Impact of Paediatric Life Support Courses on Knowledge, Decision-Making and Confidence Level among Healthcare Workers in Saudi Arabia

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Abstract

Background: Healthcare practitioners are expected to have adequate knowledge of PALS guidelines to resuscitate critically ill children.

Objective: This study aims to evaluate the HCWs knowledge of PALS, to evaluate the decision-making skills, as well as to assess self-reported confidence of HCWs in managing life threatening scenarios.

Methods: A cross sectional, survey-based study was conducted between January - April 2016, at king Khaled University Hospital, Riyadh, Saudi Arabia among health care workers (HCWs) who are working at different paediatrics areas using a pretested self-administered questionnaire. The questionnaire included demographic and background questions, common abnormal electrocardiogram ECG rhythm, two sets of different clinical scenarios and questions of the respondent's insights regarding the life support training programs. It was electronically announced to HCWs in different paediatrics areas. Statistical analysis was performed using SPSS software. Logistic regression, Chi-Square test, Students t-test and Multiple regression analysis were applied.

Results: Out of 143 participants (58% nurses and 42% physician) only 45.5% had PALS certification within the past 2 years, followed by 23.8% who were certified more than two years ago and 30.8% never had PALS certification. The overall mean Knowledge percentile score for this sample was 46.2%. Males Tended to have higher score than females, Similarly, physician scores were higher compared to the nurses. None the less, HCW's age groups, levels of experience and their working area (critical care versus none) showed no significant impact on their knowledge score. However, there was no differences on the PALS knowledge score between the levels of recent PALS certification time. Nevertheless, a downward trend in the mean knowledge score as people's time of most recent PALS went from most recent to the farthest, their overall mean score tended to decline. The overall responders' self-confidence to participate in CPR as a team member was 6.4 on a 10-point scale.

Conclusion: The results suggest that HCWs who is working in paediatrics areas in our hospital had poor knowledge of PALS guidelines. Besides, they were not very confident to resuscitate critical children. Therefore, the factors that might influence knowledge acquisition and self confidence among HCWs should be further studied.

Keywords: Paediatric Advanced Life Support; Knowledge PALS; Health Care Workers HCWs; Self-Confidence; Cardiopulmonary Resuscitation

Introduction

Although cardiac arrest is quite uncommon event among pediatric population, it is associated with unfavourable outcomes as reported by many studies conducted worldwide [1-5]. Unlike in Western countries, the incidence and outcomes of paediatric cardiac arrest in our area are not well described in the literature. However, A twenty-three child suffered a cardiopulmonary arrest in out of hospital settings included in recent study performed in Riyadh, Saudi Arabia in whom none of them succeed to return to spontaneous circulation [6]. De-

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spite the small sample size, the findings are highly support the other studies' conclusion of poor survival rates in cardiac arrest victims. Prevention, early recognition and intervention are believed to be a cornerstone in tackling this problem and decrease its consequences on the individual and population level. Preparing HCWs to provide professional life saving actions to children who are experiencing cardiac arrest, became a universal objective. Therefore, many training courses of pediatrics cardiopulmonary resuscitation have been established. PALS, Pediatric BLS and NRP, PFCCS are a training courses offered by the American heart association, targeting all HCWs. PALS is a 2-day course introduced by the AHA and AAP in the late 1980s and was initially introduced in KSA by KSU Medical City, is designed to impact the HCWs knowledge and practical skills to provide professional life saving actions to critically ill and injured child. Many studies demonstrated a significant improvement in the health worker's (physicians, paramedics, nurses and residents) knowledge about cardiac arrest evaluation, management and PALS algorithms [7-12]. Despite the improvement, there is no change in the mortality rate after taking the course [7]. The results of these training courses depend on many factors such as the quality, structure and the way of delivering the material [13]. Furthermore, the information is not sustained and the progress in the technical skills are not as expected [13]. Studies have shown rapid decrease in the knowledge within months from taking the course [11,12,14]. Profession, Years of experience and age are some factors that may have a direct impact on the level of knowledge, skills and confidence of the health practitioner during the cardiac arrest code [15]. In addition, self-perception to participate in such events may impact the quality of care deliver. Several studies show low level of confidence among health care providers to participate in cardiopulmonary resuscitation. Nevertheless, the self-confidence seemed to be higher in those who certified with PALS course. In the literature, there is no report about the effectiveness of these courses in our area and about the retention of the knowledge and level of confidence for health practitioners after taking the Advance Life Support Courses in Saudi Arabia. The purpose of this study was to assess the life-support knowledge among Healthcare Workers (HCWs) who are taking care of children at KKUH, as well as, to evaluate the decision-making skills and ability among KKUH Paediatric HCWs. assess self-reported confidence of HCWs in managing life threatening scenarios is one of our objectives. To explore factors that may affect the knowledge, decision- making skills and confidence levels in relation to life-support among Pediatric HCWs.

