Guideline 12.5 – Management after Return of Spontaneous Circulation (ROSC)

Summary

ANZCOR Guidelines 12.1 to 12.5 are provided to assist health professionals in the resuscitation of children. Differences from the adult and newborn guidelines reflect differences in the causes of cardiorespiratory arrest in, and anatomy and physiology of newborns, older infants, children and adults. These guidelines draw from the Paediatric Life Support 2025 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations,[1] the development of which included representation from the Australian and New Zealand Committee on Resuscitation

(ANZCOR). The 2025 European Resuscitation Council Paediatric Life Support guidelines,[2] 2025 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Care,[3, 4] previous Paediatric Life Support International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations[5-25]statements and local practices have also been considered.

ANZCOR Guideline 12.5 focuses on the management of the infant or child after cardiorespiratory arrest in cases where return of spontaneous circulation has been achieved. It should be read in conjunction with the other paediatric guidelines (ANZCOR Guidelines 12.1, 12.2, 12.3 and 12.4).

To whom does this guideline apply?

This guideline applies to infants and children (refer to ANZCOR Guideline 12.1 for definitions) who have return of spontaneous circulation (ROSC) after cardiorespiratory arrest.

Who is the audience for this guideline?

This guideline is intended for health professionals who care for infants and children in healthcare environments where resuscitation equipment and medications are available.

It represents the next steps in the continuum of care from bystander basic life support (BLS) and/or health professional paediatric basic life support (PBLS) and paediatric advanced life support (PALS) through to recovery and steps to optimise long term outcome.

About this Guideline

Search date/s	ILCOR literature search details and dates are available on the CoSTR page of the ILCOR website (https://costr.ilcor.org) and relevant CoSTR documents.
Questions/PICOs:	Are described in the CoSTR documents (https://costr.ilcor.org)
Method:	The guideline process includes involvement of stakeholders from member organisations of the Australian Resuscitation Council & New Zealand Resuscitation Council, and peer review by members of the Australian and New Zealand Committee on Resuscitation (ANZCOR). Details of the guideline development process can be found on the ANZCOR website at www.anzcor.org. The ANZCOR treatment recommendations provided (highlighted in grey boxes) bring together the available resuscitation evidence and clinical expertise. If an ANZCOR treatment recommendation is obtained from the ILCOR CoSTR, that statement will be referenced. Where the development of a recommendation has been based on "expert consensus opinion", this will be labelled as either an ILCOR Good Practice Statement or an ANZCOR Good Practice Statement. Some paediatric doses are provided for reference but practitioners should comply with local drug dosing guidelines.
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Approved:	April 2026

Abbreviations

Abbreviation	Meaning/Phrase
ALS	advanced life support
ANZCOR	Australian and New Zealand Committee on Resuscitation
BLS	basic life support
BP	blood pressure

CoSTR	Consensus on Science with Treatment Recommendations
CPR	cardiopulmonary resuscitation
ECG	electrocardiogram
EEG	electroencephalogram
EIT	Education, Implementation and Teams
ETT	endotracheal tube
IHCA	in-hospital cardiac arrest
ILCOR	International Liaison Committee on Resuscitation
IO	intraosseous
IV	intravenous
OHCA	out-of-hospital cardiac arrest
$PaCO_2$	partial pressure of arterial carbon dioxide
PaO_2	partial pressure of arterial oxygen
PALS	paediatric advanced life support
PBLS	paediatric basic life support
PLS	paediatric life support
PCAS	post cardiac arrest syndrome
RCT	randomised control trial
ROSC	return of spontaneous circulation
SGA	supraglottic airway
SCA	sudden cardiac arrest
TTM	targeted temperature management

Summary of Changes

The main changes made in this latest update to the ANZCOR Guideline 12.5 include:

