling the ambulance) also accounted for most of their expected reactions if the situation was concerning a stranger (73%).Most of the participants (79%) reported that they don't know the correct way to perform chest compressions in case of sudden cardiac arrest. This percentage almost matches the finding that 81% of the participants have not received training in this field (first aid). For those who have taken such training, the most frequent training entity was MoH (33%), then school (25%).The majority of the participants (89%) do not know where they can find an automated external defibrillator or pacemaker.

Question	Answers	N (N = 359)	%
Have you ever experienced sudden death? If yes, who was it?	Yes, one of the family members	38	11.5
	Yes, a friend	2	0.6
	Yes, a stranger	11	3.3
	No	280	84.6
If you witnessed sudden death, what did you do in this situation?	I started pressing his/her chest	2	3.9
	I did artificial respiration	3	5.9
	I performed chest compressions and artificial respiration	5	9.8
	I called an ambulance	30	58.8
	I told someone to ask for help	11	21.6
If someone from your family or friends felt faint (sudden death), what would you do?	Start with chest compressions	82	24.0
	Call an ambulance	219	64.2
	Call for help	40	11.7
If you saw a stranger feeling faint, what would you do?	Start with chest compressions	39	11.4
	Call an ambulance	248	72.7
	Call for help	53	15.5
	I watch the situation and go	1	0.3
What fears can prevent you from pressing a stranger's chest?	Causing a bone fracture	115	33.7
	Causing harm to an organ	112	32.8
	Stopping the heart	57	16.7
	Punishment for legal reasons	57	16.7
Do you know the correct way to perform chest compressions in case of sudden cardiac arrest?	Yes	72	21.1
	No	269	78.9
Have you received training in this field (first aid)?	Yes	65	19.1
	No	276	80.9
If your answer is yes to the previous question, where did you train?	School	16	25.4
	University	7	11.1
	A course given by the Ministry of Health	21	33.3
	Course given at my workplace	11	17.5
	Social media sites	8	12.7

Do you know where you can find an automated external defibrillator or pacemaker?	Yes	39	11.4
	I don't know	302	88.6

The Overall Scores and Its Categorization:-

The average knowledge score among participants is 3.94 (SD = 1.61), which lies in the low-area (i.e., < 5). The frequency distribution shown in the bar chart also supports these statistics, where it shows that most of the participants (72%) have low-scores (i.e., < 5).



Discussion:-

The aim of this study was to assess awareness and prevalence of cardiopulmonary resuscitation among teachers of Makkah region, Saudi Arabia.The current study discovered that less than half of the participants knew the correct answer to five (out of ten) of the knowledge-based questions, namely. This low level of knowledge was also observed in a previous community-based study conducted in Northern Saudi Arabia, which revealed a low overall awareness of CPR (5). This low awareness reveals a significant knowledge gap regarding the importance and proper application of CPR techniques. The prompt initiation of CPR can significantly improve the survival rate of individuals experiencing cardiac arrest; however, low levels of awareness are cause for concern (8).A previous study that investigated the extent of knowledge of CPR skills among school teachers in Riyadh, Saudi Arabia, found similarly low levels of awareness. This study also found that school teachers lacked knowledge of CPR and the various services that should be provided in the event of an emergency (9).A study conducted in Al-Qassim supports our conclusion that secondary school teachers lack CPR training and have limited knowledge and skills (4). Another Saudi study found that 31% of university students are unaware of CPR (10). Similar studies in the United Kingdom support our finding that teachers have limited CPR knowledge (11).

A previous Saudi study attributed the low awareness of Basic Life Support to limited access to CPR training programmes, insufficient emphasis on CPR training in the educational curriculum, and a general lack of awareness about the importance of CPR in saving lives (12,13). These findings highlight the importance of targeted interventions and educational initiatives to increase CPR awareness and training among Makkah teachers.The current study found that the majority of participants (79%) did not know how to perform chest compressions in the event of sudden cardiac arrest, which could explain the low level of awareness. 81% of them had not received first-aid training. The same result was observed in another study conducted in Riyadh, where only 15.2% of teachers had prior CPR training (9).A study conducted in Al-Qassim, Saudi Arabia, involved 305 teachers, the majority of whom were Saudi nationals aged 31 to 50 years. In this study, only 35.7% of teachers had received prior CPR training, and their overall CPR knowledge and skills were found to be inadequate. Surprisingly, there was no significant

