



## LETTER TO THE EDITOR

## Pediatric life support guidelines 2021, novelties and adaptations in Spain



### Recomendaciones en soporte vital pediátrico 2021, novedades y adaptaciones en España

Dear Editor:

We read with attentive interest the article “Novelties in the pediatric cardiopulmonary resuscitation recommendations and lines of development in Spain”, by López-Herce et al. on behalf of the Spanish Group of Paediatric and Neonatal Cardiopulmonary Resuscitation (GERCPYN).<sup>1</sup>

First of all, we want to underscore the active role of the GERCPYN in the dissemination of knowledge on the management of paediatric cardiac arrest in Spain as well as its coordination, and are grateful for the effort to facilitate the involvement in this process of all paediatricians and health care professionals who deliver care to children.

We understand that the purpose of the article was to analyse international guidelines for paediatric life support/cardiopulmonary resuscitation (CPR) (terms accepted for interchangeable use by the Consejo Español de Reanimación Cardiopulmonar [CERCP, Spanish Council of Cardiopulmonary Resuscitation]) and to identify and disseminate the main changes that have been made since the

**Table 1** Additional novelties in the ERC-2021 paediatric life support recommendations.<sup>3</sup>

Context	Recommendation
Applicability of PLS guidelines	PLS guidelines apply to all children, aged 0–18 years, except for ‘newborns at birth’. Patients who look adult can be treated as an adult
Management of severely ill or injured child	Oxygen therapy should be titrated to an SpO <sub>2</sub> of 94%–98%. Until titration is possible, initiate it based on the signs of circulatory/respiratory failure. Once in the recovery position, reassess breathing every minute In cases of haemorrhagic shock: (a) minimise crystalloid boluses (maximum of 20 mL/kg; (b) early blood products; c) give tranexamic acid in all children requiring transfusion after severe trauma within the first 3 h. Also consider tranexamic acid in children with isolated moderate TBI (Glasgow coma scale, 9–13) without pupillary abnormalities. Loading dose of 15–20 mg/kg (max1 g) followed by 2 mg/kg/h or at least 8 h or until the bleeding stops (max1 g)
BLS + AED	Preferential use of the two-thumbs encircling technique for compressions in infants, avoiding incomplete recoil (even for single rescuers, who can alternate it with the two-finger technique) Do not routinely apply an AED at the scene of traumatic CA unless there is a high likelihood of shockable underlying rhythm (eg after electrocution)
ALS	If pads are set in the AP position, place the anterior pad immediately left to the sternum In the case of low-amplitude ventricular fibrillation or when in doubt, consider the rhythm shockable In children who are monitored and have a defibrillator immediately ready for use at the moment of a witnessed CA, consider a ‘‘stacked shock’’ approach with delivery of 3 initial shocks followed by administration of amiodarone after the third one In traumatic CA, treat any reversible causes, consider the use of tourniquets, blood products, a pelvic binder, or bilateral thoracostomy or thoracocentesis, depending on the situation and resources Consider early extracorporeal life support where conventional ALS does not promptly lead to ROSC or there is a lack of resources, for specific subgroups or in cases of deep hypothermic arrest

AED, automated external defibrillator; ALS, advanced life support; AP: anteroposterior; BLS, basic life support; CA, cardiac arrest; ERC, European Resuscitation Council; PLS, paediatric life support; SpO<sub>2</sub>, partial oxygen saturation; VF, ventricular fibrillation.

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**Table 2** Differences between the ILCOR/CoSTR-2020,<sup>4</sup> ERC-2021<sup>3</sup> and GERCPYN-2021<sup>1</sup> recommendations.