Section	Updated Guidance	Previous Guidance

1.0	ANZCOR suggests that infants and children with ROSC who have been resuscitated after cardiorespiratory arrest should be admitted to a facility with the necessary resources for post cardiac arrest care.	ANZCOR suggests that infants and children with ROSC who have been resuscitated after cardiorespiratory arrest should be admitted to a facility with the necessary resources for proper post-ROSC neuroprotective care, organ- and/or life supporting treatments, comprehensive neurological assessment and psychosocial support.
2.0	ANZCOR recommends that for infants and children after ROSC, a systolic or mean arterial blood pressure >10th percentile for age should be targeted.	ANZCOR recommends that for infants and children after ROSC, parenteral fluids and/or inotropes or vasopressors should be used to maintain a systolic blood pressure of at least greater than the fifth percentile for age.
3.0	ANZCOR suggests that rescuers measure partial pressure of arterial carbon dioxide ($PaCO_2$) after ROSC and target normocapnia. Consider adjustments to the target $PaCO_2$ for specific patient populations where normocapnia may not be desirable (e.g. chronic lung disease, congenital heart disease, increased intracranial pressure). ANZCOR suggests that rescuers measure partial pressure of arterial oxygen (PaO_2) after ROSC and target a value appropriate to the specific patient condition and suggest rescuers target normoxemia after ROSC. ANZCOR suggests that, to achieve normoxia, targeting an oxygen saturation of 94 to 99% may be a reasonable alternative to measuring PaO_2.	ANZCOR suggests that rescuers measure $PaCO_2$ after ROSC and target normocapnia. Consider adjustments to the target $PaCO_2$ for specific patient populations where normocapnia may not be desirable (e.g. chronic lung disease with chronic hypercapnia, congenital heart disease with single-ventricle physiology, increased intracranial pressure with impending herniation). ANZCOR suggests that rescuers measure PaO_2 after ROSC and target a value appropriate to the specific patient condition. In the absence of specific patient data, we suggest rescuers target normoxemia after ROSC. Given the availability of continuous pulse oximetry, targeting an oxygen saturation of 94% to 99% may be a reasonable alternative to measuring PaO_2 and titrating oxygen when feasible to achieve normoxia.
6.0	ANZCOR suggests continuous electroencephalogram (EEG) monitoring should be considered post-arrest within the first 24 hours and the treatment of seizures is suggested for children post–cardiac arrest. Routine use of prophylactic anti-seizure medication is not advised.	Nil

7.0	ANZCOR recommends that no single test be used in isolation to predict good neurological outcome in children after cardiac arrest. Clinicians should use multiple tests in combination for good neurological outcome prediction. ANZCOR recommends that no single test be used in isolation to predict poor neurological outcome in children after cardiac arrest. Clinicians should use multiple tests in combination for poor neurological outcome.	ANZCOR suggests that practitioners use multimodal tools to predict neurologic outcomes for infants and children after cardiac arrest.
9.0	ANZCOR suggests performing post-event debriefing after paediatric cardiac arrest in all settings.	ANZCOR suggests data-driven, performance-focused debriefing of rescuers after IHCA or OHCA in children.

1.0 | Introduction

After the return of spontaneous circulation (ROSC), resuscitation does not stop. It is essential to continue maintenance of airway, breathing and circulation. ROSC is just the first step toward the goal of complete recovery from cardiac arrest.

Return of circulation following successful resuscitation results in the complex physiology of post cardiac arrest syndrome (PCAS). The key components of this are:

1. post cardiac arrest brain injury
2. post cardiac arrest myocardial dysfunction
3. systemic ischemia/reperfusion response
4. the persistent precipitating pathophysiology of the cardiac arrest.

To maximise survival to hospital discharge with good neurological outcome, these components must all be anticipated, recognised and treated.

Hypoxic brain injury, myocardial injury or subsequent organ failure are the predominant causes of morbidity and mortality after cardiac arrests. The goal of post-cardiac arrest care is to prevent ongoing secondary brain injury and optimise end-organ perfusion to allow time for recovery and ongoing neuroprognostication.

The possible reversible causes of cardiorespiratory arrest should be sought and treated. Reversible causes (the “4Hs and 4Ts”) include hypoxaemia, hypovolaemia, hypo/hyperthermia, hyper/hypokalaemia or other metabolic disorders, cardiac tamponade, tension pneumothorax, toxins, (poisons and drugs) and thrombosis (cardiac or pulmonary).

Occasionally, cardiac arrest occurs unexpectedly in an infant or child. In the case of sudden cardiac arrest (SCA), a standardised diagnostic protocol should be used to identify the cause of arrest event. If the SCA might have been due to an inherited condition, such as certain arrhythmias and cardiomyopathies, appropriate screening of family members should be considered.