Methodology

Study design and setting

This is a cross sectional, survey-based study conducted between January - April 2016 among health care providers who are taking care of children at KKUH, a tertiary-care teaching hospital in Riyadh, Saudi Arabia.

Participants

Our target sample included all the KKUH's healthcare workers who are working at Pediatric inpatient, outpatient, intensive care and emergency services. We used random sample distribution with type 1 error (a margin of error set at 5% and confidence interval set at 95%), given the target population around 500 healthcare workers; we aimed to obtain around 220 responses from physicians and nurses working in the Department of Pediatrics.

Questionnaire distribution

An electronic survey established Using online survey tool (Survey Monkey) presented to the participants throw tablet computers.

Survey instrument

Data collection was accomplished using an anonymous, self-administered electronic questionnaire of pilot-validated questions in the English language. the questionnaire consisted of 4 main domains. The first domain covered demographic and background questions surveyed age, gender, Clinical Role, working area and the Years of experience in pediatric care. The first domain also included questions regarding the respondent's Last PALS Certification, other than PALS, other Life Support courses, the time of the last academic activity attended on Pediatric Life Support, as well as, the time of the last real code they have attended and if they had done so, they were asked to specify their role whether they were team Leader or member in that CPR. Besides, the clinicians were asked to select from multiple desired attributes/traits for an effective PALS team leader.

The second part designed to figure whether the participants can correctly identify common abnormal ECG rhythm (SVT and Torsades Pointes), whether if they were familiar with the fastest way to gain access for medication during an CPR, as well as the best method of assessment for evaluating the effectiveness of ventilation during an ongoing CPR.

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The third section of the survey contained two sets of different clinical scenarios designed in variable acceptable difficulty level. General and cardiac scenarios were administered in which the clinician's knowledge on various EKG, clinical decision making, CPR and actual pediatric CPR information was assessed in order to measure their retained knowledge on pediatric life support. The best correct questions were predefined based on the American Life Support Association Guidelines and each clinicians' responses were marked with one mark for each correctly answered question and the overall percentage out of a maximum hundred percent was computed. These scenarios are displayed in the appendix 1.

The final part of the survey included questions of the respondent's insights regarding the life support training programs. HCWs were asked to rate their own confidence levels on a confidence scale between one and ten with ten denoting very confident on three main concepts (confidence to be a CPR team leader, confidence to be a CPR team member and confidence to continue assuming the role of a team leader for an ongoing CPR if another senior physician arrives late and interferes with the commands.

Statistical analysis

Statistical data analysis performed by using SPSS software. For all tests statistical significance set at $p < 0.05$. Descriptive statistics (mean, standard deviation and percentages) were used to summarize the data. Logistic regression and Chi-Square test were applied to compare the distribution of response of Qualitative Variables. Students t-test for independent sample was used to compare the mean values of continues variables. Multiple regression analysis conducted to see if the relation is significant while controlling for other possible confounders.

Ethical statement

All participants informed about the aim of the study and its voluntary nature. We obtained each candidate consent for participation before starting the Survey (Page 1 in the Survey). No personal identifiers had been included. the study was approved by the Institutional Review Board of the College of Medicine, King Saud University, Riyadh, Saudi Arabia, and the study conducted in accordance with the declaration of Helsinki for human studies.

