



ANZCOR Guideline 12.1 – Introduction to Paediatric Advanced Life Support

Summary

Who does this guideline apply to?

This guideline applies to infants and children.

Who is the audience for this guideline?

This guideline is for health professionals and those who provide healthcare in environments where equipment and drugs are available.

Recommendations

The Australian and New Zealand Resuscitation Committee on Resuscitation (ANZCOR) make the following recommendations:

1. Use the term “infant” to refer to 0-1 yr of age and “child” to refer to 1-8yrs of age.
2. Suggest the use of paediatric medical emergency team (MET) or rapid response team (RRT) systems in all hospitals that care for children.
3. Suggest that adult resuscitation protocols may be used for older children aged 9 years and above (bearing in mind that this age group have lower rates of ventricular fibrillation or pulseless ventricular tachycardia than adults).

Guideline

1 Introduction

These Guidelines are provided by the Australian and New Zealand Resuscitation Councils (ARC, NZRC) to assist in the resuscitation of infants and children. They are intended to act as adjuncts to Advanced Life Support guidelines for adults published by the ARC and NZRC in guidelines 11.1 – 11.1. Differences from the adult guidelines reflect differences in the causes of cardiorespiratory arrest and differences in anatomy and physiology between infants, children and adults. Differences from basic life support for ratios of chest compression and lung inflation reflect the use of equipment in advanced life support, an expected higher degree of skill by healthcare personnel and the intention to align with common international guidelines.

These guidelines draw (non-exclusively) from the consensus on resuscitation and treatment recommendations issued by the International Liaison Committee on Resuscitation^{1,2,3} which included representation from the ARC and NZRC.

These guidelines are specifically for advanced life support *i.e.*, resuscitation with the aid of equipment and drugs to restore and maintain airway, breathing and circulation to infants and children in a hospital or other environment where cardiorespiratory arrest may be encountered. They apply to children and to all infants but not to infants at birth (newborns) (Class A, Expert Consensus Opinion).

The exact age at which paediatric techniques, particularly the compression-ventilation ratio, should replace those used for newborns is not certain, especially for small premature infants. Infants whose cardiorespiratory physiology is in transition from an intra-uterine environment at birth to several hours after birth, *i.e.*, newborns, should be managed as per neonatal guidelines 13.1-13.10 with a compression-ventilation ratio of 3:1. Infants aged more than a few hours beyond birth should be managed according to paediatric guidelines, particularly with a compression-ventilation ratio of 15:2, in the settings of pre-hospital, emergency department, paediatric wards and paediatric intensive care unit (Class A, Expert Consensus Opinion)². With the exception of newborns, all infants with known or suspected cardiac aetiology of cardiac arrest should be managed according to paediatric guidelines regardless of location (Class A, Expert Consensus Opinion)² with a compression-ventilation ratio of 15:2 ratio if not intubated and continuous compressions without interruption if intubated². Infants in cardiac arrest secondary to hypoxaemia should be treated initially with positive pressure ventilation and oxygen (Class A, Expert Consensus Opinion).

Because equipment may not be immediately available, the guidelines incorporate some essential techniques of basic life support (resuscitation without equipment and drugs). Further details of basic life support for infants and children may be found in Guidelines 4-7.

As guidelines, they are neither immutable nor irrefutable prescriptions. They are not “stand-alone” documents – they do not encompass every emergency but are meant to serve as brief step-by-step guides to facilitate management of common life-threatening emergencies. Details of some techniques are described but not the details of every technique. Where scientific evidence exists, only the highest level of evidence supporting recommendations is cited.

Many recommendations are based on expert consensus opinion. These guidelines cannot replace broader education and training for paediatric emergencies.

2 Prevention of Cardio-Respiratory Arrest

Cardio-respiratory arrest in children is often, but not always, preceded by a period of recognizable deteriorating respiratory or cardiovascular function or both and is therefore predictable and may not be unexpected. If deterioration is recognized and treated early, cardio-respiratory arrest may be prevented. However, in institutions, barriers to recognition and treatment of a child with a deteriorating illness may exist⁴. ANZCOR suggests the use of pediatric medical emergency team (MET) or rapid response team (RRT) systems in all hospitals that care for children (CoSTR 2015, weak recommendation, very low quality of evidence)¹.

3 Definitions

Definitions of 'infant' and 'child' are based on combinations of physiology, age and physical size which influence the efficacy and practicality of performing resuscitative techniques.

The term 'infant' refers to a child of less than one year of age; a 'young child' refers to a child of pre-school and early primary school age (1-8 years); an 'older child' refers to a child of late primary school and early secondary school age or early teenage (9-14 years). Older children may be treated as per adult protocols but it should be noted that they do not have the same rates as adults of ventricular fibrillation as the initial dysrhythmia discovered at cardiac arrest². The guidelines do not refer in detail to the resuscitation of the newborn (newly-born) infant which may be found in guidelines 13.1 – 13.10.

4 Causes of Cardiorespiratory Arrest in Infants and Children

Cardiorespiratory arrest occurs in a wide variety of conditions among infants and children. The majority are caused by hypoxaemia or hypotension or both. Examples are trauma, drowning, septicaemia, sudden infant death syndrome, asthma, upper airway obstruction and congenital anomalies of the heart and lung. The initial cardiac rhythm discovered during early electrocardiographic monitoring is often severe bradycardia or asystole. The incidence of ventricular fibrillation as the initial rhythm is approximately 10%. This may influence the order of resuscitative actions. Ventricular fibrillation may occur initially with congenital heart conditions or secondary to poisoning with cardioactive drugs and it is encountered during the course of resuscitation. It may occur in membrane ion channelopathies. Respiratory arrest may occur alone, but if it is treated promptly it may not progress to cardiac arrest.

5 Checking Resuscitation Equipment

ANZCOR and ARC guidelines should be considered in conjunction with accepted National Standards and local policies. ANZCOR is aware of cases where equipment failure (e.g. oxygen pipes being incorrectly connected resulting in hypoxic gases being administered, and resuscitation bag valve devices incorrectly assembled) has led to adverse outcomes.

The checking and maintenance of hospital and resuscitation equipment is covered by National Standards and local policies. Practitioners involved in resuscitation should always be alert to errors of assembly or use, and have checking processes to minimise these risks before equipment is used. They should also respond to unexpected situations with further checking procedures, and in the case of unexplained hypoxia change gas supply and circuits, and include removing the patient from ventilators and gas supplies by using a self-inflating bag with room air. In this situation oxygen analysis of delivered gases should be considered and an oxygen analyser should be available.

References

1. 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, Pintos RV. 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-e168.
2. Consensus on Resuscitation Science & Treatment Recommendations. Part 6, Paediatric basic and advanced life support. *Resuscitation* 2005; 67: 271-291.
3. 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, Tibballs J, Zaritsky AL, Zideman D, On behalf of the Paediatric Basic and Advanced Life Support Chapter Collaborators. 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:e213–e259.
4. Azzopardi P, Kinney S, Moulden A, Tibballs J. Attitudes and barriers to a medical emergency team system at a tertiary paediatric hospital. *Resuscitation*(2010),doi:10.1016/j.resuscitation.2010.10.013