Appendix B

Pediatric Life Support – 2026 Evidence Updates

Table of Contents

2026 Evidence Update

PLS 4190.02 – Interventions to Treat Hypotension

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PICOST / Research Question:

PICOST	Description
Population	Children (>24 hours to 18 years of age) with sustained ROSC (Return of spontaneous circulation) following cardiac arrest
Intervention	Intervention to treat hypotension. (Interventions include medication and/or fluid; exclude mechanical circulatory support devices.)
Comparison	No intervention or an alternative intervention.
Outcomes	Any clinical outcome. The task force prioritizes outcome as defined in P-COSCA [1]
Study Design	Randomized controlled trials (RCTs) and non-randomized studies (non-randomized controlled trials, interrupted time series, controlled before-and-after studies, cohort studies) are included. Case series may be included in the initial search and the minimal number of case studies is greater or equal to 5. Unpublished studies (e.g., conference abstracts, trial protocols) are excluded. All relevant publications in any language are included as long as there is an English abstract. All relevant publications in any language are included as long as there is an English abstract.
Timeframe	All years from inception

Year of last full review: No previous review on this topic

Current ILCOR Consensus on Science and Treatment Recommendation for this PICOST: No current recommendation on this topic

Database searched: Medline

Time Frame: (new PICOST) – all years, from inception to November 14th, 2025

Date Search Completed: November 14th, 2025

Search Results (Number of articles identified and number identified as relevant): 968/8

Summary of Evidence Update:

Post cardiac arrest hypotension is associated with increased hospital mortality. Current recommendations suggest that, in infants and children post cardiac arrest (CA) with a return of spontaneous circulation (ROSC), a systolic or mean arterial blood pressure greater than 10th percentile for age should be targeted[2] There is no previous ILCOR review or recommendation on how to achieve the targeted blood pressure in children.

The evidence update identified eight studies: six observational studies[3-8], one systematic review[9], and one ongoing clinical trial[10]. Two additional studies, although not directly aligned with the PICOST question, were considered relevant by the task force: a systematic review evaluating vasopressor selection after cardiac arrest in adults [11] and an ongoing pediatric trial investigating blood pressure targets in critically ill children[12].

Conlon et al evaluated children after out-of-hospital cardiac arrest (OHCA) who underwent transthoracic echocardiography (TTE), 41% showed evidence of decreased systolic function. Sixty-two percent of patients received inotropic support, most commonly dopamine (69%) and epinephrine (11%). A higher vasoactive–inotropic score (VIS) was associated with increased mortality[3].

The remaining observational studies did not specify which inotropes were used to manage postcardiac arrest hypotension. The studies demonstrated an association between the duration of hypotension and the amount of vasoactive support (measured by VIS) with outcomes. Two studies including children with IHCA and OHCA who had ROSC demonstrated that higher VIS [5, 7] and longer duration of vasoactive medication use [7] were independently associated with increased mortality. Unfavorable neurological outcomes were also associated with higher VIS in both IHCA and OHCA pediatric patients[6] . Some studies reported the proportion of patients receiving inotropic support during the post–cardiac arrest phase, ranging from 41% [7]to 62% [3]

Nuthall et al. conducted a systematic review of 11 studies and concluded that maintaining systolic or mean arterial blood pressure above the 10th percentiles for age is associated with improved survival to hospital discharge and favorable neurological outcomes[9].Prasad et al is conducting the first randomized controlled trial comparing norepinephrine and epinephrine in hypotensive children following cardiac arrest[10].

The evidence update highlighted a paucity of literature on this topic, identifying only one ongoing trial in children comparing inotropes for the treatment of hypotension post–cardiac arrest. Existing evidence demonstrates a high prevalence of cardiac dysfunction in children post cardiac arrest. However, it does not provide evidence favoring any specific strategy to prevent hypotension.

