Evaluation of the advanced pediatric life support courses by the students: experience of Spanish pediatric and neonatal resuscitation group☆

Valoración de Los cursos de reanimación cardiopulmonar avanzada pediátrica por los alumnos: experiencia del Grupo Español de Reanimacion Cardiopulmonar Pediatrica y Neonatal

To the Editor:

The training in cardiopulmonary resuscitation (CPR) of health care professionals is provided mainly in the form of CPR workshops. Although the evaluation of the quality of these trainings is essential, few studies have analysed the perceptions of students on the training received.[1–6]

In the past 25 years, 1367 trainings of paediatric advanced life support (PALS) accredited by the Spanish Group on Paediatric and Neonatal Cardiopulmonary Resuscitation (Spanish acronym, GERCPPyN) have been delivered, training 30 797 students. We analysed 1512 anonymous questionnaires filled out in the context of 128 PALS trainings held between 2014 and 2020 in 14 autonomous communities in Spain. Table 1 summarises the characteristics of the trainees, and Table 2 the results of the questionnaires, comparing the responses in different professional categories. All theoretical and practical trainings received ratings greater than 8.5 out of 10. The trainings that received the highest scores were theoretical trainings on basic life support, integrated advanced CPR and airway support and practical trainings in integrated advanced CPR, while the ones with the poorest ratings were theoretical trainings on stabilization, CPR and trauma, drugs and fluids and introduction to CPR, and practical trainings on CPR and trauma.

All the variables related to the organization and methodology of the trainings received ratings above 8.5 except for the training spaces, schedule, and time devoted to present the contents. All the variables related to the evaluation of instructors received ratings above 9.

Emergency and family physicians and nurses gave significantly higher ratings to theoretical and practical trainings, while anaesthesiologists and intensive care physicians gave lower ratings compared to all other professionals.

Students suggested prolonging the trainings over a greater number of days and providing more practice time, especially in comprehensive CPR, offering trainings adapted to different professions and offering refresher trainings.

While the students generally perceived the training very positively, our study identified opportunities for improvement. The schedule, which involves long hours of training, causes fatigue and impairs the ability to learn, so it is no surprise that this was the aspect that received the worst rating. On the other hand, students considered that more time needed to be devoted to the practical components. Since increasing the duration of the training is complicated, one possible option would be to consider cutting down the time devoted to in-person theoretical training, replacing this time by distance education, but not completely eliminating in-person theoretical training, as the live interaction of instructors and students is also essential in this component.

The trauma module received the lowest ratings, probably due to the difficulty of summarizing the key aspects efficiently, although some students considered that it should not be eliminated. The GERCPPyN believes that this module needs to be maintained, but only presenting aspects related to CPR, as there are also specific trainings on paediatric trauma and the PALS training cannot address the management of every emergency and should focus on the management of cardiac arrest and teamwork.

The practical training on integrated advanced CPR received the best ratings, which highlights the importance attributed by students to practical trainings that best simulate real-life situations and where they learn to work as a team.

Adult anaesthesiologists and intensive care doctors gave the lowest ratings to the training. It is possible that the training did not meet their expectations, and perhaps what they need is training on the assessment of paediatric patients and the differences between paediatric and adult CPR protocols.

Table 1 Students in paediatric life support trainings.

Profession	Count	Percentage
Paediatrician	656	43.4%
PICU/NICU	26	4%
Hospital	100	15.2%
Resident	466	71%
Primary care	62	9.5%
Outpatient	2	0.3%
Nurse	561	37.1%
PICU/NICU	157	15.1%
Hospital	279	31.2%
Resident	79	44.9%
Primary care	21	6.8%
Outpatient	23	2.1%
Unknown	5	
Family physician	47	3.1%
Adjunct	38	82.6%
Resident	8	17.4%
Unknown	1	
Anaesthesiologist -Adult ICU	118	7.8%
Adjunct	32	27.1%
Resident	86	72.9%
Adult emergency physician	74	4.9%
Inpatient	46	63%
Outpatient	27	37%
Unknown	1	
Other	30	2%
Unknown	26	1%
Total	1512	

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Table 2 Questionnaire results (mean and standard deviation).

