Guideline 12.3 – Management of other arrhythmias in infants and children

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 12.3 focuses on the management of the infant or child with a cardiac arrhythmia (but not in cardiorespiratory arrest). It should be read in conjunction with the other paediatric guidelines (ANZCOR Guidelines 12.1, 12.2, 12.4 and 12.5).

To whom does this guideline apply?

This guideline applies to infants and children requiring advanced life support (PALS) in a healthcare environment (pre-hospital or hospital).

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.

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.
Principal reviewers:	Jason Acworth, Marissa Alexander, Christine Brabyn, Jane Cichero, Elliot Long, Andrea Christoff, Gabrielle Nuthall
Approved:	April 2026

Abbreviations

Abbreviation	Meaning/Phrase
ANZCOR	Australian and New Zealand Committee on Resuscitation
CoSTR	Consensus on Science with Treatment Recommendations
CPR	cardiopulmonary resuscitation
ECG	electrocardiogram
ILCOR	International Liaison Committee on Resuscitation

IO	intraosseous
IV	intravenous
PALS	paediatric advanced life support
pVT	pulseless ventricular tachycardia
ST	sinus tachycardia
SVT	supraventricular tachycardia
VF	ventricular fibrillation
VT	ventricular tachycardia

Summary of Changes

The main changes made in this latest update to the ANZCOR Guideline 12.3 include:

Section	Updated Guidance	Previous Guidance
2.0	(Previous Sections 2.0-2.2 combined) ANZCOR suggests that, for patients with bradycardia and hemodynamic compromise not responsive to oxygenation and ventilation commence CPR, follow the standard paediatric advanced life support algorithm and treat underlying causes.	2.1 ANZCOR suggests that, for the treatment of children with bradycardia: IV/IO Adrenaline (epinephrine) 10 micrograms/kg (maximum 1mg per dose) may be administered to infants and children with bradycardia and poor perfusion that is unresponsive to treating the underlying cause, for example hypoxia. IV/IO Atropine 20 micrograms/kg (maximum 600 micrograms) may be administered for bradycardia caused by increased vagal tone. 2.2 ANZCOR suggests that, for the treatment of children with bradycardia: Transthoracic pacing may be lifesaving in selected cases of life-threatening bradycardia caused by complete heart block or abnormal function of the sinus node. Specialist advice should be sought. Pacing is not helpful in children with bradycardia secondary to a post-arrest hypoxic/ischemic myocardial insult or respiratory failure.

1.0 | Tachyarrhythmias

Any heart rate significantly above normal-for-age should prompt consideration of a tachyarrhythmia as a possibility. This is especially so if associated with signs of poor circulation and hypotension; if the child has a history of cardiac disease or cardiac surgery; or in cases where the child may have been poisoned with cardioactive drugs. In sinus tachycardia, the elevated heart rate is a response to, rather than the cause of, poor circulation. A careful history and a 12-lead electrocardiograph (ECG) may help to differentiate the likely cause.

1.1 | Supraventricular Tachycardia (SVT)

Supraventricular tachycardia (SVT) is the most common spontaneous-onset arrhythmia in childhood and infancy. It may result in life-threatening hypotension. It usually presents with a heart rate of 220 to 300/min in infants, and a lower rate in older children (approximately 180/min). The QRS complex is usually narrow (<0.08 sec) making it difficult sometimes to discern from sinus tachycardia. The heart rate in sinus tachycardia may vary with activity or stimulation, whereas in SVT it is uniform and is often of sudden onset and offset. A P-wave may be discernible in either rhythm but is often absent in SVT.

In haemodynamically stable children, vagal stimulation should be attempted as initial treatment of SVT. For infants and young children, this may best be achieved by application of a plastic bag filled with iced water to the face or by wrapping the infant's arms in a towel and immersing the whole face in an ice water slurry for 5 seconds. Older children, if conscious, may be coached to perform a Valsalva manoeuvre (such as blowing on a balloon or syringe).