Relevant Guidelines or Systematic Reviews

Author; Year Published	Guideline or systematic review	Topic addressed or PICO(S)T	Number of articles identified	Key findings	Treatment recommendations
Nuthall, 2025[9]	Systematic Review	Blood pressure target in pediatric patients post cardiac arrest and ROSC	11 observational studies	Early hypotension after return of circulation post cardiac arrest is associated with worse outcomes in infants and children after cardiac arrest.	Systolic or mean arterial blood pressure targets >5th and >10th percentile for age are associated with improved survival to hospital discharge and survival with favorable neurologic outcomes at hospital discharge.
Niemela, 2025 [11]	Systematic Review	Vasopressor choice in adult patients with hypotension following cardiac arrest and ROSC	8 (one RCT, 7 nonrandomized trials)	Included studies compare noradrenaline vs adrenaline (6 studies), noradrenaline vs dopamine (1), noradrenaline vs noradrenaline and dopamine (1), and dopamine vs noradrenaline and adrenaline (1). The single RCT found no difference in outcomes between noradrenaline and adrenaline. Results from other studies comparing noradrenaline and adrenaline were inconsistent. Some studies found no difference in outcomes, while others suggested association between adrenaline use and worse outcomes	Existing evidence does not support the use of any specific vasopressor to treat hypotension following cardiac arrest and return of spontaneous circulation

Ongoing RCTs:

Study Acronym; Author; Year Published; Location	Aim of Study; Study Type; Sample Size (N)	Patient Population	Study Intervention / Comparator	Outcomes	Study Limitations; Adverse Events
Prasad, 2025[10] Patna, India	**Study Aim:** To compare epinephrine vs norepinephrine in pediatric post cardiac arrest shock **Study Type:** Ongoing study: single center, double blind RCT N= 250 (125 per group)	Children aged 1 month to 18 yo who experienced CA for non-cardiac causes, achieve ROSC and develop post resuscitation shock	Epinephrine VS norepinephrine	**Primary:** in hospital mortality **Secondary**: duration of vasopressor use, MAP response, neurological outcomes, arrhythmias.	Ongoing study
PRESSURE trial; Darnell, 2024[12] United Kingdom (eighteen PICUs)	**Study Aim:** Adjustment of hemodynamic support to achieve a permissive MAP target greater than fifth centile for age during invasive mechanical ventilation. **Study Type:** Pragmatic, open, multicenter, parallel group randomized control trial (RCT) N= 1900	Infants and children older than 37 weeks corrected gestational age to 16 years accepted to a participating PICU, on mechanical ventilation and receiving vasoactive drugs for hypotension.	Permissive MAP target VS usual care	**Primary:** composite of death and days of ventilatory support at 30 days **Secondary** Several secondary outcomes, including Mortality at PICU discharge, 30d, 90d, 12m Time to fist liberation from invasive ventilation Length of stay	Ongoing study; Not post cardiac arrest population, but aims to determine clinical and cost-effectiveness of a permissive mean arterial pressure (MAP) target of greater than a fifth centile for age in ventilated PICU patients

Observational Studies

Author; Year Published	Study Type/Design; Study Size (N)	Patient Population	Primary Endpoint of study	Findings related to use of inotropes / Vasoactive inotropic score (VIS)
Chun, 2024[7]	**Study type:** Single center, retrospective, observational study **Study size:** n= 106	Pediatric patients with IHCA or OHCA and ROSC admitted to a 14 bed PICU	This study identified diastolic blood pressure (DBP) within one-hour post-ROSC as the most significant hemodynamic determinant of survival to intensive care unit discharge among resuscitated pediatric patients.	Survival was 63,2% (67/106). VIS within 24 hours was higher in non survivors compared to survivors (19,7± 32 vs 94,7 ± 75, p <0,01). Duration of vasoactive drugs was higher in non survivors compared to survivors (5,8 +- 10,9 vs 36,5 +- 75,7, p < 0,01). Hypotension defined as blood pressure below the normal range for age (not defined).