Area	Recommendation	ERC-2021 guidelines	ILCOR/CoSTR-2020 consensus document	GERCPYN-2021 adaptation
Prevention of CA	Fluid therapy	Administer crystalloids (preferably balanced) at 10 mL/kg in case of detected shock, start vasoactive drugs early. Consider albumin as second-line fluid for children with sepsis, especially in the case of malaria or dengue fever	Give initial bolus of 20 mL/kg in children with SS or severe malaria or dengue, followed by reassessment. Fluid boluses should not be given routinely in children with severe febrile illness without shock	Volume expansion recommended only for absolute or relative si hypovolaemia (septic or anaphylactic shock). Administer crystalloid or colloid boluses (10–20 mL/kg) In CPR drug table: 20 mL/kg PSS
	Corticosteroids for septic shock	Consider a first dose of stress-dose hydrocortisone (1–2 mg/kg) for SS unresponsive to fluids and vasoactive support. Administer hydrocortisone (stress dose) for SS combined with acute or chronic exposure to corticosteroids, ketoconazole or etomidate or corticosteroid-related endocrinopathies	Consider corticosteroids (at stress dose) in the case of SS unresponsive to fluids and requiring vasoactive support	Consider stress-dose corticosteroids in children with SS unresponsive to fluid therapy and vasoactive drugs (Not included in CPR drug table)
	Atropine for bradycardia	Consider atropine only in bradycardia caused by increased vagal tone	It is reasonable to administer atropine for bradycardia caused by increased vagal tone or anti-cholinergic drug toxicity	Consider in the case of bradycardia (< 60 bpm) with adequate peripheral perfusion. CPR drug table specifies: vagal bradycardia
	Supraventricular tachycardia	In stable patients that do not improve with vagal manoeuvres, proceed with adenosine (0.1–0.2 mg/kg; max 6 mg) via a large vein with immediate PSS flush; higher initial doses are preferable, especially in infants and younger children. If SVT persists after 1 min, repeat with dose of 0.3 mg/kg (max 12–18 mg). If unstable, synchronised electrical cardioversion (with sedation/analgesia), starting with 1 J/kg, doubling energy in subsequent attempts to a maximum of 4 J/kg	In children with SVT with a pulse, adenosine is the preferred medication. Alternative therapies: verapamil in older children, procainamide or amiodarone in the case of refractory SVT (expert consultation is encouraged before use)	Featured in CPR drug table, initial dose of 0.2 mg/kg (max 6 mg), second dose of 0.4 mg/kg (max 12 mg). Flush immediately with 5–10 mL of PSS

Table 2 (Continued)

Area	Recommendation	ERC-2021 guidelines	ILCOR/CoSTR-2020 consensus document	GERCPYN-2021 adaptation
BLS	Calling emergency medical services at 1 min of CPR	Only in the case of a single rescuer that does not have a mobile phone, removed from algorithm		Still included in algorithm without specifics
	Possibility of continuous CCs without rescue breaths	Included in algorithm, specifying that ventilations should be initiated as soon as possible		Not included in either algorithm or text
	Seeking and use AED (if available)	Included in algorithm: Yes, if there are 2 rescuers; if there is only one single rescuer, yes in the case of witnessed sudden collapse.		Included in algorithm: Yes, if there are 2 rescuers and a cardiac cause is suspected (sudden collapse)
FBAO	Safety, calling for help	Algorithm and text both include ensuring safety, shouting for help and then calling medical services		Not included
	Techniques to relieve obstruction in infants	5 back blows alternating with 5 CCs		Uses the term ‘‘chest thrust’’ instead of ‘‘chest compressions’’
ALS	Volume expansion during CPR	Recommends adjusting algorithm based on the cause. Not specified	Recommends 10–20 mL/kg	Recommended specifically for PEA or hypovolaemia at 20 mL/kg
	First adrenaline dose in nonshockable rhythms	Calls for administration ‘‘as soon as possible’’ in both algorithm and text	As soon as possible during CPR	Addressed in text, not in algorithm
	Use of bicarbonate	Do not administer routinely. Consider in the case of hyperkalaemia and sodium channel blockade (TCA intoxication). Not included in algorithm	Do not administer routinely	Considering bicarbonate is recommended. Included in CPR drug table for management of refractory CA

