Research

Attitudes towards CPR among allied health students in Jordan: a cross-sectional study

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<https://doi.org/10.33151/ajp.17.860>

Abstract

Introduction

Early cardiopulmonary resuscitation (CPR) is associated with increased survival rates from out-of-hospital cardiac arrest. This aim of this study was to explore the attitudes to CPR among allied health students in Jordan; and to compare the attitudes to performing chest compression-only (CC) CPR versus CPR with mouth-to-mouth ventilation (MMV).

Methods

A cross-sectional study using a 17-item attitude questionnaire that assessed the attitude to CPR in general, and to performing MMV and CC on different patient groups (the other gender, strangers, relatives, children), and despite infection concerns.

Results

A total of 856 participants completed the questionnaire (mean age 20.8 years, 74.0% female); 79.2% of participants were willing to learn and practise CPR encouraged by their cultural values and religious beliefs and had a positive attitude towards the benefits of CPR. Compared to MMV, a greater proportion of students had a positive attitude towards performing CC on strangers (71.7% vs 29.6%, $p < 0.001$), relatives (77.9% vs 40.4%, $p < 0.001$), patients of the other gender (62.3% vs 29.8%, $p < 0.001$), and despite infection concerns (67.9% vs 24.1%, $p < 0.001$). Compared to males, a higher proportion of females had a positive attitude about delivering CC to relatives (80.7% vs 70.0%, $p = 0.004$) and despite the infection concerns (71.1% vs 58.7%, $p = 0.007$). Females were more reluctant to perform MMV on males (26.1% vs 40.4%, $p = 0.02$), strangers (25.3% vs 41.7%, $p = 0.01$) and relatives (36.5% vs 51.6%, $p = 0.01$).

Conclusion

A large proportion of participants were willing to learn CPR and had positive attitudes towards its benefits. Females were more inclined to perform CC compared to males, whereas males were more likely than females to deliver MMV. More training is recommended, and clear legislation regarding the legal liabilities of rescuers is needed in Jordan.

Keywords:

cardiopulmonary resuscitation; chest compression; attitude; allied health professions; students; emergency medical services; CPR

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Introduction

Early cardiopulmonary resuscitation (CPR) is associated with increased survival rates from out-of-hospital cardiac arrest (OHCA) (1-3). Allied health profession (AHP) students can be important bystanders and provide CPR until the arrival of paramedics.

A small-sample study in northern Jordan reported that only two of 79 (3%) OHCA patients survived to discharge, with CPR initiated for only 22% by emergency medical services. This may be due to a lack of CPR knowledge and skills among the public (4). A recent study reported a poor level of knowledge and lack of training among AHP students, providing recommendations to improve this level of knowledge (5).

International studies reported that trained individuals were more willing and confident to perform bystander CPR (6-8), which may increase the likelihood to perform CPR, leading to increased survival rates and improved patient outcomes (3,9-15). Training is not the only reported factor; gender was also reported as a contributing factor to the willingness to perform CPR. Different studies indicated that females were less likely to perform bystander CPR compared to males (11,16,17). Another study reported that females were more likely to perform chest compression (CC)-only CPR compared to males (18). Other reports also indicated that females were less willing to perform bystander CPR for a victim who was of the other gender (17). Barriers to conducting CPR were reported to be fear of disease transmission, fear of legal liabilities and fear of causing harm to patients (1,19-22).

Attitude is defined as 'a hypothetical construct that represents a person's degree of like or dislike for a place, person, thing, item or event'. It is used to describe the pattern of feelings, beliefs and reactions and can vary among individuals and is often formed based on past experiences (23). Therefore, exploring the attitudes in this study will help to understand the perceived barriers and willingness to conduct CPR. The findings will also help to provide recommendations to overcome these perceived barriers, increase CPR training rates and improve attitudes and willingness to provide CPR.

Limited research has been conducted in Jordan concerning bystander CPR. This study aimed to explore the attitudes related to performing CPR among AHP students in Jordan, comparing the attitudes towards CC versus mouth-to-mouth ventilation (MMV). The study also aimed to explore the differences between males and females as well as trained and untrained student groups.

This research is essential to establish effective strategies to improve students' attitudes towards performing CPR and provides a baseline for future research regarding CPR among allied health professionals, as well as the public, in Jordan.