Conlon, 2015[3]	**Study type:** Retrospective case series **Study size:** N= 58	Pediatric patients <18 yo with OHCA and ROSC admitted to a PICU and who had TTE within 24h of ROSC. 45% had pre-existing conditions. 43% received therapeutic hypothermia (32 - 34o target)	In patients receiving TTE within the first 24 hours following ROSC after pediatric OHCA, decreased LV systolic function and vasopressor use were common. Decreased LV systolic function was associated with increased mortality.	Median time from ROSC to TTE was 6,5h. 41% of patients had decreased LV systolic function, and 79% had any abnormality on TTE. Thirty-six patients (62%) were treated with vasopressor support at the time of TTE. Of those on support, 27 patients (75%) were treated with dopamine, 25 (69%) with epinephrine, 4 (11%) with vasopressin, 2 (6%) with norepinephrine, 2 (6%) with dobutamine, 2 (6%) with phenylephrine, and 1 (3%) with milrinone. VIS at the time of TTE was not associated with LV systolic function
Gardner, 2023[4]	**Study type:** Secondary analysis of prospectively collected data **Study size:** 693 index events	Patients 37w GA to 18yo with IHCA admitted to PICU	The absence of SBP below the 10th percentile and DBP below the 50th percentile during the first 6 h after ROSC were associated with higher rates of survival to hospital discharge with favorable neurologic outcome and survival to hospital discharge.	VIS score was lower in patients with SBP higher than the 10th percentile at 6h and 24h post cardiac arrest. VIS was lower in patients with DBP > 50th percentile at 6h, but not at 24h. Study does not describe inotropes used in the post CA phase. Hypotension was defined as SBP < 10th percentile and DBP lower that the 50th percentile for age.
Laverriere, 2020[5]	**Study type:** Retrospective cohort study **Study size:** N= 116	Patients between 1 day and 18yo who had CA (at least 2 min) and sustained ROSC for more than 20 minutes and received ICU support.	A higher burden of post resuscitation hypotension within the first 72 hours of ICU post resuscitation care is significantly associated with decreased discharge survival in a single-center cohort. Importantly, this study characterized the burden of hypotension based on frequent blood pressure measurements and evaluated vasoactive infusion dosing with the VIS.	In the first 72 hours of ICU postarrest care, patients who had "any hypotension" and survived to discharge had a median VIS of 3.1 (IQR, 0.005–8.6), while those who did not survive to discharge had a median VIS of 14.9 (IQR, 4.6–61.6). 84% of patients with at least a single episode of hypotension received inotropes. Hypotension was defined as SBP < 5th percentile for age.
Liu, 2024[6]	**Study type:** Retrospective observational study **Study size:** N=140	Patients <18yo who experienced IHCA or OHCA, received post arrest care in a PICU and had continuous BP monitoring (arterial line).	At the 5th percentile-for-age, hypotension burden, duration, and magnitude were all associated with unfavorable outcomes.	Median vasoactive inotropic score was significantly greater for patients with unfavorable compared to favorable outcomes at 6 hours post-ROC (7.75 [0,20.1] vs 0 [0,6]; p=0.012), and at 24 hours post-ROC (4 [0,17.8] vs 0 [0,7.3]; p=0.040). Hypotension burden was calculated using area between patient's MAP and the 5th percentile for age form MAP.
Topjian, 2014[8]	**Study type:** Retrospective cohort study **Study size:**	Pediatric patients (1 day to 18yo) who had cardiac arrest and ROSC who had SBP documented within 6h of CA.	early post-resuscitation hypotension is associated with increased hospital discharge mortality in children after successful resuscitation from cardiac arrest. Among children	Forty one percent of patients received vasopressors infusion within the first 6h after ROSC. Among patients who received post-ROSC vasopressors, there was no difference in discharge outcomes between

	N= 383		with documented early post-ROSC hypotension, 53% died in the hospital compared to 41% without documented early post-ROSC hypotension.	hypotension and no hypotension groups (p=0.18). However, among patients who did not receive vasopressors within six hours post-ROSC, those with no post-ROSC hypotension were less likely to die than those with hypotension (OR=2.12; 95% CI, 1.18–3.81). Thirty-three patients (8.6%) were initiated on a new vasopressor following resuscitation. Three hundred fifty patients did not have the initiation or addition of a new vasopressor following ROSC. Mortality rate for both groups was 48%. Of the 214 with early post-resuscitation hypotension, 73 continued to receive preexisting vasopressor support, while 15 were initiated on vasopressor support. More than half (126/214) were not treated with a continuous vasopressor infusion. Hypotension was defined as SBP < 5th percentile for age.

Reviewer Comments:

There is limited pediatric evidence on how to prevent hypotension in children in post–cardiac arrest. One ongoing trial comparing epinephrine to norepinephrine (9) may provide additional insights, but at present, the available evidence does not justify a systematic review on this topic, nor a good practice statement.

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