It is important to use a systematic approach to post cardiac arrest management supporting end organ function and treating PCAS should commence immediately after ROSC. Use individualised goals and bundles of care and treat underlying disease. Patients should be transferred to centres where ongoing paediatric intensive care therapies can be provided. Intensive care monitoring includes electrocardiogram (ECG), pulse oximetry, capnography, temperature and blood pressure. Routine monitoring should also include invasive arterial blood pressure monitoring and central venous access in all comatose children.

ANZCOR suggests that infants and children with ROSC who have been resuscitated after cardiorespiratory arrest should be admitted to a facility with the necessary resources for post-cardiac arrest care [ANZCOR Good Practice Statement].

2.0 | Post ROSC Haemodynamic Support

It is important to ensure an adequate systemic arterial blood pressure as soon as practicable after ROSC. The known pathophysiology of post-cardiac arrest syndrome provides a rationale for titrating haemodynamic support to optimise organ perfusion.[26] Blood pressure should ideally be monitored using continuous arterial line pressure monitoring, so hypotension can be rapidly identified and treated. Any episode of hypotension may be associated with worse neurologic outcomes.[26-29]

The topic of post-ROSC blood pressure targets was most recently reviewed as part of the CoSTR 2025 process.[1]Optimal blood pressure (BP) targets in infants and children following return of circulation after cardiac arrest are not well defined. New evidence emerged after the systematic review,[1] prompting an updated systematic review.[30] Seven non-randomised observational cohort studies were included, 5 of which were secondary analyses.

ANZCOR recommends that for infants and children after ROSC, a systolic or mean arterial blood pressure >10th percentile for age should be targeted [CoSTR 2025, weak recommendation, very low certainty evidence].

BP percentile ranges for age are available for reference.[31, 32]

3.0 | Post ROSC Oxygenation and Ventilation

Optimal oxygenation and ventilation of children after ROSC may be altered by the pathology that

caused the cardiac arrest and post-cardiac arrest ischemic injury and reperfusion. For management of oxygenation and ventilation, PaO_2, $PaCO_2$ and saturations should be monitored. Target normoxia and/or saturations of 94 to 99% (or child's normal oxygen saturations), and avoid hypocapnia (or aim for a $PaCO_2$ that is appropriate for the child's underlying condition).[33-36]

As a part of the ILCOR 2020 CoSTR process, a systematic review[37] of oxygen and carbon dioxide targets in adults and children with ROSC after cardiac arrest was conducted with involvement of clinical content experts from both the adult life support (ALS) and paediatric life support (PLS) Task Forces. Evidence from adult and paediatric literature was sought and considered by the ALS and PLS Task Forces, respectively.

No paediatric randomised control trials (RCTs) were identified examining ventilation and oxygenation post ROSC in children. Observational studies[34, 36] showed an increase in hospital mortality associated with both hypocapnia and hypercapnia after ROSC compared with normocapnia. No benefit was found for hyperoxemia compared with normoxemia.[34, 38, 39] One large registry-based study[40] found that hyperoxemia was associated with higher mortality when compared with normoxemia.

An ILCOR systematic review is being undertaken to review new evidence for post ROSC ventilation and oxygenation and association with critical outcomes of survival to hospital discharge and survival with favourable neurologic outcome in children.

ANZCOR suggests that rescuers measure $PaCO_2$ after ROSC and target normocapnia [CoSTR 2020 weak recommendation, very low-certainty evidence]. Consider adjustments to the target $PaCO_2$ for specific patient populations where normocapnia may not be desirable (e.g. chronic lung disease, congenital heart disease, increased intracranial pressure).

ANZCOR suggests that rescuers measure PaO_2 after ROSC and target normoxemia. A value appropriate to the specific patient condition should be chosen [CoSTR 2020, weak recommendation, very low-quality evidence].

ANZCOR suggests that, to achieve normoxia, targeting an oxygen saturation of 94-99% may be a reasonable alternative to measuring PaO_2 [Good Practice Statement].