	Total	Paediatricians	Nurses	Family physicians	ICU anaesthesiologists	Emergency physicians	Other	*P*
Theoretical trainings								
Introduction	8.77	8.72	8.85	8.87	8.33	9.09	8.77	.000
	1.15	1.14	1.17	0.94	1.29	0.90	1.04	
Concepts and prevention	8.89	8.82	9.03	8.96	8.42	9.04	9.00	.000
	1.09	1.13	1.04	0.77	1.27	0.97	0.94	
Basic CPR	9.15	9.09	9.26	9.21	8.75	9.23	9.53	.000
	0.97	0.94	0.95	0.83	1.10	1.08	0.73	
Airway	9.02	8.99	9.25	9.19	7.90	9.16	9.17	.000
	1.10	1.02	0.94	0.79	1.62	1.04	1.02	
Vascular access	8.95	8.89	9.07	9.11	8.50	9.12	8.83	.000
	1.12	1.16	1.05	0.72	1.37	1.03	1.12	
Drugs and fluids	8.76	8.77	8.81	8.91	8.22	9.18	8.43	.000
	1.22	1.23	1.12	1.03	1.27	0.94	1.27	
Arrythmias	8.94	8.98	8.96	8.91	8.54	9.22	8.60	.002
	1.17	1.18	1.16	1.08	1.15	0.98	1.49	
Neonatal CPR	8.85	8.77	8.89	8.89	8.94	9.15	8.83	.252
	1.30	1.39	1.32	0.96	0.99	1.08	0.95	
CPR and trauma	8.72	8.70	8.78	8.70	8.38	8.84	8.93	.074
	1.30	1.29	1.31	1.28	1.48	1.08	1.04	
Stabilization	8.52	8.40	8.69	8.60	8.21	8.70	8.33	.000
	1.37	1.47	1.28	1.33	1.42	1.03	1.15	
integrated advanced CPR	9.09	9.04	9.16	9.02	8.83	9.28	9.33	.012
	1.02	1.04	0.99	0.92	1.12	0.94	0.75	
[0.1−9]								
Practical trainings								
Basic CPR	8.92	8.96	8.99	9.02	8.29	8.89	9.07	.000
	1.27	1.15	1.32	1.03	1.48	1.52	1.20	
Airway	8.97	8.99	9.17	8.96	7.74	9.07	9.17	.000
	1.17	1.07	0.98	0.99	1.77	1.15	0.91	
Vascular access	8.97	8.98	9.05	8.87	8.48	9.08	8.97	.000
	1.13	1.09	1.11	0.90	1.40	1.09	1.15	
Arrythmias	9.05	9.08	9.08	9.13	8.59	9.22	9.07	.001
	1.10	1.07	1.13	0.87	1.19	1.02	1.28	
Neonatal CPR	8.97	8.95	8.98	8.91	8.97	9.01	9.13	.991
	1.28	1.33	1.30	0.97	1.04	1.35	0.97	
CPR and trauma	8.77	8.78	8.83	8.89	8.44	8.61	8.87	.091
	1.32	1.32	1.28	0.89	1.55	1.46	1.31	
integrated advanced CPR	9.19	9.24	9.19	9.04	8.81	9.30	9.40	.001
	0.96	9.19	0.97	0.93	1.10	0.91	0.81	
[0.1−9]								
[0.1−9]*Organization*								
Organization	8.96	9.00	8.93	8.89	8.59	9.26	9.37	.001
	1.13	1.04	1.26	1.00	1.21	0.84	0.71	
Classrooms	8.32	8.29	8.29	8.57	7.98	8.89	8.47	.001
	1.46	1.14	1.56	1.22	1.45	1.10	1.40	
Schedule	8.25	8.40	8.05	8.28	8.07	8.73	7.93	.000
	1.54	1.44	1.69	1.39	1.54	1.22	1.72	
Slides	8.54	8.53	8.56	8.74	8.25	8.76	8.47	.104
	1.32	1.27	1.44	1.07	1.25	1.15	1.07	
Materials used for practice	8.57	8.60	8.54	8.87	8.11	8.80	9.00	.001
	1.33	1.32	1.37	0.99	1.43	1.22	1.14	

Table 2 (*Continued*)