Pharmacological management of SVT was last reviewed as part of the CoSTR 2010 process.[24] In 2020, an evidence update was performed to identify new evidence published in the last 10 years.[26] The ILCOR PLS Task Force concluded that there was insufficient new evidence to consider a change from the 2010 recommendations.

Adenosine remains the preferred first-line medication for treatment of children with SVT with a palpable pulse. Adenosine has a very short half-life and must be given as a rapid intravenous (IV) or intraosseous (IO) bolus (preferably into a proximally located large vein) followed by a rapid flush of 0.9% sodium chloride. A dose in the range of 100 to 300 micrograms/kg reverts most SVT to sinus rhythm. The initial recommended dose is 100 micrograms/kg (maximum 6mg), but if this is ineffective, the further doses of 200 micrograms/kg then 300 micrograms/kg may be tried (maximum 12mg each single dose). If these are ineffective, then expert advice should be sought to guide further treatment options including:

- Further IV/IO Adenosine doses of 400 micrograms/kg, then 500 micrograms/kg (maximum 12mg per dose).
- Synchronised cardioversion (1 to 2 J/kg).
- Other antiarrhythmic medications.

SVT may cause hemodynamic compromise in which case synchronised cardioversion should be

performed immediately in a dose of 1 J/kg but increased to 2 J/kg if necessary.[27]

ANZCOR suggests that, for the treatment of children with supraventricular tachycardia with a palpable pulse [all ANZCOR Good Practice Statements]:

· Adenosine IV/IO should be considered the preferred medication.

· Synchronised cardioversion (1 to 2 J/kg) with the administration of suitable analgesia/sedation in conscious children may be considered in SVT with cardiovascular compromise when IV Adenosine is not able to be administered (e.g. no IV access) or is not effective.

· Amiodarone or other antiarrhythmic medications (e.g. calcium channel blockers, beta-blockers) given by a slow IV infusion with careful haemodynamic monitoring may be considered for refractory SVT after expert consultation.

1.2 | Ventricular Tachycardia

Management of ventricular tachycardia (VT) with a palpable pulse was last reviewed as part of the CoSTR 2010 process.[24] In 2020, an evidence update was performed to identify new evidence published in the last 10 years. [26] The ILCOR PLS Task Force concluded that there was insufficient new evidence to consider a change from the 2010 recommendations.

ANZCOR suggests that synchronised cardioversion (1 J/kg followed by 2 J/kg if required), with the administration of suitable analgesia/sedation in conscious children, be used as the preferred first therapy for paediatric VT with cardiovascular compromise [ANZCOR Good Practice Statement].

Amiodarone given by a slow IV infusion with careful haemodynamic monitoring may be considered after expert consultation [ANZCOR Good Practice Statement].

1.3 | Polymorphic ventricular tachycardia

Polymorphic ventricular tachycardia (Torsade de pointes, 'twisting of peaks') describes VT with a changing axis and baseline on ECG. If a pulse is still present, IV magnesium sulphate may be given over 20 minutes. If pulseless, treat with defibrillation, as for pulseless ventricular tachycardia (pVT).

1.4 | Wide QRS complex Supraventricular Tachycardia

SVT with aberrant conduction may cause a tachycardia with wide QRS complexes (>0.08 sec) and thus may be indistinguishable from VT. If pulses and blood pressure are normal, management should be informed by consultation with specialists with expertise in this area.

ANZCOR suggests that if pulses are present but the blood pressure is low or circulation deemed inadequate, the rhythm should be regarded as VT and treated with synchronised cardioversion (1 J/kg followed by 2 J/kg if required) [ANZCOR Good Practice Statement].

If pulses are absent, the rhythm should be regarded as pVT and treated accordingly with defibrillation at doses of 4 J/kg (Refer to ANZCOR Guideline 12.2).