4.0 | Temperature Management

Elevated core body temperature is common after cardiac arrest. Persistent hyperthermia is associated with unfavourable neurological outcomes in children.[26] Timely continuous core temperature monitoring and active methods to achieve targeted temperature management (TTM) should be used for patients who are comatose after ROSC.

A systematic review addressing TTM was published in 2019,[41] and an ILCOR Paediatric CoSTR was published as part of the 2019 CoSTR summary.[17] In 2021, an evidence update was performed by the ILCOR PLS Task Force but did not identify sufficient new data to warrant repeating a systematic

review.

On the basis of 2 randomised trials and multiple retrospective observational cohort studies that provided comparative data on favourable neurological outcome, survival, and in-hospital adverse events, there was inconclusive evidence to support or refute the use of induced hypothermia (32 ^{0}C to 34 ^{0}C) compared with active control of temperature at normothermia (36 ^{0}C to 37.5 ^{0}C) for children who achieve ROSC but remain comatose after out-of-hospital cardiac arrest (OHCA) or in-hospital cardiac arrest (IHCA).

ANZCOR suggests that for infants and children who remain comatose following ROSC from OHCA or IHCA, active control of temperature be used to maintain a central temperature of ≤37.5 ^{0}C [CoSTR 2019, weak recommendation, moderate-certainty evidence].

5.0 | Glucose Control

Both hypoglycaemia and hyperglycaemia have been associated with unfavourable outcomes in critically ill children.[26] Randomised control trials performed in both critically ill adults and children using insulin infusions to maintain glucose control[42] have shown mixed results with concerns about impact of hypoglycaemic events on long term patient outcomes.[43] A recent paediatric randomised controlled trial of lower-target glucose versus higher-target glucose control was ceased early due to low likelihood of benefit and the possibility of harm.[26]

There is currently insufficient evidence to determine the optimal blood glucose level during PCAC that is associated with improved neurological outcomes for infants and children.

ANZCOR suggests that blood glucose levels should be monitored after cardiac arrest with the aim of maintaining normoglycaemia. If insulin is used to control hyperglycaemia, care should be taken to avoid hypoglycaemia [ANZCOR Good Practice Statement].

6.0 | Post ROSC Seizure Management

Both non-convulsive and convulsive seizures are common in the post ROSC phase. If resources allow, continuous electroencephalography (EEG) monitoring is recommended as, without this, non-convulsive seizure and non-convulsive status cannot be detected. While there is insufficient evidence to demonstrate that treatment of seizures improves outcome, both convulsive and non-convulsive seizures are associated with worse outcomes, and it is reasonable to treat seizures in consultation with experts.[44, 45]

A systematic review examining seizure prevention and management after cardiac arrest was published as part of the 2024 CoSTR summary.[46] No paediatric studies reported improvement in survival with favourable neurological outcome or survival with prophylactic anti-seizure medication

or treatment of seizures.

ANZCOR suggests continuous EEG monitoring should be considered post-arrest within the first 24 hours and the treatment of seizures is suggested for children post–cardiac arrest [ANZCOR Good Practice Statement]. Routine use of prophylactic anti-seizure medication is not advised [ILCOR Good Practice Statement]

7.0 | Prognosis and Prediction of Outcome

The ILCOR PLS Task Force performed systematic reviews examining post-ROSC predictive factors associated with good neurological outcome in 2023[8, 47] and poor neurological outcome in 2025.[1] Tests that have been found to be useful, non-discriminating, and not useful are summarised in Figures 1 and 2.

