



AWARENESS AND KNOWLEDGE OF FEMALE COLLEGE STUDENTS TOWARD CARDIOPULMONARY RESUSCITATION IN AL-AHSA CITY, EASTERN SAUDI ARABIA

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ABSTRACT

Objectives: This study aimed to estimate the level of awareness and knowledge regarding Cardio-Pulmonary Resuscitation during basic life support among female students at King Faisal University in Al-Ahssa, Saudi Arabia.

Material and Method: A cross-sectional study was conducted on 358 Saudi female students who studied at King Faisal University Colleges in Al-Ahsa, Saudi Arabia between 1st of May 2019 and 31 of June 2020. The data was collected via a self-administered questionnaire prepared in Arabic, including questions relevant to the socio-demographic variables, and basic questions to measure the level of participants' awareness regarding basic CPR.

Results: Out of the study sample of 358 students, 98.9% believe that it is mandatory to learn CPR. Almost the entire student population studied (93.9%) thinks that every individual in the community should be familiar and well-trained in performing CPR. Unfortunately, this study revealed that a significant percentage of female college students at King Faisal University have inadequate knowledge of CPR, although most of them have good awareness. Only 72.6% know the correct sequence for basic life support CPR, and 68% of the students were aware of the medical emergency contact number.

Conclusion: It was found that the overall awareness of CPR was good. However, the knowledge on the topic was insufficient. Thus, more focus should be placed on the improvement of CPR skills. In addition, more studies are needed to estimate knowledge about cardio-pulmonary resuscitation in our community.

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INTRODUCTION

Sudden Cardiac Arrest (SCA) is one of the world's leading causes of death and a major public health problem.^[1] SCA is best defined as the abrupt cessation of cardiac activity and hemodynamic collapse, typically due to persistent ventricular tachycardia or ventricular fibrillation. Most of these events happen in patients with structural heart disease (which may not have been diagnosed), especially coronary heart disease.^[2] The exact number of incidences of SCA is unknown in the United States, but estimates range from 180,000 to more than 450,000. The estimated incidences in the general population in North America and Europe fall from 50 to 100 per 100,000.^[3] The real incidence of sudden cardiac death out of the hospital is not known. Out of Hospital Cardiac Arrest (OHCA) occurs most often in the patient's home, but when they occur in a public place, the prognosis is shown to be better.^[4] The technique known as the "chain of survival," which consists of five links, is a key concept in the successful treatment of patients with OHCA. These five links are: early detection of cardiac arrest and emergency response system activation; urgent, high-quality CPR; rapid defibrillation; basic and advanced EMS; and post-arrest care and advanced life support.

^[5] SCA survival assessments have reached very different conclusions. Studies have reported survival rates of 1 to 6% in the out-of-hospital environment.^[3] One of the main reasons for infrequent bystander intervention in OHCA is that cardiac arrest may not be recognized by lay rescuers. In order to simplify the initial assessment for the lay provider, the 2015 guidelines from the AHA, the ERC, and the ILCOR recommend that bystanders should suspect cardiac arrest and begin CPR whenever a person is unresponsive and does not breathe normally.^[5] When the heart stops beating, CPR is an emergency lifesaving procedure. Immediate CPR may double or triple survival chances after cardiac arrest.^[6] It is well known that after OHCA, CPR should be attempted as soon as possible.^[1] For every minute that a person with OHCA goes without CPR and defibrillation, the chance of survival is reduced by 7 to 10%. Unfortunately, bystander CPR is provided in less than 50% of cases, and AEDs are used with no more than 25% of suitable patients, although they are often available in public places.^[5] After recognizing SCA (failure to respond or absence of breath by the lay rescuer), the rescuer should activate the emergency response system by himself or another rescuer if present should do so and then carotid pulse is checked. The patient should not be evaluated for more than