2.0 | Bradyarrhythmias

Bradycardia (heart rate of <60/minute or heart rate low for age) is rare in children and may be caused by intrinsic dysfunction or injury to the heart's conduction system (e.g. heart block) or by extrinsic factors acting on a normal heart and its conduction system (e.g. sinus bradycardia secondary to vagal stimulation).

In 2025, the ILCOR PLS Task Force conducted a scoping review on the topic of management of bradycardia in children with haemodynamic compromise.[1] The review identified numerous gaps in the literature, including absence of studies evaluating bradycardia with hemodynamic compromise in patients not receiving CPR and minimal data examining management with atropine, adrenaline (epinephrine), or transcutaneous pacing.

The Task Force considered indirect evidence supporting CPR for bradycardia with hemodynamic compromise, specifically:

· patients receiving CPR for bradycardia with hemodynamic compromise have better survival rates than those receiving CPR for asystole or pulseless electrical activity

· patients receiving CPR for bradycardia with hemodynamic compromise who maintained that rhythm had higher survival rates than those who progressed to pulselessness

· patients with bradycardia and hemodynamic compromise unresponsive to oxygen and ventilation may have potential harm associated with delaying initiation of CPR as progression to pulselessness is associated with worse outcomes

ANZCOR suggests that, for patients with bradycardia and hemodynamic compromise not responsive to oxygenation and ventilation commence CPR, follow the standard paediatric advanced life support algorithm and treat the underlying causes [ANZCOR Good Practice Statement].

References

1. Scholefield BR AJ, Ng K-C, Tiwari LK, Raymond TT, Christoff A, and Katzenschlager S E-KR, Bansal A, Topjian A, Kleinman M, Kurosawa H, Myburgh MC, del Castillo J, Rossano J, Djakow J, Guerguerian A-M, Nadkarni VM, Bittencourt Couto T, Schexnayder SM, Nuthall G, Tijssen JA, Ong GY-K, Gray JM,

Lopez-Herce J, Ambunda ES, Nolan JP, Berg KM, Morrison LJ, Atkins DL, de Caen AR; on behalf of the Pediatric Life Support Task Force Collaborators. Pediatric life support: 2025 International Liaison Committee on Resuscitation Consensus on Science With Treatment Recommendations. Resuscitation. 2025;215.

2. Djakow J TN, Skellett S, Buysse CMP, Cardona F, de Lucas N, del Castillo J, Kiviranta P, Lauridsen KG, Markel F, Martinez-Mejias A, Roggen I, Biarent D, on behalf of the ERC Paediatric Life Support Writing Group Collaborators. European Resuscitation Council Guidelines 2025 Paediatric Life Support. Resuscitation. 2025;215.

3. Joyner BL DM, Bavare A, de Caen A, DiMaria K, Donofrio-Odmann J, Fosse G, Haskell S, Mahgoub M, Meckler G, Requist J, Schexnayder SM, Olech Smith M, Werho D, Raymond TT. Part 6: pediatric basic life support: 2025 American Heart Association and American Academy of Pediatrics Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2025;152:S424–S447.

4. Lasa JJ DG, Duff JP, Hayes J, Kamath-Rayne BD, Levy A, Mahgoub M, Morgan RW, McCormick T, Roberts JS, Ross CE, Schexnayder SM, Sweberg T, Valdes SO, Topjian AA. Part 8: pediatric advanced life support: 2025 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2025;152:S479–S537.

5. Greif R, Bray JE, Djarv T, Drennan IR, Liley HG, Ng KC, Cheng A, Douma MJ, Scholefield BR, Smyth M, Weiner G, Abelairas-Gomez C, Acworth J, Anderson N, Atkins DL, et al. 2024 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces. Circulation. 2024;150:e580-e687.

6. Greif R, Bray JE, Djarv T, Drennan IR, Liley HG, Ng KC, Cheng A, Douma MJ, Scholefield BR, Smyth M, Weiner G, Abelairas-Gomez C, Acworth J, Anderson N, Atkins DL, et al. 2024 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces. Resuscitation. 2024;205:110414.