Result

Health care workers sociodemographic and general background characteristics

One-hundred and forty-three Health Care workers fulfilled the questionnaire (response rate:65%). Among the respondents, only 65 (45.5%) had renewed their PALS certificate within a two-year prior to survey, those were followed by another 34 (23.8%) who had their certificates more than three years prior to survey, and the rest 44 (30.8%) responded they had never had any PALS certification. Moreover, 27 (18.9%) responded they have never attended any pediatric life support academic activity within their career time, followed by another 30 (21%) of them who responded they attended a course within a month time span, but the remainder responded they had attended some activities between one months to one year prior to survey (33.6%), one to two years prior to survey (15.4%) and few (11.2%) responded they had attended some pediatric life support academic activity more than two years prior to survey. The sociodemographic and general background data of the participants demonstrated in table 1.

Figure 1 shows other pediatric life support courses of the HCWs. nearly half of the participants (53.3%) certified with BLS, another 19% responded that they had the NRP course, with another 11.8% certified with PFCCS courses, but even less had the APLS course (8.2), very few of them responded they had ACLS (3.9%) and the ATLS (3.3%).

Besides, 42% responded it was less than a month ago, followed by another 32.9% who attended a CPR between a month to two years prior to survey, and the remainder of them either attended a real CPR more than three years ago (11.2%) or had never attended a CPR at all (14%). Furthermore, the majority (72%) responded they were a CPR team member, fewer of them (19.6%) undertaken a mixed role of either being a team leader or a member, the rest (19.6%) responded they worked as a team leader role (8.4%).

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	Frequency	Percentage
Sex		
Female	103	72
Male	40	28
Age		
=<40 Years	94	65.7
>= 41 Years	49	34.3
Clinical Role		
Physician	60	42
Nurse	82	58
Working area		
Non-Critical Care	60	42
Critical Care	83	58
Experience Years		
2 Years or less	23	16.1
3 - 5 Years	35	24.5
6 - 10 Years	38	26.6
> 10 Years	47	32.9
Last PALS certification		
Within the past 2 Years	65	45.5
More than two years ago	34	23.8
Never Had PALS	44	30.8
Other than PALS, when was the last academic activity attended on Pediatric Life Support		
Never attended such PALS courses	27	18.9
Less than a Month ago	30	21
> One Months to One Years ago	48	33.6
One to Two Years	22	15.4
> Two Years Ago	16	11.2

Table 1: *Sociodemographic and general characteristics of the HCWs (n = 143).*
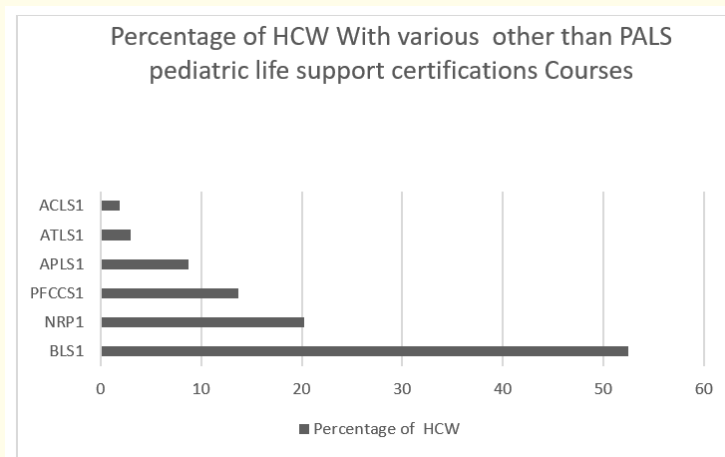
Figure 1: *Other pediatric life support courses of the HCWs.*

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Last Real Code You've attended	Frequency	Percentage
Less than One Month ago	60	42
More than a month to Two years	47	32.9
> Three years ago	16	11.2
Never attended to a Pediatric CPR	20	14
What was your Role in that CPR?		
Team Leader	12	8.4
Either Team Leader or Team Member	28	19.6
Team Member	103	72

Table 2: Last Real Code attended and their role in that CPR.