10 seconds; if there is no pulse, the cycles of 30 compressions and two breaths should be started with a rate of at least 100 chest compressions/minute and not more than 120 chest compressions /minute, while the depth should be 5-6 centimeters with minimal CPR interruptions. Early recognition and treatment with immediate initiation of high-quality CPR and early defibrillation are the keys to survival from SCA. CPR carried out before the arrival of the EMS was associated with a 30-day survival rate following a cardiac arrest outside of the hospital, which was more than twice as high as the rate associated with no CPR before the arrival of the EMS.^[6] An important factor in determining patient outcome after OHCA is the administration of CPR by a layman bystander. Survival after SCA is higher among those with bystander CPR compared to those who receive more delayed CPR from EMS staff. In addition to improved survival, better neurological function among survivors is associated with early restoration or improved circulation.^[7] The CPR has two basic approaches: the traditional approach, which is performed with both chest compressions and ventilations, and a newer approach, called compression-only CPR, which is performed with only chest compressions. Studies comparing patients who received traditional CPR with those who received compression-only CPR have shown no significant survival difference. Compression-only CPR is associated with better acceptance and engagement by lay rescuers, who may hesitate to provide traditional CPR due to fear of performing the procedure incorrectly, concern about victim regurgitation during mouth-to-mouth ventilations, or worry regarding disease transmission. In 2010, the AHA endorsed compression-only CPR for untrained lay rescuers to overcome these barriers; this recommendation continues to be supported by the 2015 AHA, ERC, and ILCOR guidelines.⁽⁵⁾ In a national cohort of 30,381 cardiac arrests witnessed in Sweden (1990 and 2011), 15,512 patients received CPR before emergency personnel arrived. Persons receiving bystander CPR before emergency personnel arrived had a significantly higher 30-day survival rate.^[8] In another national study in Japan, the rate of pre hospital bystander CPR and bystander defibrillation among patients with OHCA increased between 2005 and 2012 and was associated with increased probabilities of neurologically intact survival.^[9] A meta-analysis study showed significantly higher survival among patients with OHCA who received bystander CPR than those who did not (16.1% vs. 3.9%). Several national and international organizations have called for universal CPR training. The WHO has endorsed the “Kids Save Lives” training initiative, which recommends that school-age children receive two hours of CPR training each year. The ILCOR has launched the “All Citizens of the World Can Save a Life” program to elevate CPR training and performance, and the AHA has a stated objective to train 20 million people annually in CPR by 2020.^[5] Despite the development of CPR, electrical defibrillation and other advanced resuscitation techniques in the last 50 years, the SCA survival rate is still low.^[3]

Various studies have been done around the world to assess the knowledge and awareness of CPR of the general population. A study from Brazil (2015) has found that although a high percentage of students recognized emergency situations, a significant proportion did not know the MEAS (mobile emergency attendance service) medical emergency telephone number, and only a minority had sufficient BLS (basic life support) skills to assist in cardiac arrest. A significant

proportion had not been enrolled in a first aid course.^[10] A Lebanese study (2016) aimed to evaluate the knowledge and attitude of university students and to identify potential barriers to and facilitators of CPR learning and performance has revealed that 42.9% of participants were able to identify all signs of cardiac arrest, while 33.7% felt that they were able to perform CPR when they witnessing cardiac arrest, and 20.3% of participants reported receiving previous CPR training. The lack of sufficient expertise in CPR performance was an important barrier to the willingness to perform CPR.^[11] Similarly in a Saudi study (2008), the knowledge and attitudes towards CPR among the students of King Saud University was found deficient. Eighty five percent felt that knowledge was inadequate. and 45% believe that CPR training should be a requirement for graduation.^[12] One another Saudi study (2016) aimed to estimate the knowledge of CPR among school teachers, has found 43% of school teachers knew about CPR, but 57% had no previous CPR information. About 53% agreed that training courses in CPR should be mandatory. Only 63% of teachers knew the emergency service contact numbers.^[13]

Although the reasons for the continued poor survival of patients with OHCA (8% of the total OHCA) are not certain,^[14] awareness of the general population about CPR plays a crucial role in the survival of OHCA patients. A reasonable amount of data about the level of knowledge and awareness regarding BLS and CPR were found in the medical literatures. We found these data to be inconsistent across countries including Saudi Arabia. In Saudi Arabia, researches were exclusive to few cities in the central, northern, and western region. This has urged us to plan for our survey as a complementary source of data to assess the updated American Heart Association and Saudi Heart Association's basic CPR guidelines' awareness among the population of the eastern region of Saudi Arabia, particularly, Al-Ahsa, which constitutes a significant proportion of the eastern population. In our study, we selected female students from different colleges as the target population to whom we will conduct our survey. This survey may stimulate these young women to take more initiative in learning the basic skills of CPR.

