



SECTION 4: RESUSCITATION PROCEDURES

4.1 Responding to Clinical Deterioration: Medical Emergency Team (MET) review and CODE BLUE (55)

Aim

To restore/maintain cardio-respiratory function.

Objectives

Staff will recognise patients whose clinical condition is deteriorating and will respond to their needs in an appropriate and timely manner to ensure safe high-quality care.^{1, 2, 3}

Background

Cardiopulmonary arrest in infants and children is an uncommon event. However, it does occur in a variety of conditions and is usually the result of hypoxia and/or hypovolaemia.¹ Signs of impending cardiopulmonary or respiratory arrest can usually be recognised preceding the event^{2,4,5}.

Emphasis is on *early recognition and management of clinical deterioration*². If the signs of clinical deterioration are recognised and treated early, cardiopulmonary arrest can generally be prevented. For this reason it is important to standardise the response of medical and nursing staff by undertaking the following:²

- Systematically assess the patient at appropriate intervals.
- Recognise and interpret abnormal physiological parameters.
 - Recognise the signs and symptoms of impending collapse and initiate appropriate interventions early.
 - Use the CEWT (Children's Early Warning Tool) chart and escalate care according to the CEWT Action Plan.
- Communicate information about clinical deterioration in a structured effective format in accordance with Clinical Handover policy.
- Be proficient at resuscitation methods and use of equipment and be familiar with the drugs which are commonly used in emergency resuscitation procedures according to the Australian Resuscitation Council (ARC) and Advanced Paediatric Life Support (APLS).^{3,4}
- Have access to resuscitation equipment that has been maintained and is functional in accordance with the Resuscitation Trolley checking procedures.

Key Points

1. Recognition and response systems must apply at all time for all patients and in all locations of the hospital.^{2,4}
2. The Advanced Paediatric Life Support (APLS)¹ approach, as outlined in this document, will be undertaken for all children requiring resuscitation at PMH. Refer to the paediatric APLS algorithm ([Appendix 1](#)).
3. The ARC resuscitation algorithm ([Appendix 2](#)) will be used by all non-clinical staff who commence Basic Life Support (BLS) as a first responder, including staff who work in the community e.g. HITH, ACC. This algorithm is also used during resuscitation of adults at PMH.⁶
4. At the discretion of the team leader family may be given the option to be present during resuscitation. A staff member shall be allocated to the parents/carers for support if they choose to remain present.
5. Staff must practice within their scope of practice at all times.

Guidance on Age Definitions^{3,4}

Neonate	44 weeks post conceptual age
Infant	less than 1 year
Young Child	1-8 years
Older child	9 -14 years
Adult	>14years

Note: In accordance with ARC Guideline 12.1; to maintain consistency in teaching and learning at PMH any patient >14 years will be treated as an adult. If unsure of the patient's age, if they look like a child, then treat as a child.⁴

Medical Emergency Team (MET) Review

A Medical Emergency Team (MET) operates within the hospital. The team provides an immediate (within 5 minutes) medical and nursing review of any inpatient, when ward staff are concerned that failure to review may lead to an emergency situation (refer to the Children's Early Warning Tool for escalation of care). The team includes the PICU Registrar, Nurse Shift Coordinator and Consultant (in hours if required). Ward staff seeking the MET review should DURA Page the PICU Coordinator on 8165. The PICU Coordinator will reply immediately and inform the PICU Registrar; the team will review the child within 5 minutes. The MET will treat the child, liaise with the child's consultant and team, who should have been notified when the MET call was placed, and arrange transfer to the PICU if required.

If there is any doubt as to whether to call a Code Blue (55) or a MET review, call a Code Blue (55).

Code Blue (55) emergency team

- Activated by dialling switchboard on extension '55'
- State: Code Blue, location of emergency including hospital (eg. PMH, Ward x, Room 5) and your name.

NB. Some areas such as the Neonatal Unit, Emergency Department and Operating theatres do not use code blue calls as the areas are staffed with medical teams 24 hours a day. However, they will assess the situation and call a code blue if they deem it necessary e.g. for an adult or staff member (CAHS Emergency Procedures Manual).

