Original Article

Caregivers' Awareness and Perception of Cardiopulmonary Resuscitation: Our Experience

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Abstract

Introduction: Adverse health-related events such as cardiac arrest can occur at any location: it is broadly classified as out-of-hospital or in-hospital cardiac arrest. The location of cardiac arrest however affects outcome; the actions of caregivers and bystanders may influence the outcome of witnessed out-of-hospital cardiac arrest; therefore, their knowledge of cardiopulmonary resuscitation (CPR) is relevant. **Materials and Methods:** This was a questionnaire-based cross-sectional study conducted at the Paediatric Outpatient Clinic and Paediatric Specialty Clinic of Aminu Kano Teaching Hospital. **Results:** There were 120 (33.3%) males and 240 (66.7%) females, with a male-to-female ratio of 1:2. Only 57 (15.8%) respondents were aware of CPR. However, 69 (19.2%) respondents were aware of chest compression. One hundred and twenty-nine (35.8%) respondents reported that they could perform mouth-to-mouth resuscitation on their own children; however, 66 (18.3%) respondents reported willingness to perform mouth-to-mouth resuscitation on another person's child if the need arose. Only 15 (4.2%) respondents had training on CPR. Six (40%) respondents were trained at school. However, caregivers in the chronic illness subgroup were more willing to perform mouth-to-mouth resuscitation. Caregivers of children with acute illnesses would use palm kernel oil to treat convulsion; however, those of the chronic illness group would mostly use herbs to treat convulsion; this observation was statistically significant (Fisher's exact test = 32.457, $P = 0.00$). **Conclusion:** There was poor awareness of CPR among respondents; furthermore, there was lack of willingness to perform CPR by most respondents on children.

Keywords: Acute illness, cardiopulmonary resuscitation, caregivers, children, chronic illness

Introduction

Adverse health-related events such as cardiac arrest can occur at any location: it is broadly classified as out-of-hospital or in-hospital cardiac arrest. The location of cardiac arrest however affects outcome; most studies from developed countries (with effective and efficient health-care delivery system) on out-of-hospital cardiac arrest have been associated with dismal outcome; these are often attributed to delays in commencing effective resuscitation by bystanders before arrival of the emergency medical service.[1-5] Therefore, efforts have been made in such settings to improve the knowledge base of laymen on the basic tenants of resuscitation, such as the conventional cardiopulmonary resuscitation (CPR) and the chest compression-only CPR.[3-6] However, in most resource-limited settings, these networks or chains of emergency services are not readily available; therefore, a good knowledge base of CPR by laymen may save lives before transporting patients to health facilities. Therefore, this study hopes to determine the awareness, acceptability of the practice of CPR, and willingness to perform CPR during an emergency setting by caregivers.

Materials and Methods

This was a cross-sectional study conducted at the Paediatric Outpatient Clinic and Paediatric Specialty Clinic of Aminu Kano Teaching Hospital. Three-hundred and sixty caregivers of children with acute and chronic morbidities (180 each) were enrolled between May and July, 2017. Caregivers of children with acute and chronic morbidities were matched for age, sex, educational qualification, social class, and number of children.

From a prevalence of willingness to perform CPR on children by caregivers of 75.8% as reported by Cu *et al*.[7] and using

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the Cochran formula (Z^2xpq/d^2),[8] the sample size calculated for population <10,000 ($n/1+n/N$)[8] was 180; based on a target population of 480 caregivers of children with chronic morbidities recruited from the Specialty Clinic for the 6-week study period. They were equally matched by caregivers of children with acute morbidity recruited from the Paediatric Outpatient Clinic. A systematic random sampling method was adopted for patient recruitment, with one in every three caregiver being recruited.

Survey tool

The questionnaire was developed in English and it contained 17 questions which were closeended questions. This questionnaire was pretested on 19 volunteers and an internal consistency with Cronbach's alpha value of 0.75 was derived. It was administered by the researchers and trained medical doctors who served as research assistants. It contained relevant information such as age, sex, educational status of the caregiver, their awareness, willingness to perform, and acceptance of CPR.

Permission to conduct the study was obtained from the Research and Ethics Committee of Aminu Kano Teaching Hospital, Kano.

Inclusion criteria for caregivers who have children with acute illness

All caregivers whose children presented with acute illness to the Paediatric Outpatient Department and whose children did not have any background chronic disease such as sickle cell anemia, asthma, cerebral palsy, and epilepsy, congenital and acquired heart disease, and chronic kidney disease.