MATERIAL AND METHODS

The study was a cross-sectional survey conducted on female college students at King Faisal University of Al Ahsa. The study was done to assess the level of awareness and knowledge toward Cardio-Pulmonary Resuscitation in basic life support among female college students at KFU in Al-Ahsa between 1st of May 2019 to 30th of June 2020. All 41,598 students attending the college were the study population. All female Saudi students studying in KFU was the inclusion criteria while non-Saudi students were excluded from this study. With the presumption (based on previous study of the same type) that 40 percent (with the range of 45%) of the students must be aware about CPR and had good knowledge about basic life support with a total population of 41,598 students, the sample size was calculated using the Epi info software with 95% of CI was 381. The sample were collected through a stratified sampling technique where King Faisal University's female population was divided according to the study field into 3 strata: Medical, paramedical, and others. A fraction of the sample was taken from each one of the three strata via Simple Random Sampling. The sample fraction from each stratum was determined based on the proportion population in each stratum. The proportion of each stratum was determined from the total

number population in that strum by the assistance of university administration. Selected participants were contacted verbally through telephone to take their permission to be involved in the study. A validated pretested questionnaire form written in simple Arabic language was used to collect the sociodemographic data of the participants including age, gender, marital status, level of education, and major. The questionnaire also consisted of inquiries about attending a BLS course before, and the last BLS course attended, if applicable. Basic questions aware added to measure the level of participants' awareness, attitude, and practices regarding basic CPR guidelines. A small section in the form was reserved for assessing the proficiency of BLS Certified participants, and these included mainly practical questions taken from the BLS curriculum. Based on the score, they were evaluated. The validity of the questionnaire was tested and insured through a small pilot study and calculating Connacht's alpha. The collected data from the survey were entered, managed, and computed by using SPSS software 21 version to find our study result. Data analysis was done by using inferential and descriptive statistics. The descriptive statistics like mean, standard deviation, frequency distribution and percentage were used to assess the demographic variables. The comparison between the awareness was performed using chi square test. A p-value cut off point of 0.05 at 95% CI will be used to determine statistical significance.

RESULTS

A total of 358 participants out of 381 participants returned the questionnaires after proper replying them making a response rate of 94%.The mean age of the participants were 21.57 years ± 3.243 Std.Dev. More than sixty three percent (N=226) of the participants were unmarried while 39.9% were married. Sixty percent of the participants (N=143) were non-medical students while 40% were students from medical college. As far as the educational status is concerned, about one-half of the participants (46.9%) were in the last three years in their colleges. Most of the participants (84.9%,N=304) stated that they had never come across the need to perform CPR before, and the majority of the participants (92.7%,N=332) had never participated in CPR before. The details of the demographic information are shown in table 1.

Table 1 Showing the demographic characteristics of the participants

		Frequency	Percent
Marital status	Single	226	63.1
	Married	132	36.9
Original region	Alhasaa	336	93.9
	Eastern province	22	6.1
College	Medical and health colleges	143	39.9
	Non-medical colleges	215	60.1
	Preparatory year	40	11.2
Study level	First year	56	15.6
	Second year	52	14.5
	Third year	42	11.7
	Fourth year	55	15.4
	Fifth year	32	8.9
	Sixth year	81	22.6
Have you ever come across CPR condition before?	Yes	54	15.1
	No	304	84.9
Have you ever participated in CPR before?	Yes	26	7.3
	No	332	92.7
Age		mean	SD
		21.57	3.243

More than seventy four percent (N=266) of the participants knew the purpose of CPR. The vast majority of the participants (98.9%, N=354) correctly agreed with the statement that it is mandatory for them to learn basic life support (CPR).Similarly 93.9% of the participants (N=336) correctly answered that every individual in the community should be familiar with basic life support. The details of the response on awareness question are shown in table 2.