7. Berg KM, Bray JE, Ng KC, Liley HG, Greif R, Carlson JN, Morley PT, Drennan IR, Smyth M, Scholefield BR, Weiner GM, Cheng A, Djarv T, Abelairas-Gomez C, Acworth J, et al. 2023 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces. Resuscitation. 2024;195:109992.

8. Berg KM, Bray JE, Ng KC, Liley HG, Greif R, Carlson JN, Morley PT, Drennan IR, Smyth M, Scholefield BR, Weiner GM, Cheng A, Djarv T, Abelairas-Gomez C, Acworth J, et al. 2023 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support;

Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces. Circulation. 2023;148:e187-e280.

9. Wyckoff MH, Greif R, Morley PT, Ng KC, Olasveengen TM, Singletary EM, Soar J, Cheng A, Drennan IR, Liley HG, Scholefield BR, Smyth MA, Welsford M, Zideman DA, Acworth J, et al. 2022 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces. Pediatrics. 2023;151.

10. Wyckoff MH, Greif R, Morley PT, Ng KC, Olasveengen TM, Singletary EM, Soar J, Cheng A, Drennan IR, Liley HG, Scholefield BR, Smyth MA, Welsford M, Zideman DA, Acworth J, et al. 2022 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces. Resuscitation. 2022;181:208-288.

11. Wyckoff MH, Greif R, Morley PT, Ng KC, Olasveengen TM, Singletary EM, Soar J, Cheng A, Drennan IR, Liley HG, Scholefield BR, Smyth MA, Welsford M, Zideman DA, Acworth J, et al. 2022 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces. Circulation. 2022;146:e483-e557.

12. Wyckoff MH, Singletary EM, Soar J, Olasveengen TM, Greif R, Liley HG, Zideman D, Bhanji F, Andersen LW, Avis SR, Aziz K, Bendall JC, Berry DC, Borra V, Bottiger BW, et al. 2021 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Neonatal Life Support; Education, Implementation, and Teams; First Aid Task Forces; and the COVID-19 Working Group. Circulation. 2022;145:e645-e721.

13. Wyckoff MH, Singletary EM, Soar J, Olasveengen TM, Greif R, Liley HG, Zideman D, Bhanji F, Andersen LW, Avis SR, Aziz K, Bendall JC, Berry DC, Borra V, Bottiger BW, et al. 2021 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Neonatal Life Support; Education, Implementation, and Teams; First Aid Task Forces; and the COVID-19 Working Group. Resuscitation. 2021;169:229-311.

14. Maconochie IK, Aickin R, Hazinski MF, Atkins DL, Bingham R, Bittencourt Couto T, Guerguerian AM, Nadkarni VM, Ng KC, Nuthall GA, Ong GYK, Reis AG, Schexnayder SM, Scholefield BR, Tijssen JA, et al. Pediatric Life Support 2020 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. Pediatrics. 2021;147.

15. Maconochie IK, Aickin R, Hazinski MF, Atkins DL, Bingham R, Couto TB, Guerguerian AM, Nadkarni VM, Ng KC, Nuthall GA, Ong GYK, Reis AG, Schexnayder SM, Scholefield BR, Tijssen JA, et al. Pediatric Life Support: 2020 International Consensus on Cardiopulmonary Resuscitation and

Emergency Cardiovascular Care Science With Treatment Recommendations. Resuscitation. 2020;156:A120-A155.

16. Maconochie IK, Aickin R, Hazinski MF, Atkins DL, Bingham R, Couto TB, Guerguerian AM, Nadkarni VM, Ng KC, Nuthall GA, Ong GYK, Reis AG, Schexnayder SM, Scholefield BR, Tijssen JA, et al. Pediatric Life Support: 2020 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. Circulation. 2020;142:S140-S184.