Methods

Design and setting

This is a cross-sectional study among AHP students in the Faculty of Applied Medical Sciences at Jordan University of Science and Technology. A multidisciplinary expert panel, including academics, designed the questionnaire using American Heart Association guidelines, previous studies and clinical and academic experience (1,2,16). The expert panel also assessed the questionnaire for face and content validity. A second group of four paramedicine professionals evaluated the questionnaire providing feedback that further improved the validity of the survey. The questionnaire (in Arabic) was then piloted to a group of 30 AHP students. The questions proved to be valid with an acceptable level of reliability (Cronbach alpha = .82, one-sided 95% CI: 0.81). Another group of 30 students was recruited to examine the test-retest reliability of the questionnaire (interclass correlation coefficient [ICC] = 0.9, 95% CI: 0.8, 0.95). The expert panel approved a final version of the survey.

The study questionnaire included two sections: demographics and attitudes. The first section included participants' demographic information, university level (the year in the program), university cumulative grade point average (GPA out of 4.2 points), the status of previous CPR training, willingness to learn CPR, whether they had witnessed CPR in progress, and whether they have family members with a history of cardiac disease. In the current study, trained individuals were defined as students who had CPR certification or hands-on training with post-training summative assessment by professionals (5,24).

The attitudes section included 17 questions divided into three areas, including attitude towards CPR in general as well as towards performing MMV and CC to different groups. These groups were: the other gender, strangers, relatives, and children, and included concern of infection. Each of the 17 questions had a 5-point Likert scale, where the higher the score indicating a more positive attitude. To simplify the interpretation of the results and to allow comparisons, the final attitudes scale scores were categorised into 'yes' (scores of 4 and 5), 'neutral' (score of 3) and 'no' (scores of 1 and 2).

Sample and setting

The Faculty of Applied Medical Sciences offers four-year Bachelor of Science programs of nine AHP majors. Of these, we included eight majors: medical laboratory sciences, physical therapy, occupational therapy and speech pathology, dental technology, allied dental science, radiologic technology, optometry, and paramedicine. The paramedic program was excluded from the study as these students receive mandatory CPR training throughout the program. Also, they receive advanced levels of training and deal with OHCA simulation cases during the program. Therefore including them may bias the results.

A convenience sample consisting of second, third and fourth-

year AHP students were asked to participate in the study voluntarily. First-year students were excluded as they are only enrolled in general science courses and can change their majors after their first year of study. Furthermore, those who participated in the pilot study were excluded. Data were collected from April to May 2018 within Faculty of Applied Medical Sciences, which enrolled a total of 1525 students of the second, third and fourth years, with about 70% females (n=1068).

The corresponding author (AO) and research assistants recruited the participants, explained the study purposes and collected questionnaires on completion. A sample size composed of more than 500 participants is considered excellent in cross-sectional studies (25). All participants in this study signed the Institutional Review Board informed consent forms and received no compensation for their participation.

Statistical analysis

Continuous variables were summarised as means and standard deviation, and categorical variables were presented as counts and proportions. Differences in attitudes between groups were compared using independent t-test for continuous variables and chi-squared tests for categorical variables. Two-sample proportion tests were used to examine the differences between those who had a positive attitude regarding CC and MMV, comparing different groups: males versus females and trained versus untrained students. A p-value of 0.05 was considered for statistical significance. All statistical analyses were undertaken using STATA (version 14.0 Stata Corporation, College Station, TX, USA).

Ethical approval

The study was approved by the Jordan University of Science and Technology Institutional Review Board (project number: AO-20180064).

Results

Descriptive analysis

A total of 917 out of 1525 students responded to the questionnaire (60.1%); 856 returned complete questionnaires and were included in the final analysis (response rate 56.1%). Table 1 shows the demographics of the participating students. The mean age of participants was 20.8 ($\pm$ 1.1) years, with the majority being females (74.0%); 181 (n=181, 21.1%) students had previous CPR training (19.7% males vs 21.6% females); and about 70% (n=598, 69.9%) were willing to be trained or retrained in CPR.

Attitudes

General questions about participants' attitudes towards CPR were included in the questionnaire (items 1-7 in Table 2). The vast majority of participants showed an eagerness to learn CPR, encouraged by their cultural values and religious beliefs (79.2%). These beliefs include saving lives whenever possible,

causing no harm to others and gaining good deeds from helping others. Also, participants showed a positive attitude to receive CPR by professionals (65.4%), that CPR is important and can increase patient survival (87.5%) and that CPR is not harmful (46.6%). Less than half of participants (40.7%) rated themselves as confident of performing CPR, whereas 53.9% reported that they do not have the knowledge and skills to perform it. About one-third of participants (34.4%) indicated that they would avoid CPR, fearing legal liabilities.