Table 2 Showing the response of the participants awareness questions towards CPR

Questionnaires	No.	%
What is the basic life support (CPR)?		
1. Massage to the chest to stimulate the victim's heart to restart again	37	10.3
2. Repeated blowing in the victim's mouth to ensure that oxygen reach the brain	29	8.1
3. Repeated chest compression in effective way to ensure arrival of blood circulation to the brain before medical emergency team arrives.	266	74.3
4. Injection of medicine to the victim to keep the heart and lung survive before emergency medical team arrive	16	7.3
Which one of the following community groups is required to be familiar with basic life support?		
1. Doctors	1	0.3
2. Nurses	1	0.3
3. All health care providers	14	3.9
4. Every individual in the community	336	93.9
5. I Do Not Know.	6	1.7
Do you think that it is mandatory for you to learn Basic Life support training as CPR?		
Yes	354	98.9
No	4	1.1

When asked about the most effective step to increase the survival of the pulseless victim after calling the emergency team, almost eighty seven percent (N=311) of the participants answered correctly. More than twenty seven percent (27.4%, N= 98) of the participants did not know the correct sequence for basic life support (CPR) and similarly thirty percent of the participants (29.9%, N= 107) did not know the correct area to check for the pulse of the victim. Only 22.3% (N=80) of the participants knew the first step in basic life support when encountered an unconscious victim and 39.1% (N=140) of the participants knew the correct breast to chest compressions ratio. However 51.7% (N=185) of the participants knew the correct action in a pulseless and unconscious victim. The details on the response of knowledge questions are shown in table 3.

Table 3 Showing the response on the knowledge questionnaires of CPR

	No.	%
What is the first step in basic life support (CPR) when encounter unconscious victim?		
1.Check breathing	87	24.3
2.Check the Pulse	148	41.3
3.Call for help	80	22.3
4.Start to give breaths by blowing through mouth	27	7.5
5.I Do Not Know	16	4.5
Whom should you contact when you come across a medical emergency?		
1.997	246	68.7
2.999	4	1.1
3.998	46	12.8
4.937	8	2.2
5.I Do Not Know	54	15.1
After calling the medical emergency team (red crescent), which of the following is the most effective step to increase the survival of the victim who had no PULSE?		
1.1. Start CPR through repeated and effective chest compressions.	311	86.9
2.2. Repeating calling for the medical emergency team Red Crescent.	13	3.6
3.3. Just Observe the victim until the medical emergency team arrive	10	2.8
4.4. Keep waking up the victim	9	2.5
5.5. I Do Not Know.	15	4.2

What is the correct area to check for the pulse in the victim?		
1.Wrist	83	23.2
2.Neck	251	70.1
3.Arm	3	0.8
4.Foot	3	0.8
5.I Do Not Kno	18	5.0
In Case of feeling Pulse in the unconscious victim, what will be the correct action?		
1. Provide the victim with 75 grams sugar through mouth	4	1.2
2. Start chest compression	41	11.5
3. Give the victim repeated breath by blowing through his mouth.	50	14.0
4. Ensure that the victim is breathing and observe him while in side position until the arrival of medical team.	219	61.2
5. I Do Not Know.	44	12.3
In Case of absent pulse in the unconscious victim, what will be the correct action?		
1.Provide the victim with 75 grams sugar through mouth	54	15.1
2.Start chest compression	185	51.7
3.Give the victim repeated breath by blowing through his mouth.	70	19.6
4.Ensure that the victim is breathing and observe him while in side position until the arrival of medical team.	16	4.5
5.I Do Not Know.	33	9.2
What do you know about Automated External Defibrillator (AED)?		
1.Device that provide brain with electricity during convulsion	6	1.7
2.Essential device used to stimulate the heart during basic CPR	194	54.2
3.Essential device that provide the lung with oxygen during CPR	8	2.2
4.Device that read the blood pressure of victim who had arrested heart.	1	0.3
5.I Do Not Know.	149	41.6
What is the CORRECT sequence for Basic Life Support (CPR)?		
1. Call for help→ Check Pulse→ Chest compressions Open airway and provide breaths.	260	72.6
2. Call for help→ Open airway and provide breaths→ Check Pulse→ Chest compressions.	43	12.0
3. Call for help→ Open airway and provide breaths→ Chest compressions →Check Pulse.	8	2.2
4. Check the Pulse→ Open airway and provide breaths→ Chest compressions → Call for help.	13	3.6
5. I Do Not Know	34	9.5
During CPR what is the CORRECT Breaths to Chest Compressions Ratio?		
1.2 breaths Per 15 Chest compressions	54	15.1
2.2 Breaths Per 30 Chest Compressions	140	39.1
3.One breath per one chest compression	10	2.8
4.One breath Per 10 Chest Compressions	54	15.1
5.I don't know	100	27.9

There was a significant difference in the awareness between those who have come across CPR before and who had never come across it, in favor of those who had come across it (p=0.0001). In addition, there was a significant difference in the awareness between those who had participated in CPR before and those who had never participated in it, in favor of who had participated it (p=0.001). Similarly there was a significant difference in the awareness between medical and non-medical colleges, in favor of medical colleges (p=0.0001).