Exclusion criteria for caregivers who have children with acute morbidity

Caregivers who declined consent for the study.

Inclusion criteria for caregivers who have children with chronic morbidity

All caregivers whose children presented with chronic illnesses at Specialty Clinic. These included caregivers whose children have sickle cell anemia, asthma, cerebral palsy, epilepsy, congenital and acquired heart diseases, and chronic kidney disease.

Exclusion criteria for caregivers who have children with chronic morbidity

Caregivers who declined consent for the study.

Definition of terms

Acute illness was defined as any illness of sudden onset and of short duration lasting for days;[9,10] while chronic illness lasts for weeks, months, or years.[11]

Data analysis

All data obtained were analyzed using the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) version 16. Qualitative variables such as gender and educational qualification were summarized as frequencies and percentages, while quantitative variables such as age were summarized as means and standard deviations. The Chi-square test and Fisher's exact test of significance were used to compare qualitative variables and $P < 0.05$ was considered statistically significant.

Results

There were 120 (33.3%) males and 240 (66.7%) females, with a male-to-female ratio of 1:2. Their ages were stratified into <20 years (36, 10%), 20–40 years (312, 86.7%), and more than 40 years (12, 3.3%). One hundred and twenty (33.3%) respondents had primary school education, 156 (43.3%) had secondary school education, 60 (16.7%) had tertiary qualification, while 24 (6.7%) had no formal education. The clinic distributions were as follows: hematology 87 (48.3%), neurology 36 (20.0%), cardiology 33 (18.3%), respiratology 21 (11.7%), and three (1.7%) cases from the nephrology clinic.

Sixty-three (17.5%) out-of-hospital emergencies were reported by the respondents. Fifty-seven (15.8%) respondents were aware of CPR, while 303 (84.2%) were not. However, 69 (19.2%) respondents were aware of chest compression and 291 (80.8%) were not. Eighty-seven (24.2%) were aware of mouth-to-mouth resuscitation, while 273 (75.8%) were not. One hundred and twenty-nine (35.8%) respondents reported that they could perform mouth-to-mouth resuscitation on their children, while 231 (64.2%) would not. However, 66 (18.3%) respondents reported willingness to perform mouth-to-mouth resuscitation on another person's child if the need arose, but 294 (81.7%) would decline. Only 15 (4.2%) respondents had training on CPR. Among them, 6 (40%) were trained at school, 3 (20%) at the hospital, three (20%) at basic life support (BLS) program, and 3 (20%) from the mass media. All reported the training to be beneficial.

Out-of-hospital emergencies were more common among those with chronic morbidities, though this observation was not statistically significant (*$\chi^2 = 1.443$, df = 1, $P = 0.337$); most respondents in both groups were not aware of CPR and performance of chest compression during CPR, though these observations were not statistically significant ($^{\dagger}\chi^2 = 0.563$, df = 1, $P = 0.618$ and $^{\ddagger}\chi^2 = 0.484$, df = 1, $P = 0.643$) [Table 1].

Most caregivers were unaware of mouth-to-mouth ventilation and were also unwilling to perform mouth-to-mouth ventilation on either their wards or other people's children in the event of an emergency; however, caregivers in the chronic illness subgroup were more willing to perform mouth-to-mouth resuscitation, but these observations were not statistically significant (*$\chi^2 = 1.137$, df = 1, $P = 0.394$; $^{\dagger}\chi^2 = 1.776$, df = 1, $P = 0.253$; and $^{\ddagger}\chi^2 = 0.223$, df = 1, $P = 0.814$). Furthermore, none of the caregivers in the acute illness subgroup had training on CPR, but only 15 caregivers in the chronic illness subgroup were trained on CPR; this observation was statistically significant (§Fisher's exact test = 5.217, $P = 0.029$) [Table 2].

Application of palm kernel oil and taking the child to hospital were the most common actions proffered by caregivers

Table 1: Out-of-hospital emergencies and awareness of cardiopulmonary resuscitation among caregivers

	Out of hospital*			CPR?†			Comp?‡		
	Acute illness (%)	Chronic illness (%)	Total	Acute illness (%)	Chronic illness (%)	Total	Acute illness (%)	Chronic illness (%)	Total
Yes	24 (13.3)	39 (21.7)	63	24 (13.3)	33 (18.3)	57	30 (16.7)	39 (21.7)	69
No	156 (86.7)	141 (78.3)	297	156 (86.7)	147 (81.7)	303	150 (83.3)	141 (78.3)	291
Total	180 (100.0)	180 (100.0)	360	180 (100.0)	180 (100.0)	360	180 (100.0)	180 (100.0)	360