	Total	Paediatricians	Nurses	Family physicians	ICU anaesthesiologists	Emergency physicians	Other	*P*
Materials received	8.75	8.64	8.89	8.87	8.35	9.01	9.03	.000
	1.31	1.40	1.24	1.37	1.25	1.12	1.09	
Methodology	8.98	8.96	9.03	9.09	8.63	9.11	9.13	.010
	1.06	1.07	1.06	0.85	1.18	1.05	0.81	
Duration of contents	8.43	8.54	8.23	8.64	8.39	8.58	8.77	.001
	1.42	1.35	1.58	1.13	1.28	1.13	0.97	
Theoretical contents	8.76	8.70	8.89	8.85	8.42	8.91	8.67	.002
	1.13	1.18	1.08	0.83	1.15	1.07	1.13	
Practical contents	9.11	9.16	9.13	9.13	9.00	9.16	9.47	.050
	1.06	0.80	1.05	1.08	0.90	1.18	0.62	
Instructor competence	9.37	9.36	9.45	9.40	8.84	9.59	9.43	.000
	0.85	0.86	0.76	0.77	1.16	0.79	0.72	
Adaptation to student needs	9.15	9.18	9.19	9.15	8.69	9.39	8.90	.000
	1.05	0.99	1.07	0.83	1.31	1.03	1.06	
Coordination	9.14	9.10	9.24	9.28	8.62	9.39	9.17	.000
	1.12	1.23	0.95	0.80	1.40	0.94	0.69	
Clarity	9.19	9.18	9.27	9.15	8.75	9.34	9.13	.000
	0.96	0.98	0.92	0.78	1.05	0.99	0.81	
Ability to elicit interest	9.25	9.26	9.33	9.21	8.68	9.38	9.23	.000
	0.95	0.96	0.90	0.72	1.12	0.81	0.81	
Ability to stimulate participation	9.27	9.30	9.31	9.23	8.77	9.43	9.23	.000
	0.98	0.91	0.99	0.69	1.29	0.89	0.93	
Ability to give constructive feedback	9.27	9.26	9.34	9.21	8.85	9.35	9.33	.000
	1.01	1.04	0.96	0.77	1.23	0.09	0.80	

Some students suggested the development of specific trainings for different health professionals. However, we believe that the combination of professionals and trainees with different skill levels is one of the pluses of this training, as it reflects the reality that students will be facing in clinical practice.

We ought to highlight the high ratings given to the instructors, evidence in support of the usefulness of the instructor training system developed in Spain. The European Resuscitation Council considers that a general instructor training is sufficient. However, the GERCPPyN considers that instructors should be trained specifically to teach each of the practical components of the PALS training.

Last of all, students considered that refresher trainings should be offered periodically, which is one of the most pressing aspects in need of improvement.

In conclusion, PALS trainings are perceived very positively by students, who underscored the importance of practical training. Some theoretical and practical trainings received lower ratings from the students, which could guide future changes to their contents or format to adapt them to the needs of the students and improve their quality.

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Conflicts of interest

The authors have no conflicts of interest to declare.

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Pulmonary hypertension as a sign of onset of multiple mitochondrial dysfunction syndrome☆

Hipertensión pulmonar como forma de inicio del síndrome de disfunción mitocondrial múltiple

Dear Editor:

A pulmonary artery pressure of 25 mmHg or above at rest is rare and severe. Pulmonary hypertension is a feature of various conditions, including metabolic disorders such as multiple mitochondrial dysfunctions syndrome (MMDS, OMIM #605711) or pyruvate dehydrogenase lipoic acid synthetase deficiency (PDHLD, OMIM #614462), which affect mitochondrial oxidative decarboxylation. This disease is associated with leukoencephalopathy, pulmonary hypertension and hyperglycinaemia without ketosis, thus sharing the characteristics of nonketotic hyperglycinaemia (NKH, OMIM #605899), an autosomal recessive disorder of glycine (Gly) metabolism that manifests with an elevation of Gly in the absence of ketoacidosis.

In the context of these metabolic disorders, MMDS is a recently described syndrome. The term refers to a group of rare inborn errors of energy metabolism caused by deficiencies in the formation or attachment of iron-sulphur (Fe-S) clusters, leading to abnormal function of enzymes dependent on lipoic acid and other proteins involved in intermediate metabolism and oxidative phosphorylation that participate in electron transport chain reactions and the function of complexes I, II and III. This explains the multiple mitochondrial dysfunctions associated with NFU1 (OMIM *608100), BOLA3 (OMIM *613183), LIAS (OMIM *607031), ISCU (OMIM *611911), IBA57 (OMIM *615316) and LIPT1 (OMIM *610284). Multiple mitochondrial dysfunctions syndrome is a severe autosomal recessive disorder of systemic energy metabolism with onset in infancy characterised by lack of neurologic development, hypotonia, respiratory failure, lactic acidosis and early death.

We present the cases of 2 patients with PH that received a diagnosis of PDHLD, one of which has been described previously.[1]

Case 1

Boy aged 2 months. Onset with heart failure associated with metabolic acidosis, hyperlactataemia and cardiomegaly. The echocardiographic examination revealed suprasystemic PH, type III ventricular septal defect and dilatation and hypertrophy of the right ventricle. A computed tomography (CT) angiogram ruled out pulmonary embolism. Treatment was initiated with milrinone, sildenafil and bosentan. The initial response was poor, with progression to septic shock

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