Table 1. Participants demographics

Characteristic	Total N=586 (%)
Age (mean (SD), years)	20.8 (1.1)
Grade point average (mean (SD))	3.1 (0.5)
Trained	
Yes	181 (21.1)
No	675 (78.9)
Gender	
Male	223 (26.0)
Female	633 (74.0)
Year of study	
Second	311 (36.3)
Third	330 (38.6)
Fourth	215 (25.1)
Having a family member with cardiac disease	
Yes	253 (29.6)
No	603 (70.4)
Witnessed a CPR in progress	
Yes	110 (12.9)
No	746 (87.1)
Willing to train/retrain	
Yes	598 (69.9)
No	258 (30.1)

SD = standard deviation

Attitudes towards CC and MMV

Table 2 summarises the participants' attitudes towards performing CC (items 8-12) and MMV (items 13-17) in different scenarios. Responses are classified into 'yes' (indicating a positive attitude), 'neutral' and 'no' (indicating negative attitude). The study findings suggest that more than half of the participants showed a positive attitude towards performing CC to strangers (71.1%), relatives (77.9%), children (54.7%) and the other gender (62.3%), as well as despite infection concerns (67.9%).

Moreover, small percentages of the participants had a positive attitude toward delivering MMV despite infection concerns (24.0%), to strangers (29.6%), the other gender (29.8%), and relatives (40.4%). In contrast, 57.7% were positive towards providing MMV to children.

MMV vs CC among participants who had positive attitudes

Participants had more positive attitudes regarding CC to strangers (71.7% vs 29.6%, $p<0.001$), relatives (77.9% vs 40.4%, $p<0.001$) and the other gender (62.3% vs 29.8%, $p<0.001$) compared to positive attitudes towards MMV (Figure 1). Moreover, participants were more inclined to deliver CC compared to MMV when considering infection risk (67.9% vs

24.1%, $p<0.001$). No difference was found when dealing with children (CC 54.7% vs MMV 57.7%, $p=0.3$). Also, a higher proportion of participants had a positive attitude regarding MMV delivery to relatives compared to MMV to strangers (40.4% vs 29.6%, $p=0.007$). This was also observed in CC (relatives 77.9% vs strangers 71.7%, $p=0.01$).

Figure 1. Proportion comparisons of those who had a positive attitude towards CC versus MMV (all $p<0.001$ except in children, $p=0.3$)

Table 2. Participants' attitudes towards performing CPR, MMV and CC (n=856)

Item	Yes n (%)	No n (%)	Neutral n (%)
General attitude			
1. I would like to learn and practise CPR encouraged by cultural values and religious beliefs	678 (79.2)	141 (16.5)	37 (4.3)
2. I would like to receive CPR by professionals when needed	560 (65.4)	191 (22.3)	105 (12.3)
3. I believe that CPR is important and can increase the patients' survival	749 (87.5)	76 (8.9)	31 (3.6)
4. I have the confidence to perform CPR	348 (40.7)	229 (26.8)	279 (32.6)
5. I have the knowledge and skills to perform CPR	187 (21.9)	208 (24.3)	461 (53.9)
6. CPR is characterised as being harmful	157 (18.3)	300 (35.1)	399 (46.6)
7. I avoid providing CPR as I am afraid of legal liabilities	295 (34.5)	294 (34.4)	267 (31.2)
Providing CC to:			
8. strangers	614 (71.7)	156 (18.2)	86 (10.1)
9. relatives	667 (77.9)	125 (14.6)	64 (7.5)
10. children	468 (54.7)	245 (28.6)	143 (16.7)
11. other gender	533 (62.3)	186 (21.7)	137 (16.0)
12. despite infection concerns	581 (67.9)	197 (23.0)	78 (9.1)
Providing MMV to:			
13. strangers	253 (29.6)	275 (32.1)	328 (38.3)
14. relatives	346 (40.4)	282 (32.9)	228 (26.6)
15. children	494 (57.7)	217 (25.4)	145 (16.9)
16. other gender	255 (29.8)	253 (29.6)	348 (40.6)
17. despite infection concerns	206 (24.0)	248 (29.0)	402 (47.0)

Males vs females: a comparison of positive attitude towards MMV and CC

Table 3 outlines the attitude differences between males and females who had a positive attitude regarding CPR. The majority of males and females believe that CPR is important and can increase a patient's survival, yet more females believe so than males (90.2% vs 79.8%, $p<0.001$). Moreover, more females indicated that CPR is harmful (49.9% vs 37.2%, $p=0.04$). No other statistical differences were found in the remaining questions ($p>0.05$). Also, only low proportions of both genders reported that they have the knowledge and skills to perform CPR (23.8% males and 21.1% females, $p=0.7$).