Pediatric advance life support Knowledge score

	% Incorrect Answers	% Correct Answers
EKG Rhythm: SVT	55.2	44.8
EKG Rhythm: Torsades Pointes	59.4	40.6
EKG Rhythm: Pulseless Electrical Activity	67.1	32.9
The fastest way to gain access for medication administration during CPR is Intraosseous Access	52.4	47.6
To evaluate for effective ventilation during CPR, you should assess Rise and fall of the chest with ventilation	10.5	89.5
The lowest acceptable Systolic BP for 6-month-old infant is (70 mmHg)	51.7	48.3
Clinical Scenario-1	44.1	55.9
Clinical Scenario-2	51	49
Clinical Scenario-3	40.6	59.4
Clinical Scenario-4	76.2	23.8
Clinical Scenario-5	53.1	46.9
Clinical Scenario-6	69.9	30.1
Clinical Scenario7-EKG intervention1 SVT	63.6	36.4
Clinical Scenario8-EKG intervention2	62.9	37.1
Clinical Scenario9 -EKG intervention3	45.5	54.5
Clinical Scenario-10	57.3	42.7
Clinical Scenario-11	54.5	45.5
Clinical Scenario-12	53.1	46.9

Table 3: Percentages of HCW's who correctly and incorrectly answered to each PALS knowledge question.

The overall mean Knowledge percent for this sample was 46.2% out of a 100%. We provide detailed information on the percentages of clinicians who correctly and incorrectly answered the questions related to participants knowledge in table.

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An SVT Rhythm displayed as an Image was incorrectly identified by 55.2% of the HCW's. Similarly, an EKG Rhythm showing A Torsades de Pointes was incorrectly identified by 59.4% of the participants. In the same manner, an EK rhythm displaying a Pulseless Electrical Activity (PEA) with information suggesting a No pulse or perfusion signs was correctly identified by only 32.9% of the HCW's. Likewise, only 46.6% identify the Intraosseous route as the fastest way to gain access in case of difficult IV route in CPR. Moreover, 89.5% knew that the rise and fall in the chest wall is the best assessment sign of effective ventilation during CPR. Nonetheless, only 48.3% of HCWs correctly responded with the correct lowest acceptable Systolic BP for 6-month-old infant. However, for the first scenario in which an admitted infant with cardiomyopathy Suddenly developed ventricular fibrillation, 55.9% of the HCWs correctly answered with Start high-quality CPR and immediate defibrillation as the best immediate action to improve his outcome. For the second clinical scenario, 49% of respondents failed to identify the best immediate action in case no pulse detected when CPR is interrupted in a 2-year-old girl, even though ECG monitor shows sinus rhythm. Likewise, a case of 2-year-old boy brought to ER after 2 days history of been sick with a fever, diarrhea and vomiting, the majority (59.4%) of respondents were aware of the correct assessment. As well, a scenario of asthmatic 8-year-old boy presented with the classical findings suggested Respiratory Failure, only (23.8%) were able to identify the correct diagnoses. For the same scenario, 46.9% were able to correctly identify the optimal desired level of O_2 saturation for the above condition. For the same scenario as well, the condition deteriorated as the child became unresponsive and his respiratory rate dropped to 5/min as will his pulse oximetry falls to 65%, unfortunately 96.9% of the HCW's failed to identify the correct next steps. In the same manner, an SVT cardiac rhythm is seen on the cardiac monitor with classical clinical presentation of SVT, the majority (63.6%) incorrectly responded with inappropriate measures/ interventions. Another scenario displayed an EKG Rhythm showing unstable Ventricular Tachycardia and suggested that 10 years boy presented with lethargy and palpitation. On examination he looks very pale with poor capillary refill, weak pulses and hypotensive, only (37.1%) responded correctly with the best next interventions.

For the clinical scenario of a 5 years old girl post tonsillectomy developed pulseless arrest with Ventricular Fibrillation rhythm, the majority (54.5%) answered appropriately with the desired next action. Only (42.7%) correctly answered with the appropriate set of interventions in the next clinical scenario of an infant with a history of vomiting and diarrhea with hypovolemic shock manifestation and hypoglycemia. Next, for the clinical scenario of agitated 2-year-old girl with mild stridor and SpO_2 of 91% in room air, as well as sub costal and intercostals retractions with transmitted upper airway sounds on Lung auscultation, the MOST appropriate initial therapeutic intervention was identified by only 45.5% of the respondents. Finally, the last clinical scenario presented a child with classic picture of left sided tension Pneumothorax after a Motor Vehicle Accident and 53.1% of the HCW's failed to identify the immediate best interventions.