*χ^2=1.443, df=1, *P*=0.337; †χ^2=0.563, df=1, *P*=0.618; ‡χ^2=0.484, df=1, *P*=0.643. CPR: Cardiopulmonary resuscitation

Table 2: Willingness to perform cardiopulmonary resuscitation by caregivers

	Mouth?*			Perform?†			Child?‡			Train?§		
	Acute illness (%)	Chronic illness (%)	Total	Acute illness (%)	Chronic illness (%)	Total	Acute illness (%)	Chronic illness (%)	Total	Acute illness	Chronic illness	Total
Yes	36 (20.0)	51 (28.3)	87	75 (41.7)	54 (30)	129	36 (20.0)	3 (16.7)	69	0	15	15
No	144 (80.0)	129 (71.7)	273	105 (58.3)	126 (70)	231	144 (80.0)	15 (83.3)	294	180	165	345
Total	180 (100.0)	180 (100.0)	360	180 (100.0)	180 (100)	360	180 (100.0)	180 (100.0)	360	180	180	360

*χ^2=1.137, df=1, *P*=0.394; †χ^2=1.776, df=1, *P*=0.253; ‡χ^2=0.223, df=1, *P*=0.814; §Fishers exact test=5.217, *P*=0.029

of children with acute illness in the event their child have convulsion; however, those of the chronic illness group would mostly use herbs and also would take their children to hospital during convulsion; this observation was statistically significant (*Fisher's exact test = 32.457, *P* = 0.00); however, sprinkling of water on the child's body and also taking the child to the hospital were the two common responses observed among caregivers in both groups, in the event their children stopped breathing or lost consciousness, but these observations were not statistically significant for the response to the question on breath cessation (†Fisher's exact test = 8.412, *P* = 0.192), but this was statistically significant for the response to the question on loss of consciousness (‡Fisher's exact test = 15.061, *P* = 0.004) [Table 3].

Majority of respondents whose children had acute or chronic illnesses were not aware of CPR, chest compression in CPR, or mouth-to-mouth resuscitation in CPR; however, these observations were not statistically significant (*Fisher's exact test = 1.105, *P* = 0.881, †Fisher's exact test = 0.843, *P* = 0.955, ‡Fisher's exact test = 3.179, *P* = 0.363; and **Fisher's exact test = 0.873, *P* = 0.919, ††Fisher's exact test = 1.809, *P* = 0.621, ‡‡Fisher's exact test = 2.194, *P* = 0.538). However, when asked on willingness to perform mouth-to-mouth ventilation on their children, majority of respondents in the acute illness category who had tertiary educational qualification and those without formal education were willing to perform mouth-to-mouth ventilation on their wards and this observation was statistically significant (§Fisher's exact test = 7.401, *P* = 0.04); however, those in the chronic illness group were not willing to perform except among those without formal education who had equal representations, though this observation was not statistically significant (§§Fisher's exact test = 1.391, *P* = 0.786). Furthermore, most respondents will not perform mouth-to-mouth ventilation on another person's child; however, these observations were not statistically

Table 3: Comparing the form of illness and caregivers response to common emergencies

Illness	Water	Fan	Milk	Herbs	Kernel	Hospital	Ventilate	Total
Convulse*								
Acute	27	27	9	24	42	45	6	180
Chronic	6	6	0	45	9	114	0	180
Total	33	33	9	69	51	159	6	360
Breathing†								
Acute	63	12	9	6	18	72	0	180
Chronic	72	12	0	12	9	69	12	180
Total	135	24	9	18	27	135	12	360
Unconscious‡								
Acute	102	6	9	15	24	24	0	180
Chronic	108	12	0	3	3	54	0	180
Total	210	18	9	18	27	78	0	360

*Fisher's exact test=32.457, *P*=0.00; †Fisher's exact test=8.412, *P*=0.192; ‡Fisher's exact test=15.061, *P*=0.004

significant (‖Fisher's exact test = 8.124, *P* = 0.34 and ‖‖Fisher's exact test = 3.781, *P* = 0.248) [Table 4].

Only 15 caregivers had training on CPR, but none in the tertiary group had training on CPR; this observation was statistically significant (Fisher's exact test = 6.786, *P* = 0.035) [Table 5].