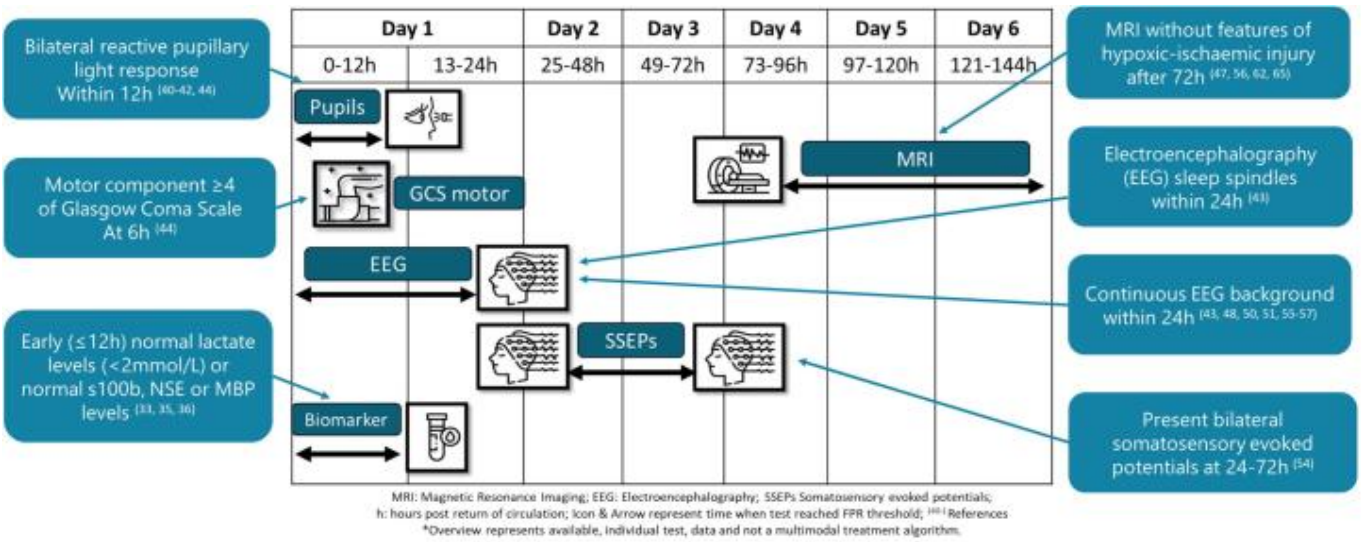


Figure 1: Overview of test and timing for prediction of good neurological outcome after paediatric cardiac arrest

[Reproduced from Scholefield et al https://doi.org/10.1016/j.resuscitation.2024.110483]