Life support training insights

	Mean (S.D)	Median	1st Percentile	3rd Percentile
Confidence as a Team Member in CPR	6.2 (1.5)	6.06	5.00	7.00
Confidence as a Team Leader In CPR	5.8 (1.7)	5.81	5.00	7.00
Confidence to Remain as a Leader for a CPR	5.5 (1.8)	5.13	4.00	7.00

Table 4: Descriptive statistics for HCWs overall Perceptions of CPR leadership and team playing. N = 143.

In brief, their overall mean confidence as a team member was rated with 6.2 points out of maximum 10 points, denoting they were approximately 62% confident. Besides, their overall mean confidence as a team leader was rated with 5.8 points out of maximum 10 points, denoting they were on average 58% confident. However, their willingness to continue as a CPR team leader in light of interference from another late-arriving senior physicians was not too different, their overall mean confidence was rated with 5.5 points out of maximum 10 points, denoting they were half way to being very confident to sustain a leadership role in such scenario.

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Determining factors affecting the knowledge scores

	Knowledge score		
	Mean (SD)	**Test Statistic**	**p**
Sex			
Female	41 (22.6)	t (141) = 4.1	< 0.001
Male	59.1 (24.6)		
Age			
< = 40 Years	45.6 (24.5)	t (141) = 0.34	0.739
> = 41 Years	47 (24.5)		
Experience			
2 Years or less	42.3 (28.2)	f (3,139) = 1.74	0.161
3 - 5 Years	52.5 (20.8)		
6 - 10 Years	40.6 (24.2)		
> 10 Years	47.9 (24.4)		
Clinical Role			
Nurse	42.2 (20.6)	t (141) = 2.2	0.03
Physician	51.7 (28.2)		
Clinical Area			
Non-Critical Care Areas	43.4 (24.5)	t (141) = 1.5	0.251
Critical Care Areas	48.2 (24.3)		
Last PALS Certification			
Within the past 2 Years	50 (26.1)	f (3,139) = 2.3	0.102
More than two years ago	47.1 (26.7)		
Never Had PALS	39.9 (18.6)		
Last Real Code have attended			
Less than One Month ago	49.4 (26.7)	f (3,139) = 1.9	0.125
More than a month to Two years	46.6 (22.2)		
> Three years ago	47.9 (24.4)		
Never attended to a Pediatric CPR	34.4 (19.9)		
HCWs Role in the CPR was a:			
Team Leader	50.5 (35.1)	f (2,140) = 2.6	0.082
Either Team Leader or Team Member	54.6 (23.1)		
Team Member	43.4 (23)		

Table 5: Comparison between health care worker characteristics on total knowledge score (%). N = 143.

The healthcare worker characteristics were compared to assess the differences between the levels of HCW characteristics for statistical significance on the PALS Knowledge score. Males (mean = 59.1, S.D = 24.6) had significantly greater knowledge than females (mean = 41, S.D = 22.6) on average, p < 0.01. As well, Physicians (mean = 51.7, S.D = 28.1) had significantly greater PALS knowledge score than Nurses (mean = 42.2, S.D = 20.5), Nurses were more consistently similar notably than Physicians as evident with their smaller standard deviation however, physicians are more variable with their knowledge score on average. None the less, there was no statistically significant differences between HCW's age groups, levels of experience, as well as their working area (critical care versus none). Similarly, there was No statistically significant differences on the PALS knowledge score between the levels of recent PALS certification time, however a downward trend in the mean knowledge score as people's time of most recent PALS went from most recent to the farthest, their overall mean score tended to decline, however the difference between the times of PALS certification was not statistically significant one, p =

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0.102. None the less, the levels of time-span to an exposure until a real CPR were compared for statistical significant differences on the knowledge score, there was No statistically significant differences on the mean knowledge score across the levels of time since last real Code was attended, p = 0.125.