Sprinkling of water on their children and taking them to hospital were the two most common actions respondents would initiate if their children stopped breathing; this was observed across all the groups irrespective of their educational qualification and stratification of illness. However, initiation of ventilation before taking the child to hospital was reported only among those whose children had chronic illnesses, though these observations were not statistically significant (*Fisher's exact test = 15.778, *P* = 0.273 and †Fisher's exact test = 14.564, *P* = 0.372). Similarly, use of water and taking the child to hospital were the two common responses if the

Table 4: Comparing the educational qualifications of caregivers and their awareness and willingness to perform cardiopulmonary resuscitation during emergencies

Acute illness	CPR?*			Com?†			Mouth?‡			Perf?§			Others?‖		
	Yes	No	Total	Yes	No	Total	Yes	No	Total	Yes	No	Total	Yes	No	Total
Education															
Primary	6	54	60	12	48	60	12	48	60	18	42	60	24	36	60
Secondary	12	66	78	12	66	78	12	66	78	27	51	78	6	72	78
Tertiary	6	24	30	6	24	30	12	18	30	18	12	30	6	24	30
None	0	12	12	0	12	12	0	12	12	12	0	12	0	12	12
Total	24	156	180	30	150	180	36	144	180	75	105	180	36	144	180
Chronic illness	**CPR?****			**Com?††**			**Mouth?‡‡**			**Perf?§§**			**Others?‖‖**		
	Yes	No	Tot	Yes	No	Tot	Yes	No	Tot	Yes	No	Tot	Yes	No	Tot
Education															
Primary	12	48	60	18	42	60	21	39	60	18	42	60	9	51	60
Secondary	12	66	78	15	63	78	18	60	78	24	54	78	21	57	78
Tertiary	6	27	30	3	27	30	6	24	30	6	24	30	0	30	30
None	3	3	12	3	9	12	6	6	12	6	6	12	0	12	12
Total	33	147	180	39	141	180	51	129	180	54	126	180	30	150	180

*Fisher's exact test=1.105, *P*=0.881, †Fisher's exact test=0.843, *P*=0.955, ‡Fisher's exact test=3.179, *P*=0.363, §Fisher's exact test=7.401, *P*=0.04, ‖Fisher's exact test=8.124, *P*=0.34, **Fisher's exact test=0.873, *P*=0.919, ††Fisher's exact test=1.809, *P*=0.621, ‡‡Fisher's exact test=2.194, *P*=0.538, §§Fisher's exact test=1.391, *P*=0.786, ‖‖Fisher's exact test=3.781, *P*=0.248. CPR: Cardiopulmonary resuscitation, Com: Chest compression, Mouth: Mouth-to-mouth ventilation, Perf: Perform

Table 5: Comparing the education qualification of caregivers with training on cardiopulmonary resuscitation

	Trained in CPR?			*P*
	Yes	No	Total	
Education				
Primary	6	54	60	0.035
Secondary	3	75	78	
Tertiary	0	30	30	
None	6	6	12	
Total	15	165	180	

CPR: Cardiopulmonary resuscitation

child would lose consciousness and these observations were not statistically significant (‡Fisher's exact test = 15.909, *P* = 0.252 and §Fisher's exact test = 9.982, *P* = 0.777) [Table 6]. Use of kernel oil and taking the child to hospital were the two common responses observed among caregivers of children with acute morbidity when asked on their action if their children had convulsion; however, those with primary school education also reported fanning their children as their preferred action in the event of convulsion; however, this observation was statistically significant (‖Fisher's exact test = 35.394, *P* = 0.00). Use of herbs and taking the child to hospital were the two most common responses observed among caregivers of children with chronic morbidity when asked on their action if their children had convulsion; however, this observation was not statistically significant (¶Fisher's exact test = 8.645, *P* = 0.795) [Table 6].

Discussion

The chance of survival of a child having out-of-hospital cardiopulmonary arrest has been shown to increase if they were witnessed; this is further increased if the witnessing bystander or caregiver is trained in CPR;[12,13] therefore, caregivers who are most likely to be witnesses should be trained on BLS. The American Heart Association (AHA) recommends that at least 20% of adults need proficiency in CPR to significantly improve the outcome of out-of-hospital cardiac arrest.[14]