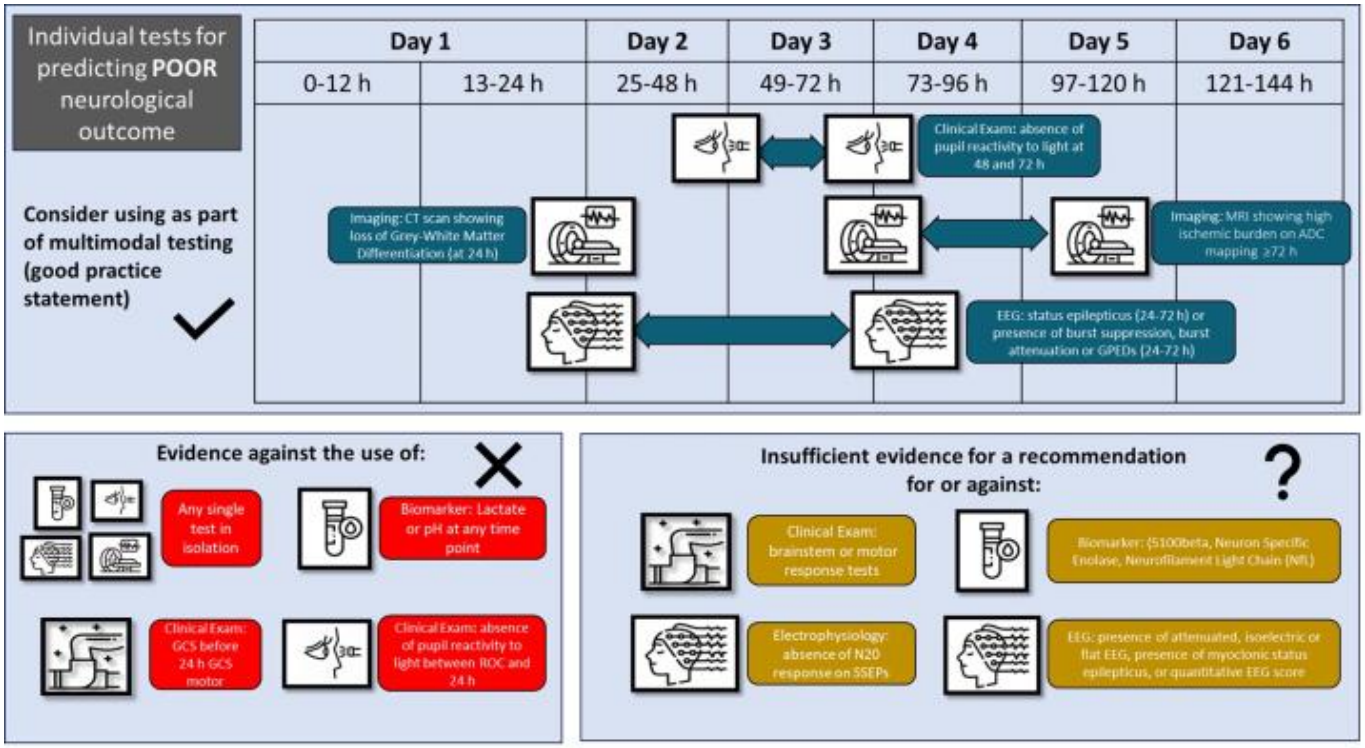


Figure 2: Overview of test and timing for prediction of poor neurological outcome after cardiac arrest

[Reproduced from Scholefield et al https://doi.org/10.1161/CIR.0000000000001362]

ANZCOR recommends that no single test be used in isolation to predict good neurological outcome in children after cardiac arrest. Clinicians should use multiple tests in combination for good neurological outcome prediction [ILCOR Good Practice Statement].

ANZCOR recommends that no single test be used in isolation to predict poor neurological outcome in children after cardiac arrest [CoSTR 2025, strong recommendation, very low–certainty evidence]. Clinicians should use multiple tests in combination for poor neurological outcome prediction [ILCOR Good Practice Statement].

8.0 | Cessation of Cardiopulmonary Resuscitation

The decision to stop resuscitation efforts in paediatric patients after cardiac arrest is challenging. It should be based on a combination of factors including, but not limited to, the pre-arrest status, duration of arrest, response to resuscitation, remediable factors, opinions of experienced personnel and wishes of parents/carers.

Although there are no highly reliable means of determining outcome, in the absence of reversible causes, prolonged resuscitative efforts for children are unlikely to be successful.

It is important to note that the decision to stop resuscitation should not be made by a single individual but rather by a team of experienced healthcare professionals, including physicians, nurses, and other specialists, after following established guidelines and protocols. Additionally, the decision-making process may vary depending on local laws, cultural considerations, and institutional policies.

9.0 | Post Cardiac Arrest debriefing

After resuscitation events staff may benefit from debriefing. This can be done either immediately after the event (hot debrief), or at a later time (cold debrief). It is increasingly recognised that there are a number of benefits to debriefing and that these include: acknowledgement of these events causing potential distress, clarifying medical facts and discovering both system successes and system improvements, which can all result in safer patient care.

The Education, Implementation and Teams (EIT) Taskforce performed a systematic review on debriefing of resuscitation performance as part of the ILCOR 2025 CoSTR process.[48] The review was limited by high inconsistency (heterogeneity) across studies, reflecting variation in instructional design, provider type, and outcome measures. Performance of post-event debriefing was either associated with no effect or with improved outcome (favourable neurological outcome, survival to discharge, ROSC, chest compression depth, chest compression rate, chest compression fraction, adherence to guidelines). The review did not identify any undesirable effects (e.g. emotional trauma) related to debriefing after cardiac arrest in the reviewed studies and concluded that the reported positive effects outweigh any possible undesirable effects. The review also considered the high likelihood that this type of intervention is both acceptable to staff; with potential benefits such as improved teamwork, improved communication, or identification of latent safety threats.

ANZCOR suggests performing post-event debriefing after paediatric cardiac arrest in all settings [CoSTR 2025, weak recommendation, very low-certainty evidence].

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Referencing this guideline

When citing the ANZCOR Guidelines we recommend:

ANZCOR, 2026, Guideline 12.5 – Management after Return of Spontaneous Circulation (ROSC), accessed 29 September 2026,
https://www.anzcor.org/home/paediatric-advanced-life-support/guideline-12-5-management-after-return-of-spontaneous-circulation-rosc