difference in scores between teachers who received training and those who did not. The majority of teachers expressed a desire for additional CPR training and were willing to participate in a free course. The study concludes that secondary school teachers in Al-Qassim lack CPR training and that providing them with future training opportunities may improve their ability to contribute to the community's well-being (4).Even studies on the general population in Saudi Arabia revealed that only a small percentage had received CPR training. A cross-sectional study of the Jeddah population discovered that only 28.7% of nonmedical individuals had received CPR training, and only a small percentage could perform CPR techniques correctly (1). This is significantly lower than a survey of Flemish teachers, which found that 59% had received CPR training (14).This emphasizes the need for a coordinated national effort to raise public awareness through mass education, specialized first aid training, and legislative measures (1). And the importance of implementing comprehensive CPR training programs and targeted interventions to address CPR knowledge gaps among teachers and the general population, as well as improve individuals' preparedness to respond effectively to cardiac arrest events (15,16).

The majority of participants in the current study (79%) were unaware of how to perform chest compressions in the event of a sudden cardiac arrest. A similar result was observed in a study conducted in Jeddah, where only 32.7% of participants were aware of how to apply chest compressions (1).Based on the total; knowledge scores, our study found that 71.8% of the participants had low knowledge scores, while 21.9% had moderate scores and only 6.1% had high scores. This low knowledge was reported in previous Saudi studies (1,4), and also among international studies (17,18,19).Initiating CPR before the arrival of trained assistance doubles the 30-day survival rate. This implies that community participation is required to learn the practical application of CPR and provide safe and effective resuscitation (20,21). Given the significant amount of time teachers spend at school with peers and students, it is urgent that national health education campaigns be implemented to increase their knowledge of CPR. The findings also highlight the urgent need for improved CPR training programs for Saudi teachers. Collaboration among healthcare providers, educational institutions, and policymakers is critical for optimizing CPR training and improving outcomes in out-of-hospital cardiac arrest cases.

Conclusion and Recommendations:-

This study investigates the current state of CPR awareness and practice among teachers in the Makkah region as of 2022. The findings, suggest that the majority of the participants have a low level of knowledge regarding CPR. This is evident from the low average knowledge score and the high percentage of participants who answered questions incorrectly. Additionally, most participants have not received CPR training and do not know the correct way to perform chest compressions in case of sudden cardiac arrest. For that reason, we have some recommendations that we expect will increase the knowledge regarding CPR. First of all, we highly recommend making a significant commitment to increasing awareness and understanding of CPR. For example, we advise teachers to conduct a BLS course every year and to make it a routine requirement. We additionally advise our Ministry of Education to designate a BLS course as an obligatory requirement before getting a license to teach.Second, we suggest establishing a regular training of CPR to teachers such training would help to improve their knowledge and skills in providing CPR, which could potentially save lives. Finally, we think it’s essential to evaluate the level of CPR performed, since this is a critical component of resuscitation success.

References:-

1. Qara F, Alsulimani L, Fakeeh M, Bokhary D. Knowledge of Nonmedical Individuals about Cardiopulmonary Resuscitation in Case of Cardiac Arrest: A Cross-Sectional Study in the Population of Jeddah, Saudi Arabia. Emergency Medicine International [Internet]. 2019 [cited 21 January 2022];2019:1-11. Available from: https://pubmed.ncbi.nlm.nih.gov/30792927/
2. What is CPR [Internet]. cpr.heart.org. [cited 2022Jan22]. Available from: https://cpr.heart.org/en/resources/what-is-cpr
3. The top 10 causes of death [Internet]. Who.int. 2022 [cited 16 April 2022]. Available from: https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death
4. Al Enizi BA, Saquib N, Zaghloul MS, Alaboud MS, Shahid MS, Saquib J. Knowledge and Attitudes about Basic Life Support among Secondary School Teachers in Al-Qassim, Saudi Arabia. Int J Health Sci (Qassim). 2016 Jul;10(3):415-22. PMID: 27610065; PMCID: PMC5003585.
5. Alquwaiay FK, Alshammari FA, Alshammari MS, Alquwaiay DA, Alabdali NAN, Elkandow AEM, et al. Assessment of the levels of awareness toward cardiopulmonary resuscitation: A communitybased study in northern