Table 4 Showing the differences of awareness among the different categories of variables

		N	Mean	Std. Deviation	Std. Error Mean	P value
Have you ever come across CPR condition before?	Yes	54	3.3889	0.65637	0.08932	0.0001
	No	304	2.9836	0.78961	0.04529	
Have you ever participated in CPR before?	Yes	26	3.5385	0.58177	0.11410	0.001
	No	332	3.0060	0.78503	0.04308	
College	Medical and health colleges	143	3.3986	0.70351	0.05883	0.0001
	Non-medical colleges	215	2.8093	0.74627	0.05090	
Original region	Ahsaa	336	3.0387	0.78131	0.04262	0.572
	Eastern province	22	3.1364	0.83355	0.17771	
Marital status	Single	226	3.0088	0.76589	0.05095	0.258
	Married	132	3.1061	0.81266	0.07073	
Study level	Preparatory year	40	2.8000	0.72324	0.11435	0.0001
	First year	56	2.9464	0.77271	0.10326	
	Second year	52	2.6346	0.79283	0.10995	
	Third year	42	2.8333	0.79378	0.12248	
	Fourth year	55	2.9455	0.70496	0.09506	
	Fifth year	32	3.4375	0.66901	0.11827	
	Sixth year	81	3.5185	0.61464	0.06829	

The awareness among the students of level six was significantly more as compared to those with other levels (p=0.0001). The details of the differences of awareness among

the different categories of variables are shown in table 4. There was a significant difference in the knowledge between those who have ever come across CPR condition before and those who had never come across it, in favor of who had come across it (p=0.0001), between those who had participated in CPR before and who had never participated in it, in favor of those who had participated it (p=0.0001) and between medical and non-medical colleges, in favor of medical colleges (p=0.0001). In addition, there is a significant difference in the knowledge between levels of study, in favor of sixth level (p=0.0001). The details of the difference in the knowledge among different groups of participants are shown in table 5.

Table 5 showing details of the difference in the knowledge among different groups of participants

		N	Mean	Std. Deviation	
Have you ever come across CPR condition before?	Yes	54	6.7407	1.78236	0.000
	No	304	5.0066	2.06014	
Have you ever participated in CPR before?	Yes	26	7.0000	1.62481	0.000
	No	332	5.1325	2.08734	
College	Medical and health colleges	143	6.7972	1.67651	0.000
	Non-medical colleges	215	4.2512	1.72453	
Original region	Ahsaa	336	5.2262	2.11379	0.142
	Eastern province	22	5.9091	2.02153	
Marital status	Single	226	5.1239	2.01828	0.091
	Married	132	5.5152	2.24963	
Study level	Preparatory year	40	4.9000	1.44648	0.0001
	First year	56	4.5536	1.62838	
	Second year	52	4.2115	1.90290	
	Third year	42	4.5238	1.69990	
	Fourth year	55	4.2909	2.10531	
	Fifth year	32	6.0313	2.03968	
	Sixth year	81	7.3704	1.36423	

There is a significant positive relationship between age and knowledge (p=0.001). In addition, there is a significant positive relationship between age and awareness (p=0.012). Also, there is a significant positive relationship between awareness and knowledge (p=0.0001). The details of the correlation between awareness and knowledge on CPR is shown in table 6.