Too, there was a slight statistically significant difference on the HCW's scored PALS knowledge test across the levels of HCW's assumed roles during their attended CPR's, with those assuming mixed roles (Being a leader + a member) scoring greater knowledge (mean = 54.6, S.D = 23.1) than those who responded their roles were either team leaders (mean = 50.5, S.D = 35.1) or those whose roles were often a team member (mean = 43.4, S.D = 23), p = 0.08.

	Knowledge Score	Team Leader	Sustaining Leadership
Confidence as a CPR team Leader	.093		
Confidence to sustain a CPR leadership	.048	0.64	
Confidence as a CPR team Member	.161	0.75	0.6
**: Correlation is significant at the 0.01 level (2-tailed).			

Table 6: *Correlations between Knowledge score and the other CPR leadership self-ratings/perceptions. N = 143.*

The correlation between the knowledge score and the other self-rating on confidence in being a CPR team leader, member beside the confidence to sustain leadership of an ongoing CPR with the arrival of another senior physician showed no significant associations, however greater confidence as a team leader was significantly associated with the confidence to sustain leadership of an ongoing CPR with an interference from a late-arriving senior physician, r = 0.64, p < 0.01, likewise greater confidence as a CPR team leadership was significantly associated with greater confidence as a CPR member, r = 0.75, p < 0.01, similarly greater confidence as a CPR team member was significantly associated with greater confidence to sustain an ongoing CPR with interference from a more senior late-arriving physician, r = 0.6, p < 0.01. In brief, all confidence perceptions were positively and significantly associated with each other, see the table above.

Discussion and Conclusion

Life support courses, including Pediatric Advanced Life Support (PALS), are programs that offer an advanced and systematic approach to pediatric assessment. They cover various aspects of resuscitation to equip health service providers with skills and knowledge for treating critically sick infants and children. Healthcare workers (HCWs) who respond to emergency cases, such as pediatric care providers, emergency responders, ICU staff and ER personnel are encouraged to take these life-support courses. In these courses, HCWs gain knowledge regarding pediatric treatment algorithms, team dynamics, effective resuscitation, and effective pediatric assessment.

Due to the lack of research and literature in the region, the main goal of this study was to evaluate the effectiveness of Pediatric Life Support courses in Saudi Arabia. The research focused on the impact of Pediatric Life Support courses on the knowledge, decision-making skills as well as the confidence Level among healthcare workers (HCWs). To evaluate the decision-making skills and ability among KKUH Pediatric HCWs. This study also aims to assess self-reported confidence of HCWs in managing life threatening scenarios, to explore factors that may affect the knowledge, decision- making skills and confidence levels in relation to life-support among Pediatric HCWs, and to explore barriers that may prevent HCWs from participating in Life Support training.

In order to obtain a comprehensive understanding of the effectiveness of Pediatric Life Support courses among HCWs in Saudi Arabia, 143 HCW from various number of medical background and careers participated in a validated questionnaire. The participants had different type of training courses for life-support, such as BLS, NRP, PFCCS, APLS, ACTS, and ATLS. The majority of the HCWs reported that they have attended or participated in a CPR-related activity. Also, over half of the participants stated that they had attended some kind of pediatric life support academic activity during their career. The findings of this study are compared to previously conducted studies to provide in depth evaluation of the impact of Pediatric Life Support courses among HCWs.

On one hand, our findings showed that HCWs with more recent PALS training or certification showed slightly higher knowledge score than those with older PALS training or certification. Similarly, the findings from Lin., *et al.* [11], and Su., *et al.* [12] and Grant., *et al.* [16]