Table 3 compares the number of those who were positive towards performing CC and MMV between males and females. Compared to males, a higher proportion of females had a positive attitude regarding CC to the other gender (67.1% vs 48.4%, $p<0.001$). Although high proportions in both genders had a positive attitude regarding delivering CC to relatives and despite their infections concerns, higher proportions of females had a positive attitude to perform CC to these groups (relatives 80.7% vs 70.0%, $p=0.004$; despite infections concerns 71.1% vs 58.7%, $p=0.007$). On the other hand, females were more reluctant than males to perform MMV to the other gender (26.1%

vs 40.4%, $p=0.02$), strangers (25.3% vs 41.7%, $p=0.01$) and relatives (36.5% vs 51.6%, $p=0.01$). No statistically significant differences in CC attitudes between males and females was seen when dealing with strangers (66.8% vs 73.5%, $p=0.1$).

Low proportions of participants had positive attitudes towards MMV despite their infection concerns, but no statistical difference was found between males and females (31.4% vs 21.5, $p=0.1$).

Finally, when the scenario included children, considerable percentages of both genders were inclined to conduct MMV and CC with no statistical differences between the two groups (CC 48.0% vs 57.0%, $p=0.1$; MMV 57.0% vs 58%, $p=0.8$). When comparing attitudes to perform CPR among various scenarios within the same gender group, higher proportions of females were more positive to perform MMV for children compared to all other scenarios ($p<0.001$). This was similar among males ($p<0.05$), except when comparing MMV for children and relatives ($p=0.4$).

Trained vs untrained: a comparison of positive attitude towards MMV and CC

Table 4 provides a summary of attitudes towards CPR comparing trained and untrained students. The majority of both

Table 3. Positive attitude towards CPR (answers 'yes')

Item	Male n (%)	Female n (%)	p-value¥
General attitude			
1. I would like to learn and practise CPR encouraged by cultural values and religious beliefs	165 (74.0)	513 (81.0)	0.06
2. I would like to receive CPR by professionals when needed	144 (64.6)	416 (65.7)	0.8
3. I believe that CPR is important and can increase the patients' survival	178 (79.8)	571 (90.2)	<0.001*
4. I have the knowledge and skills to perform CPR	53 (23.8)	134 (21.2)	0.7
5. I have the confidence to perform CPR	106 (47.5)	242 (38.2)	0.1
6. CPR is characterised as being harmful	83 (37.2)	316 (49.9)	0.04*
7. I am afraid of the legal responsibility when performing CPR	69 (30.9)	226 (35.7)	0.5
Providing CC to:			
8. strangers	149 (66.8)	465 (73.5)	0.1
9. relatives	156 (70.0)	511 (80.7)	0.004*
10. children	107 (48.0)	361 (57.0)	0.1
11. other gender	108 (48.4)	425 (67.1)	<0.001*
12. despite infection concerns	131 (58.7)	450 (71.1)	0.007*
Providing MMV to:			
13. strangers	93 (41.7)	160 (25.3)	0.01*
14. relatives	115 (51.6)	231 (36.5)	0.01*
15. children	127 (57.0)	367 (58.0)	0.8
16. other gender	90 (40.4)	165 (26.1)	0.02*
17. despite infection concerns	70 (31.4)	136 (21.5)	0.1

¥ = two-sample test of proportions; * = statistically significant

higher proportions observed among the trained group (85.1% vs 77.6%, $p=0.04$; 92.8% vs 86.1%, $p=0.02$, respectively). Moreover, 35.9% of trained individuals expressed that they believe they have the skills and knowledge to perform CPR. This percentage was significantly higher than that of the untrained group (35.9% vs 18.1%, $p=0.007$). No statistical difference was observed in the remaining items, although higher proportions were observed among trained individuals (except in item 7: fear of legal liabilities).

Furthermore, both groups had considerable proportions of individuals who had positive attitudes to perform CC and MMV, with a higher proportion of trained students with a positive attitude to perform CC to strangers (78.5% vs 69.9%, $p=0.046$) and relatives (84.0% vs 76.3%, $p=0.04$), compared to untrained individuals. There were no statistical differences between trained and untrained students in the remaining scenarios. Despite this, more than half of the participants had positive attitudes, ranging from 56.4% to 70.7% among the trained and 54.2% to 67.1% among the untrained group, with higher percentages of positive attitudes among the trained group. There were also no statistical differences when comparing attitudes to perform MMV between the trained and untrained groups.

Discussion

This cross-sectional study examined the attitude of AHP students about CPR, including the general attitudes towards performing CPR as well as attitudes towards performing CC and MMV in five different potential scenarios. These scenarios included patients of the other gender, strangers, relatives, children and where concerns exist about the risk of infection.