Table 6 Showing the details of the correlation between awareness and knowledge on CPR

Correlations				
		Age	Awareness	Knowledge
Age	Pearson Correlation	1	.133*	.183**
	Sig. (2-tailed)		0.012	0.001
Awareness	Pearson Correlation		1	.522**
	Sig. (2-tailed)			0.000
	N			358

*. Correlation is significant at the 0.05 level (2-tailed).
 **. Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

The present study was conducted to evaluate the level of awareness and knowledge among the college student about CPR, which is one of the most essential methods available to save a cardiac patient's life. This study revealed that a significant percentage of college students at KFU had inadequate knowledge of CPR, though most students had good awareness. Our study found that 15.1% of the female students had witnessed a CPR requiring condition. This finding was similar to the studies conducted in Jeddah (Saudi Arabia)^[15] and King Saud University in Riyadh (Saudi Arabia)^[12,13] where 15.8% and 12% of the students had witnessed an OHCA

condition. However, only 14% of them actually performed CPR, which is a very low percentage when we compare it to our study at KFU (Saudi Arabia) which showed that 48.3% of the students who had witnessed an OHCA actually performed CPR. Yet, we cannot ignore that more than half of our participants came across an OHCA without performing CPR, which is a big defect in our community that indicates the need to increase people's knowledge regarding CPR and assess the causes of their limitations.

Regarding the awareness, about 74.3% were able to identify what CPR is and almost all of the students 93.9% thought that every individual in the community should be familiar and well-trained to perform CPR; 98.9% thought that CPR courses should be mandatory, which is significantly higher than that reported in Riyadh^[14] among the students of King Saud University that showed that only 45% believe that CPR training should be mandatory and a requirement for graduation. This indicates a good awareness of CPR and its importance among the female students of our study. It also showed the students' willingness to learn cardiopulmonary resuscitation skills.

When we come to the knowledge of the medical emergency contact number, 68% of students were aware of it. However it was lower than what has been found in other similar study in Saudi Arabia where 70% of the students knew the correct medical emergency number. In Norway study (2011) which included secondary school students has showed that 90% of them knew the national medical emergency telephone number, so a significant percentage of our participants do not even know the number to call in case of a medical emergency.^[16] This indicates a shortcoming on the part of the participants in our study, or even by the responsible authorities.

The present study showed that 70.1%, 51.7%, and 39.1% of the participants were able to check for circulation, knew as when to start chest compressions, and the breaths to chest compression ratio respectively. This result is better than that of Lebanese study^[11] (2016) which had revealed that 42.9% of participants were able to identify all signs of cardiac arrest.⁽¹¹⁾ However in a Norway study^[16] (2011) on the CPR performance among secondary school students has found theoretical knowledge about MEAS among 90% of the students was significantly high. Another study conducted in Turkey (2015) has also found that only 35.5% could perform only chest compressions, 27.6% could perform only mouth- to-mouth ventilation, and 28.7% could perform both. While 52.0% knew the chest compression location,^[17]

Around 72% of students know the correct ABC sequence which is higher than the 56.3 that is found at King Saud University (Saudi Arabia). The level of knowledge about cardiac arrest and CPR varied widely between medical and non-medical students in a statistically significant manner in favor of medical colleges ($p=0.0001$), which was an anticipated barrier to the survey as the CPR course is a mandatory requirement in medical colleges, and also part of their curriculum. In addition, there was a significant difference in the awareness between levels of students in medical colleges, in favor of the sixth level, also because the CPR course is a requirement for receiving the medical license. The present study has shown that 54.2% of the students knew about an AED. In a similar Austrian study (2018), the researchers have found overall poor knowledge and awareness about BLS

and AED. Only 33% reported being willing to perform CPR and 50% would use an AED device.^[18]

The limitations of this study included the small sample size, and the fact that it was limited to one university and the female gender only. Larger sample sizes and inclusion of multiple universities both governmental as well as private would offer more information. Another limitation was the sampling technique. We intended to collect the sample through a stratified sampling technique, where King Faisal University's female population would be divided according to the study field and level. But due to the lack of cooperation and the impossibility of knowing the number of students in each college because of the strict policy regarding the privacy of university information, our method of sampling has changed to simple random sampling which may subject our research to bias.

In conclusion, it was found that most of the students had good awareness. However, the knowledge about the topic was insufficient. Thus, more focus should be placed on the improvement of CPR skills. In addition, more studies are needed to assess knowledge and awareness of CPR in the community.

In this study, we found that most of the students had good awareness. However, the knowledge on the topic was insufficient. Thus, more focus should be placed on the improvement of CPR skills. We also recommend that CPR courses should be mandatory as a graduation requirement, as we saw the students' willingness to learn CPR skills. In addition, more studies are needed to assess knowledge and awareness of CPR in the community.

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