17. Soar J, Maconochie I, Wyckoff MH, Olasveengen TM, Singletary EM, Greif R, Aickin R, Bhanji F, Donnino MW, Mancini ME, Wyllie JP, Zideman D, Andersen LW, Atkins DL, Aziz K, et al. 2019 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces. Circulation. 2019;140:e826-e880.

18. Olasveengen TM, de Caen AR, Mancini ME, Maconochie IK, Aickin R, Atkins DL, Berg RA, Bingham RM, Brooks SC, Castren M, Chung SP, Considine J, Couto TB, Escalante R, Gazmuri RJ, et al. 2017 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations Summary. Resuscitation. 2017;121:201-214.

19. Olasveengen TM, de Caen AR, Mancini ME, Maconochie IK, Aickin R, Atkins DL, Berg RA, Bingham RM, Brooks SC, Castren M, Chung SP, Considine J, Couto TB, Escalante R, Gazmuri RJ, et al. 2017 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations Summary. Circulation. 2017;136:e424-e440.

20. de Caen AR, Maconochie IK, Aickin R, Atkins DL, Biarent D, Guerguerian AM, Kleinman ME, Kloeck DA, Meaney PA, Nadkarni VM, Ng KC, Nuthall G, Reis AG, Shimizu N, Tibballs J, et al. Part 6: Pediatric Basic Life Support and Pediatric Advanced Life Support: 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. Circulation. 2015;132:S177-203.

21. Maconochie IK, de Caen AR, Aickin R, Atkins DL, Biarent D, Guerguerian AM, Kleinman ME, Kloeck DA, Meaney PA, Nadkarni VM, Ng KC, Nuthall G, Reis AG, Shimizu N, Tibballs J, et al. Part 6: Pediatric basic life support and pediatric advanced life support: 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Resuscitation. 2015;95:e147-68.

22. de Caen AR, Maconochie IK, Aickin R, Atkins DL, Biarent D, Guerguerian AM, Kleinman ME, Kloeck DA, Meaney PA, Nadkarni VM, Ng KC, Nuthall G, Reis AG, Shimizu N, Tibballs J, et al. Part 6: Pediatric Basic Life Support and Pediatric Advanced Life Support: 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations (Reprint). Pediatrics. 2015;136 Suppl 2:S88-119.

23. Kleinman ME, de Caen AR, Chameides L, Atkins DL, Berg RA, Berg MD, Bhanji F, Biarent D, Bingham R, Coovadia AH, Hazinski MF, Hickey RW, Nadkarni VM, Reis AG, Rodriguez-Nunez A, et al.

Pediatric basic and advanced life support: 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Pediatrics. 2010;126:e1261-318.

24. de Caen AR, Kleinman ME, Chameides L, Atkins DL, Berg RA, Berg MD, Bhanji F, Biarent D, Bingham R, Coovadia AH, Hazinski MF, Hickey RW, Nadkarni VM, Reis AG, Rodriguez-Nunez A, et al. Part 10: Paediatric basic and advanced life support: 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Resuscitation. 2010;81 Suppl 1:e213-59.

25. International Liaison Committee on R. 2005 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Part 6: Paediatric basic and advanced life support. Resuscitation. 2005;67:271-91.

26. Maconochie IK AR, Hazinski MF, et al. . Pediatric Life Support: 2020 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. Circulation. 2020;142:S140-S184.

27. Tibballs J, Carter B, Kiraly NJ, Ragg P and Clifford M. Biphasic DC shock cardioverting doses for paediatric atrial dysrhythmias. Resuscitation. 2010;81:1101-4.

Referencing this guideline

When citing the ANZCOR Guidelines we recommend:

ANZCOR, 2026, Guideline 12.3 – Management of other arrhythmias in infants and children, accessed 15 May 2026,
https://www.anzcor.org/home/paediatric-advanced-life-support/guideline-12-2-paediatric-advanced-life-support-pals-2