

EVALUATION OF PEDIATRIC CPR COURSE ON KNOWLEDGE OF PEDIATRIC RESIDENTS

- Before and After ACLS Course -

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Abstract

An evaluation was conducted on the knowledge gained by pediatric residents on CPR, before and after a PALS (Pediatric Advanced Cardiac Life Support) course. Following an examination of all pediatric residents at Tehran University of Medical Sciences, they were divided into two groups: non-trained (Group 1) and a group scheduled to undergo training (Group 2). A course on ACLS was conducted. Examination were performed before and after the ACLS course.

The mean of the examination prior to the course in Group 1 and 2 was low, reflecting no significant differences between the Groups. Examination after the ACLS course showed a statistically significant improvement in Group 2 ($P \leq 0.05$). It is concluded that knowledge of pediatric residents was low before ACLS course and enhanced after the course.

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Introduction

Guidelines for training in resuscitation have been written in both Australia and United Kingdom, and an Advanced Life Support Group has been formed with the aim of improving emergency care of patients^{1,2}.

In children, the initial care of the critically ill is often made by pediatric residents, whose knowledge of both the cognitive and practical skills are much needed in the management of such children. The effective resuscitation of those patients may optimize their outcome³. The American Heart Association (AHA), the Pediatric Advanced Life Support course (PALS) is required in 99% of US pediatric residency programs.

Knowledge of CPR is highly crucial for all medical trainees. The AHA has divided the CPR courses into two categories: Basic Life Support (BLS) and the Advanced Cardiac Life Support (ACLS).

Pediatric CPR is different from adult CPR. Pediatric skills in airway management, drug information, cardiac massage and vascular access abilities, are of paramount importance.

We believe that pediatric residents lack sufficient knowledge in CPR. Advanced resuscitation course offers both cognitive knowledge and practical skills. The objectives of the present study was to evaluate the standing knowledge of pediatric residents in CPR, and evaluate this knowledge after those residents receive a PALS course.

Materials and Methods

Pediatric residents from three hospitals affiliated

to Tehran University of Medical Sciences (Imam Khomeini General Hospital, Children Medical Center, Bahrami Children Hospital), participated in an examination where their knowledge in airway management, vascular access and proper pharmacological use of drugs, were assessed. A total of forty four pediatric residents (14 females, 30 males) with an average 32.3 years participated.

Prior to examination, the pediatric residents filled-out a questionnaire + experience in CPR, intubation and any PALS course attended, if any (Table 1).

All information necessary to answer the questions on resuscitation was included in the course. Instructors, other than the researchers, were unaware of the contents of the survey. Acceptable answers had to be consistent with guidelines of the AHA and the Advanced Life Support Group^{5,7}.

Resuscitation knowledge prior to the PALS course was first tested, and later followed by second test after the PALS course. Analysis was done by SPSS 11.5 software.

Results

The majority of the pediatric residents failed to pass the PALS course. Most of them (81.8%) were married with a mean age of 32.23 ± 2.8 . Eight (18.2%) pediatric residents had previously passed an adult CPR course. All the group had a median of 22.89 ± 19.8 months experience of work in emergency department.

The mean score of results of the first examination (prior to ACLS) in Group 1 were 5.27, 4.27 and 3.55

Table 1
Demographic characteristics of untrained (Group 1) trained (Group 2) resident

		Group 1 (untrained)	Group 2 (trained)	sum
Gender	female	8 (36.4%)	6 (27.3%)	14 (31.8%)
	Male	14 (63.6%)	16 (72.7%)	30 (68.2%)
Marriage	Single	3 (13.6%)	5 (22.7%)	8 (18.2%)
	Married	19 (86.4%)	17 (77.3%)	36 (81.8%)
Age (mean)		32.14 ± 2.7	32.32 ± 2.9	32.23 ± 2.8
Previous adult CPR Course	Yes	18 (81.8%)	18 (81.8%)	36 (81.8%)
	No	4 (18.2%)	4 (18.2%)	8 (18.2%)
Mean of work in emergency department (month)		19.4 ± 19.9	20.6 ± 25.8	19.8 ± 22.8
Previous CPR experience		19.4 ± 25.6	27.9 ± 20.1	24.1 ± 22.6

in airway management (A1), vascular access (V1) and proper drug usage (D1) respectively. In Group 2, the mean scores were 5.41, 4, 4.18. Results of the examination of the two Groups as compared to the pooled t-test, revealed that the two Groups had not any significant differences (Table 2).