Majority of respondents in our study were not aware of CPR; therefore, they were untrained, this observation was similar to that reported by Swor *et al*.,[13] though their patients had better awareness of CPR unlike in our case. Cu *et al*.[7] reported that 53% of respondents in their study had received training on CPR, while only 4.2% of respondents in our study had training on CPR. Prior knowledge of CPR has been reported to improve self-confidence in performing CPR during emergency.[15,16] This means that health-care providers should have it as a duty to train caregivers on BLS activities, especially caregivers of children with chronic morbidity who are at greater risk; therefore, efforts should be channeled toward achieving the desired goal of efficient CPR by their caregivers. Amazingly, majority of respondents in our study were not willing to perform mouth-to-mouth ventilation on their own children, unlike that reported by Cu *et al*.,[7] where 81% of the respondents were willing to perform CPR on their children. Similar to their report, there was less desire to perform CPR on strangers in our study. Lack of basic knowledge of CPR may be responsible for unwillingness to perform CPR. Possibly, the fear of contacting infection during mouth-to-mouth resuscitation may account for poor acceptance. Therefore, the AHA guideline which recommended chest compression-only resuscitation, especially by bystanders who lacked complete knowledge of CPR, was timely.

Table 6: Comparing the educational qualification, classification of illness, and common actions taken during emergencies

	Acute								Chronic						
	Breathing*								Breathing†						
	Water	Fan	Milk	Herb	Kernel	Hospital	Ventilation	Total	Water	Fan	Herbs	Kernel	Hospital	Ventilation	Total
Primary	24	0	0	0	12	24	0	60	15	3	6	3	30	3	60
Secondary	27	6	9	6	6	24	0	78	33	9	6	6	21	3	78
Tertiary	12	6	0	0	0	12	0	30	21	0	0	0	9	0	30
None	0	0	0	0	0	12	0	12	3	0	0	0	3	6	12
Total	63	12	9	6	18	72	0	180	72	12	12	9	63	12	180
	Unconscious‡								Unconscious§						
Primary	42	0	0	0	12	6	0	60	30	3	3	0	24	0	60
Secondary	30	6	9	15	6	12	0	78	54	6	0	3	15	0	78
Tertiary	18	0	0	0	6	6	0	30	18	3	0	0	9	0	30
None	12	0	0	0	0	0	0	12	6	0	0	0	6	0	12
Total	102	6	9	15	24	24	0	180	108	12	3	3	54	0	180
	Convulse‖								Convulse¶						
Primary	12	27	0	3	12	6	0	60	3	3	15	0	39	0	60
Secondary	9	0	9	21	18	15	6	78	3	3	24	9	39	0	78
Tertiary	6	0	0	0	12	12	0	30	0	0	3	0	27	0	30
None	0	0	0	0	0	12	0	12	0	0	3	0	9	0	12
Total	27	27	9	24	42	45	6	180	6	6	45	9	114	0	180

*Fisher's exact test=15.778, *P*=0.273, †Fisher's exact test=14.564, *P*=0.372, ‡Fisher's exact test=15.909, P=0.252, §Fisher's exact test=9.982, *P*=0.777, ‖Fisher's exact test=35.394, *P*=0.00, ¶Fisher's exact test=8.645, *P*=0.795

There was no significant difference between the demographic characteristics of respondents of this study group and their knowledge, perception, and behavior towards CPR; a similar observation was reported by Marco *et al*.[17]

Common home remedies patronized by caregivers when their wards were ill were palm kernel oil and herbs for those in the acute illness and chronic illness groups, respectively, though both groups agreed taking their children to the nearest hospital was appropriate. Palm kernel oil is extracted from the nut inside the seed of the palm tree (*Elaeis guineensis*); it is an emollient and has found its usefulness for moisturizing the skin.[18] Its use is prevalent among mothers, especially in the eastern part of Nigeria; it is believed to have medicinal properties treating stomach ailment and convulsion; and its efficacy has not been scientifically proven. However, a Cameroonian study had reported skin rashes in children following its use, which they attributed to *Candida albicans* contamination of the oil.[19]

The desire to initiate assisted ventilation was noticed mostly among caregivers of children with chronic morbidity; this may be attributed to their prior experiences because most out-of-hospital adverse events warranting resuscitation occurred among their wards.

Development of programs which will improve their knowledge of CPR should be encouraged. Caregivers of children with chronic morbidity have greater contact with health providers; this should be an opportunity to actively engage them in BLS training. Sunde *et al*.[20] in their report advocated mass distribution of calendars with algorithm on steps to manage common emergencies in children; other modalities include certifying driver license holders, government employees, and company staffs on BLS, this should be made mandatory. The media should also be in the forefront, and education of the populace on the usefulness and the need for voluntary training on CPR should be highlighted.

Conclusion

There was poor understanding, acceptance, and performance of CPR by respondents in this study, and this observation was most among respondents who had children with acute illnesses. Therefore positive efforts should be made to improve the knowledge of CPR among caregivers.

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Conflicts of interest

There are no conflicts of interest.

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