Saudi Arabia [Internet]. Journal of education and health promotion. Medknow Publications & Media Pvt Ltd; 2018 [cited 2022Jan21]. Available from: https:// www.ncbi.nlm.nih.gov/pmc/articles/PMC6332658/
6. Resource Alnajjar H;Hilal RM;Alharbi AJ;Alharthi OH;Batwie RA;AlShehri RM;Algethami MR; LS. Evaluation of awareness, knowledge, and attitudes towards basic life support among non-medical students at two academic institutions in Jeddah, Saudi Arabia [Internet]. Advances in medical education and practice. U.S. National Library of Medicine; [cited 2022Jan21]. Available from: https://pubmed.ncbi.nlm.nih.gov/33380857/
7. Alhussein RM;Albarrak MM;Alrabiah AA;Aljerian NA;Bin Salleeh HM;Hersi AS;Wani TA;Al AseriZA; Knowledge of non-healthcare individuals towards cardiopulmonary resuscitation: A cross-sectional study in Riyadh City, Saudi Arabia [Internet].
8.Al-Husinat L, Nusir M, Al-Gharaibeh H, Nusir M, Haddad F, Al Modanat Z, Varrassi G. Assessment of Basic Life Support Knowledge Among Medical Students in Jordan: Implications for Improving Out-of-Hospital Cardiac Arrest and Road Traffic Accident Survival Rates. Cureus. 2023 Dec 6;15(12):e50080. doi: 10.7759/cureus.50080.
9. M. Alharbi M, F. Horaib Y, M. Almutairi O, H. Alsuaidan B, S. Alghoraibi M, H. Alhadeedi F, S. Alrowithi A. 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,
10. Al-Turki YA, Al-Fraih YS, Jalaly JB, Al- Maghlouth IA, AlRashoudi FH, Al-Otaibi AF, et al. Knowledge and attitudes towards cardiopulmonary resuscitation among university students in Riyadh, Saudi Arabia. Saudi Med J 2008; 29(9): 1306e1309
11. Lockey AS, Barton K, Yoxall H. Opportunities and barriers to cardiopulmonary resuscitation training in English secondary schools. Eur J Emerg Med 2015. http://dx.doi.org/10.1097/ MEJ.0000000000000307. PMID: 26267076.
12. Alrasheedi SM, Alrashdi MN, Almutairi KF, Alruways AF, Almutairi IN, Alfehaid SN, Alrashdi OA, Alkhdairi A, Alrashidi AS, Aloraini YN. Awareness, Knowledge, and Attitudes Regarding Basic Life Support Among the Population With Relatives Suffering From Heart Diseases in the Al-Qassim Region, Saudi Arabia. Cureus. 2022 Nov 15;14(11):e31530.
13.Alnajjar H, Hilal RM, Alharbi AJ, Alharthi OH, Batwie RA, AlShehri RM, Algethami MR. Evaluation of Awareness, Knowledge, and Attitudes Towards Basic Life Support Among Non-Medical Students at Two Academic Institutions in Jeddah, Saudi Arabia. Adv Med Educ Pract. 2020 Dec 23;11:1015-1021.
14. 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): 496e500
15.Ro YS, Shin SD, Song KJ, Hong SO, Kim YT, Lee DW, Cho SI. Public awareness and self-efficacy of cardiopulmonary resuscitation in communities and outcomes of out-of-hospital cardiac arrest: A multi-level analysis. Resuscitation. 2016 May;102:17-24. doi: 10.1016/j.resuscitation.2016.02.004
16. Simmons KM, McIsaac SM, Ohle R. Impact of community-based interventions on out-of-hospital cardiac arrest outcomes: a systematic review and meta-analysis. Sci Rep. 2023 Jun 23;13(1):10231. doi: 10.1038/s41598-023-35735-y.
17. Anisah A, Chew KS, Mohd Shaharuddin Shah CH, Nik Hisamuddin NA. Patients' perception of the ambulance services at Hospital University Sains Malaysia. Singap Med J 2008; 49(8): 631e635
18. Mohamed A, Mohamed N. Cardiopulmonary resuscitation skills of medical professionals. Resuscitation 1990; 20: 31e39. 17. Reder S, Quan L. Cardiopulmonary resuscitation training in Washington state public high school. Resuscitation 2003; 56(3): 283e288
19. Birkun A, Frolova L. Training prevalence, knowledge and attitudes towards cardiopulmonary resuscitation: a survey amongst 5,921 preschool and school teachers. European Heart Journal 2021; 42: 1501.
20. Hasselqvist-Ax I, Riva G, Herlitz J, et al. Early Cardiopulmonary Resuscitation in Out-of-Hospital Cardiac Arrest. N Engl J Med. 2015;372(24):2307–15. https://doi.org/10.1056/NEJMoa1405796.
21. Plant N, Taylor K. How best to teach CPR to schoolchildren: a systematic review. Resuscitation. 2013;84(4):415–21. https://doi.org/10.1016/j.resuscita tion.2012.12.008.