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showed that knowledge of the details of PALS algorithms decreased significantly over the following 12 months. Therefore, PALS courses and training provide proof that the training courses alone do not provide for the expected level of capability in relevant technical skills in case of an emergency resuscitation. This could be supported by the fact that our findings showed that HCWs who participated in multiple life-support situations and events had a greater knowledge score. Another finding in our study was that physicians had a significantly higher knowledge score than nurses. Similarly, Pettinger., *et al*. [15] study concluded that Pediatric critical care nurses' overall knowledge was low and that skills plays an important role in increasing knowledge score, therefore, since physicians have more skills than nurses, it is reasonable that they would have a higher score in the life-support knowledge survey. Also, our findings showed that although, the average score of the self-rated confidence as a team leader was 62%, the overall average of knowledge was 46.2%. Most of the HCWs failed to identify the correct action when handling an emergency providing a proof that there is no correlation between self-rated confidence and actual knowledge regarding life-support. Likewise, Nadel., *et al*. [10] found that pediatric residents reported being confident in performing many of the necessary resuscitation skills, most residents performed major parts of these skills incorrectly. This proofs that current pediatric life-support training may not provide enough experience to develop adequate skills, knowledge, or confidence needed for resuscitation.
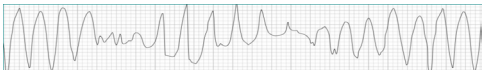
On the other hand, our findings showed that overall PALS did not have a statistically significant impact on the HCWs knowledge opposing to the findings from Baker., *et al*. [7], Heitmiller., *et al*. [8], Waisman., *et al*. [9], Nadel., *et al*. [10], Lin., *et al*. [11] and Su., *et al*. [12] that have suggested that PALS courses or training should be considered in the healthcare workers ongoing continuing medical education since it showed significant improvement proved that there is a significant improvement in the HCWs resuscitation treatment knowledge. Also, years of experience and age showed to have a direct impact on the level of knowledge in Pettinger., *et al*. [15], while they did not show any significant impact in our study.
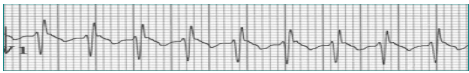
These opposite results could be explained by the fact that although most of the participant had some kind of life-support training, some did not receive any kind of life-support training due to many reasons. The main obstacle of the participated HCWs responded was the financial cost of the pediatric life support courses which is a reasonable explanation of the low knowledge score. Also, they could happen because these other studies had far more participant in comparison to our study. Another explanation is that most of the other studies were conducted directly post the PALS training as in Lin., *et al*. [11] and Su., *et al*. [12], and Grant., *et al*. [16], while most of our participants had their PALS certification at least two years prior to the survey. Also, it was noted by Heitmiller., *et al*. [8] and Pettinger., *et al*. [15] that there are some deficiencies exist in the knowledge of current AHA PALS courses which could be an important reason for the divergent results. There PALS guidelines could be improved for future research and studies that are less divergent and more accurate.
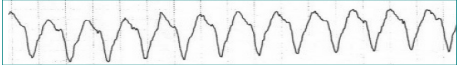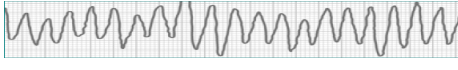
Strengths and Limitations

The strength of this study is the deeper analysis it provides. However, some of the limitations of this study include the subjective nature of the questionnaire responses, the bias sampling technique, and the limited small sample size. Also, the time restriction of the study was a major limitation of this study.

Appendix 1

The Knowledge Questions, their scenarios and the best correct answers according to American Association of Life Support Guidelines (year).		
Question	**Description/ Possible Answers.**	**Best answer**
What is the EKG Rhythm?		SVT
What is the EKG Rhythm?		Torsade Pointes
What is the EKG Rhythm: Note child has No pulse?		PEA: Pulseless Electrical Activity