In this study, most of the participants were willing to learn CPR and had a positive attitude towards it. Over half of the participants indicated a lack of confidence and knowledge to perform CPR, even among CPR trained individuals. Also, there were several perceived barriers towards performing CC and MMV including lack of knowledge, confidence and fear of infection (disease transmission).

Recommendations to overcome these barriers may include mandatory short training workshops (less than 30 minutes) (5). This is arguably especially important for medical and healthcare majors (5). These courses can provide hands-on training focussing on hands-only/compressions only CPR, which is highly recommended by the American Heart Association (5,20).

Table 4. Positive attitude towards CPR: Differences between trained and untrained students (answers 'yes')

Item	Trained n (%)	Untrained n (%)	p-value ¥
General attitude			
1. I would like to learn and practise CPR encouraged by cultural values and religious beliefs	154 (85.1)	524 (77.6)	0.04*
2. I would like to receive CPR by professionals when needed	121 (66.9)	439 (65.0)	0.7
3. I believe that CPR is important and can increase the patients' survival	168 (92.8)	581 (86.1)	0.02*
4. I have the knowledge and skills to perform CPR	65 (35.9)	122 (18.1)	0.007*
5. I have the confidence to perform CPR	82 (45.3)	266 (39.4)	0.3
6. CPR is characterised as being harmful	50 (27.6)	107 (15.9)	0.1
7. I am afraid of the legal responsibility when performing CPR	59 (32.6)	236 (35.0)	0.7
Providing CC to:			
8. strangers	142 (78.5)	472 (69.9)	0.046*
9. relatives	152 (84)	515 (76.3)	0.04*
10. children	102 (56.4)	366 (54.2)	0.7
11. other gender	125 (69.1)	408 (60.4)	0.08
12. despite infection concerns	128 (70.7)	453 (67.1)	0.4
Providing MMV to:			
13. strangers	58 (32)	195 (28.9)	0.6
14. relatives	88 (48.6)	258 (38.2)	0.1
15. children	123 (68)	371 (55)	0.2
16. other gender	71 (39.2)	184 (27.3)	0.06
17. despite infection concerns	46 (25.4)	160 (23.7)	0.8

¥ = two-sample test of proportions; * = statistically significant

Such training sessions can also be delivered to school students and teachers across various areas in Jordan. This training can also encourage female participation in initiation of CPR and its importance as well as address risk of disease transmission and legal liabilities concerns.

Furthermore, in the current study, about one-third of participants expressed concerns about legal liabilities. Fear of legal liabilities is a well-known barrier to performing CPR, which may affect the level of confidence and willingness to perform CPR resulting in a decreased rate of bystander CPR affecting the rates of patient survival. Therefore, in Jordan, there is a high need for clear legal legislations specifying the rights, responsibilities, immunity and legal liabilities of rescuers.

Limitations and recommendations

There is no standardised published survey regarding CPR attitudes; however, we adopted the current questionnaire based on the American Heart Association 2015 recommendations regarding CPR training for laypersons. However, an interdisciplinary expert panel (from paramedicine and other allied health science fields) designed and reviewed the questionnaire. The questionnaire was also piloted on 30 AHP students and modified based on their feedback. The study used self-reported measures and was cross-sectional (potential bias reporting). Future studies, including prospective designs, are encouraged to adopt more objective outcome measures. Further studies are recommended to test a designated training program effects on students' knowledge and attitude towards CPR. It is also recommended to explore the allied health professionals' as well as public knowledge and attitude towards CPR in Jordan.

Conclusion

This is the first study in Jordan to explore the attitude towards CPR and willingness to perform CC and MMV among different student groups. There is a great willingness to learn CPR and the majority of participants had a positive attitude towards the benefits of CPR. Females were more willing to perform CC compared to males, whereas males were more likely to deliver MMV, compared to females. More training is recommended to increase the willingness, knowledge, skills and confidence to deliver CPR, even among trained individuals. This may include compulsory courses, mandatory qualification requirements and refresher courses. Clear legislation regarding immunity and legal liabilities of rescuers are needed in Jordan.

Author contributions

Alaa Oteir conceived the study idea, collected the data and conducted the statistical analyses. Alaa Oteir, Khader Almhdawi, Saddam Kanaan, Mahmoud Alwidyan and Brett Williams have made a considerable contribution to the study design, interpretation of results and writing of the manuscript. All authors

have approved the final manuscript.

Competing interests

The authors declare no competing interests. Each author of this paper has completed the ICMJE conflict of interest statement.

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