Table 2 (Continued)

Area	Recommendation	ERC-2021 guidelines	ILCOR/CoSTR-2020 consensus document	GERCPY-2021 adaptation
	Special circumstances Trauma and ECMO	Contemplates adjusting/adapting the algorithm to these circumstances within reversible causes		Not included. No tranexamic acid in the CPR drug table
Training	Training nomenclature	(Basic/intermediate/advanced) paediatric LS		(Basic/intermediate/advanced) paediatric CPR

AED, automated external defibrillator; ALS, advanced life support; BLS, basic life support; CA, cardiac arrest; CC, chest compression; CoSTR, International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations; CPR, cardiopulmonary resuscitation; CC, chest compression; ECMO, extracorporeal membrane oxygenation; ERC, European Resuscitation Council; FBAO, foreign body airway obstruction; GERCPY, Grupo Español de Reanimación Cardiopulmonar Pediátrica y Neonatal; ILCOR, International Liaison Committee on Resuscitation; LS, life support; PEA, pulseless electrical activity; PSS, physiological saline solution; SS, septic shock; SVT, supraventricular tachycardia; TCA, tricyclic antidepressant.

2015 guidelines of the European Resuscitation Council (ERC<sup>2</sup> and the adaptations to be applied in Spain. However, in our opinion, the article was not always sufficiently clear in differentiating between the ERC-2015 guidelines,<sup>3</sup> the 2020 International Liaison Committee on Resuscitation (ILCOR) Consensus on Science with Treatment Recommendations (CoSTR<sup>4</sup> and the adaptations proposed by the GERCPPYN. The aim of this letter is to present structured supplemental information to attempt to facilitate its comprehension.

The article highlights many of the ILCOR/CoSTR-2020<sup>4</sup> and the ERC-2015<sup>3</sup> recommendations: teamwork, the use of tools to aid the initial evaluation (ABCDE), the management of septic shock and bradycardia, calling for help after delivery of the first 5 rescue breaths in basic life support, involving two rescuers in delivering bag-valve-mask ventilation, initiating ventilation with settings based on the respiratory rate for age after securing the airway, considering the stepwise escalation of the energy dose for defibrillation in refractory arrhythmias, the use of capnography and sonography, post-resuscitation care goals and ethical and training considerations. However, some of the novelties, perhaps due to the limited length of the article, are not mentioned and we consider that detailing them would be relevant (Table 1). In addition, other recommendations presented as novel had already been implemented in clinical practice, as is the case of the administration of adrenaline "as soon as possible" in nonshockable rhythms, a current recommendation based on studies included in the development of the ILCOR/CoSTR-2020<sup>4</sup> that support administration after 3 min, whereas previous guidelines had recommended establishing vascular access and administering adrenaline, but not waiting until having delivered 3 min of chest compressions to initiate it, as could be inferred from the article. There is also the recommendation regarding the use of paddles for defibrillation of charging them once they have been placed on the chest (an aspect that was not featured in the ERC-2015<sup>2</sup> but did appear in subsequent ERC-CERCP training materials<sup>5</sup>). In the ERC-2015<sup>3</sup> set-up, the safety of rescuers is prioritised over saving time, but the guideline also states that the use of self-adhesive pads is preferred and that shocks should be delivered within 5 seconds to minimise the time without chest compressions.

Last of all, with the aim of supplementing the information on the recent recommendations offered by López-Herce et al. and to promote a better understanding of their source

(ILCOR/CoSTR-2020<sup>4</sup> or ERC-2015<sup>3</sup>), the changes that have taken place and the adaptations proposed by GERCPPYN for their implementation in Spain, we developed Table 2.

We hope that our contribution may supplement the work carried out by the GERCPPYN and serve to clarify or qualify some points.

## References

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