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The fastest way to gain access for medication administration during CPR is	Intravenous access (IV), Intraosseous (IO), Endotracheal Tube (ETT), Subclavian Central Line (CVC)	IO
To evaluate for effective ventilation during CPR, you should assess	Making sure the Ambubag is squeezed completely, Assess for Rise and fall of the chest with ventilation; assess for Increasing abdominal size, assess for Presence of carotid pulse	Assess Rise and fall of the chest with ventilation
The lowest acceptable Systolic BP for 6-month-old infant is	50 mmHg, 60 mmHg, 70 mmHg, 80 mmHg.	(70 MMHg)
Clinical Scenario-1	Ibrahim is 6-month-old infant, who was admitted to your PICU with cardiomyopathy, Suddenly, the monitor starts alarming and you note Ventricular Fibrillation. What is your BEST immediate action to improve his outcome?	Start high-quality CPR and immediate defibrillation
Clinical Scenario-2	Nada is 2-year-old, who was brought to your Emergency Room after submersion in the swimming pool for 15minutes.She was brought by the Red Crescent with CPR on the way. The child has pulse with the chest compression, but no pulse when CPR is interrupted for rhythm check. His ECG monitor shows sinus rhythm. What is your BEST immediate action to improve her outcome?	Continue high-quality CPR and Epinephrine IV/IO at 0.01 mg/Kg
Clinical Scenario-3	You are called to a 2-year-old boy whose parents brought him to ER because he "isn't acting right". The parents inform you that he has been sick with a fever, diarrhea and vomiting for the past 2 days. The child is lying on the bed. You should start your assessment with:	Presence and strength of distal pulses, skin color, heart rate and capillary refill
Clinical Scenario-4	Scenario 4,5 and 6: for Questions 22-25: You are caring for an 8-year-old boy with a history of asthma. He presents to your ER breathing 55/min. His skin looks pale and cool to the touch. His pulse is 146/min, BP 100/70. His pulse oximetry is 81% on room air. His lung sounds reveal expiratory wheezes that are barely audible. This patient's condition represents:	Respiratory Failure.
Clinical Scenario-5	Scenario4: For The above child in scenario-4: The goal oxygen saturation in this situation = 95% - 100%, 94% - 99%, 90% - 100%.	94% - 99%
Clinical Scenario-6	Scenario 4: The child suddenly drops his respiratory rate to 5/min and becomes unresponsive. His pulse rate is 170. His pulse oximetry falls to 65%. You should immediately	Assist Ventilations with a BVM at a rate of 12-20/min.
Clinical Scenario-EKG best next intervention1	6 weeks old infant examined in the ER: V/S HR 260, T 37.2 C, BP 80/40, oxygen saturation 98% on room air. Capillary refill 3 seconds, An SVT cardiac Rhythm is seen on the cardiac monitor as shown below: whats the next best intervention:	Perform vagal stimulation, if no response to give adenosine IV.

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Clinical Scenario-EKG best next intervention2	10 years boy presented with lethargy and palpitation. On examination he looks very pale with poor capillary refill (> 5 seconds). He has weak pulses. BP 70/42, what would you best do next if you see the Unstable Ventricular Tachycardia Rhythm below:	Synchronized cardioversion 0.5-1 J/kg.
Clinical Scenario-EKG best next intervention3	5 years old girl who is hospitalized post tonsillectomy this morning. She developed pulseless arrest and you were called after CPR was initiated. Her current Rhythm shows the below Rhythm (Ventricular Fibrillation), what is your next best intervention:	Administer a cardiac defibrillation shock 2 J/kg.
Clinical Scenario-7	33. 3 months old with a history of vomiting and diarrhea comes to the ER. He only responds to painful stimulation. The upper airway is patent, the respiratory rate is 40/min with good bilateral breath sounds, and 100% oxygen is being administered. The infant has cool extremities, weak pulses, and a capillary refill time of more than 5 seconds. His blood pressure is 70/50 mm Hg. Infant is hypoglycemic. What are you going to do next?	Establish IV or IO access, administer 20 mL/kg isotonic crystalloid over 10 to 20 minutes, and simultaneously administer D25W 2 to 4 mL/kg in a separate infusion.
Clinical Scenario-8	34. 2-year-old girl with mild stridor when agitated. Her SpO_2 is 91% in room air, and she has sub costal and intercostals retractions. Lung auscultation reveals transmitted upper airway sounds with adequate distal bilaterally. with rally. Which of the following is the MOST appropriate initial therapeutic intervention for this child?	Administer humidified supplementary oxygen as tolerated and continue evaluation.
Clinical Scenario-9	35. 9-year-old child was brought to your ER after a Motor Vehicle Accident. Primary assessment reveals respiratory rate 70/min, heart rate 160/min, systolic blood pressure 68 mmHg, and SpO_2 82% on supplementary oxygen. Breath sounds are absent over the left chest, and the trachea is deviated to the right. He has weak central pulses and absent distal pulses. What are you going to do next?	A tension Pneumothorax is most Likely, Perform needle decompression of the left chest and assist ventilation with a bag and mask if necessary.

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