Table 2
First examination score in two groups (comparison with pooled t-test)

	Group 1	Group 2	P value
Mean of A1	5.27 ± 1.24	5.41 ± 1.73	0.766
Mean of V1	4.27 ± 1.12	4 ± 1.48	0.495
Mean of D1	3.55 ± 1.1	4.1 ± 1.73	0.154
Mean of total score	13 ± 2.39	13.64 ± 2.75	0.418

A1: Air way management score in first exam.

V1: Vascular access score in first exam.

D1: Drug information score in first exam.

Results of the second examination (after ACLS) showed that the means of Group 2 were (A2: 7.45, V2: 7.05, D2: 6.2. In contrast, results of Group 1 revealed (A2: 4.5, V2: 4.05, D2: 4.18. Those results reflected significant differences ($p \leq 0.05$) (Table 3). Comparisons of scores in the two Groups show significant differences, more marked in Group 2.

Discussion

Pediatric cardiopulmonary arrest is of rare occurrence, and usually such emergencies are tackled mostly by senior staff. We assume that the junior medical staff or residents get less opportunity in their training courses and residency training, and consequently these trainees are prone to make errors in managing these critical emergencies.

Table 3
Second examination scores in two group (comparison with pooled t-test)

	Group 1	Group 2	P value
Mean of A2	4.5 ± 1.65	7.45 ± 0.91	< 0.0001
Mean of V2	4.05 ± 1.74	7.05 ± 1.17	< 0.0001
Mean of D2	4.68 ± 1.17	6.2 ± 1.23	< 0.0001
Mean of total score	13.23 ± 2.75	20.45 ± 2.2	< 0.0001

A2: Air way management score in second exam.

V2: Vascular access score in second exam.

D2: Drug information score in second exam.

The objective of this study was to pinpoint the pitfalls and professional deficiencies of the pediatric residents in the subcategories of pediatric CPR (airway management and appropriate drugs used and vascular access). Our results revealed that pediatric residents who participated in this study lacked the necessary and optimal knowledge in airway management, pharmacological action of drugs and maintenance of circulatory support.

The outcome of our results showed that pediatric residents had a poor performance in the pretest (before PALS course) (Table 2) but showed a statistically significant improvement after the post test (after PALS course) was conducted (Table 3). A similar study conducted in USA also showed similar results with the only difference that the study was carried out among participants who were not physicians⁸. Two other studies conducted by Lin Ij et al⁹, and Waisman et al¹⁰ in two different centers arrived at conclusions similar to that depicted in our study.

In another study in USA, only half of the 427 certified pediatricians displayed a sense of satisfaction after completion of the course which mainly assessed the skill performance of the participants⁸. Our study, although designed similarly, did not take into consideration or measured the resuscitation skills of the candidates. However, the participants did show significant improvement in their knowledge of resuscitation after a PALS course, a project we were aiming at.

Our study confirms the significance of instituting a short term PALS course in order to improve the knowledge of the participants in the basic elements of CPR. Others however, have advocated the continuation of such courses in CPR at regular and short intervals in an attempt to achieve the desired outcome¹¹.

It is important to state that although 81% of residents participated in an adult ALS course prior to participating in the present PALS course (Table 1), they still lacked the necessary knowledge in conducting pediatric CPR, and did not show better results compared to those participants who participated in this course for the first time, and had no formal training in ACLS at all.

We emphasize that a PALS course is strongly needed and recommended for all those who deal with

pediatric emergencies specially those undergoing residency training. Quan et al⁶, is also of the same opinion that a PALS course is highly effective in improving the knowledge of pediatric residences.

Though prior experience in an emergency setting cannot guaranty that such physicians would be able to conduct a pediatric CPR properly and adequately, Dourojaiye et al¹² emphasize the need for such a course for emergency physicians as well.

It is felt that the PALS course is of immense importance not only for the health worker but also for qualified consultant physicians¹³⁻¹⁵, as both have shown a relatively poor performance in conducting ventilation and properly performing the other requirement of PALS.

Variables such as sex age and marital status does not affect the quality of training as shown in our study as well (Table 1, 2).

In conclusion, we recommend that conducting short and effective courses of PALS should be preferably included in the training curriculum of

pediatric residents. This also gives the opportunity to emergency physicians and others interested in undergoing such courses.

We also concur that PALS courses are imperative and highly important in the improvement of the knowledge and skills of the participants. Such courses should preferably be conducted at frequent and short term intervals so that participants do not lose their professional knowledge and competency with the passage of time. This aspect has been elucidated by Wolfram RW et al¹⁶ who argue that three quarters of the subjects failed to achieve a passing score on the retest after a passage of 21 months from their last PALS examination.

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