Code Blue Team Members

In Hours	Out of hours
PICU Consultant	PICU Registrar
PICU Registrar	PICU Consultant on call
PICU RN x 2 (coordinator and runner)	PICU RN x 2 (coordinator and runner)
ED Registrar	ED Registrar
NICU Registrar (Neonatal Unit only)	NICU Registrar (Neonatal Unit only)
Hospital Coordinator	Anaesthetic Registrar
Chief Orderly	Hospital Coordinator
	Chief Orderly

The Code Blue team is responsible for the delegation of roles and delivery of care to achieve: ²

- Advanced airway management
- Vascular and intraosseous access
- Defibrillation or cardioversion
- Administration of resuscitation drugs
- Advanced resuscitation skills
- Post resuscitation care

Resuscitation Process:

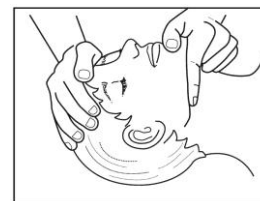
1. Check for danger to self, patient or other people.
2. Assess responsiveness by asking 'are you alright?' and providing central stimulation^{(1, 2),4,5} Do not shake the patient.
3. If unresponsive:
 - Call for assistance. Shout for help/ activate local emergency assistance button/ ask someone to call a "Code Blue (55) state location, hospital, Room Number...." Do not leave patient unless there is no help arriving. Note the time of patient collapse.
 - Inspect the airway and clear if necessary, use suction under direct vision if available.
Patient may be turned into the lateral position to clear airway if necessary.
 - Open the airway by tilting the head (in the correct age appropriate position) and supporting the jaw (see images below). If a neck injury is suspected, do not turn the head or extend the neck, use a jaw thrust manoeuvre.
Avoid hyperextension of the neck in infants as this can cause airway obstruction.⁵



Maintain an infant's head in a neutral position



Young child in a sniffing position

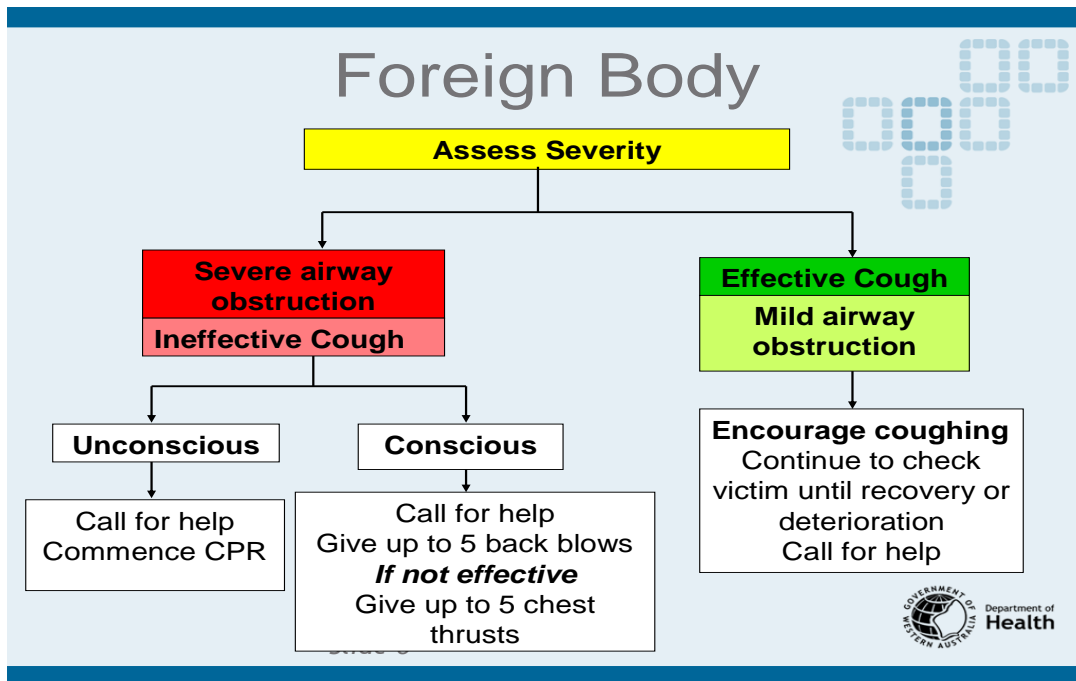


Older child/adult in a backward head tilt with a pistol grip



Spinal precautions:
Use a jaw thrust manoeuvre to open the airway

4. **Choking:** If the patient is severely choking on a foreign body, use the following process:



5. Check breathing by looking for chest movement, listening for breath sounds and feeling for exhaled air.

6. **If not breathing or ineffective breathing**

Ensure patient is on their back, maintain an open airway with head tilt or jaw thrust and give two effective breaths via mouth to mouth ventilation (mouth to nose ventilation) or Bag-Valve-Mask ventilation allowing about one second per inspiration. The amount of air delivered should be sufficient to allow the chest wall to rise.¹

(Note: if the rescuer is unwilling to provide ventilation via the mouth to mouth technique, they should perform cardiac compressions only).⁷

7. Assess for signs of life and then check for a pulse for up to 10 seconds:

- a carotid or femoral pulse (child and older child)¹
- a brachial or femoral pulse (infant).¹

If no signs of life (ie. unconscious, unresponsive, not breathing normally, not moving) and/or slow pulse (less than 60 beats per minute for an infant with poor perfusion and less than 40 beats per minute for a young child) ¹ commence cardiac compressions

Note: While health care personnel may use pulse palpation during assessment, do not waste valuable time; if a pulse cannot be identified within 10 seconds or there is uncertainty, commence CPR.

8. Method of cardiac compressions should include the patient being on a hard surface, aim for the lower half of the sternum and one third of the depth of the chest.⁷ Hand positions and techniques for age group are:
- Infant - two fingers or two thumb encircling technique (for two responders)
 - Child - one heel of the hand
 - Older child/ adult - two hand technique

The responder shall allow for full recoil of the chest after each compression to allow the heart to refill.⁷ Minimal chest compression interruption is important however, allow for a planned pause of chest compressions to facilitate effective ventilation (ventilation to compression ratio is 15:2).⁷

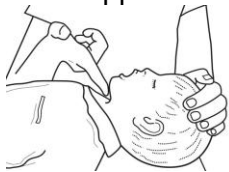




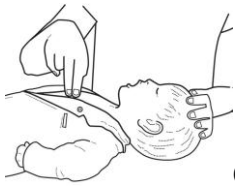



9. Defibrillation: once the defibrillator has arrived on the Code Blue team's resuscitation trolley the monitoring/ defibrillation pads should be immediately placed on the chest.

Refer to [BLS Summary](#) over the page:

Note:

- For neonates in NICU, the ratio is 3 compressions to 1 breath at a rate of 30 cycles per minute (as per NICU guidelines). For infants less than 4 weeks of age in the general ward areas, follow the **infant** guidelines outlined in this document.
- For non-intubated patients there is a brief pause to deliver the two breaths. For the intubated patient, compressions continue uninterrupted and breaths are delivered at a rate of 10-12 per minute.
- External cardiac compressions (ECC) tends to be 'underdone' rather than 'overdone' and there are too many interruptions. Even when optimally performed, ECC provides only about 25% of normal cardiac output.³

Paediatric BLS Summary:

	INFANT Up to 1 year	SMALL CHILD 1 – 8 years	LARGER CHILD 9-15 years
AIRWAY	Neutral head position with jaw support 	Sniffing position 	Backward head tilt with pistol grip. 
BREATHING Rescue breaths (in-hospital only)	Give 2 effective rescue breaths		
CIRCULATION Pulse check (in hospital only)	Brachial or Femoral 	Carotid or Femoral 	
CIRCULATION Look for signs of life	Unconscious, Unresponsive, Not breathing normally, Not moving		
Hand position	Lower half of the sternum		
Technique	Two fingers  or two thumbs 	One hand 	Two hands 
CPR ratio In hospital	15 compressions : 2 breaths 5 cycles/ minute		

Responder Roles in Resuscitation

First Responder

1. Check for Danger to self, patient or other people.
2. Assess responsiveness:
3. If unresponsive:
 - Call for assistance. Shout for help/ activate local emergency assistance button/ ask someone to call a “Code Blue (55). Do not leave patient unless there is no help arriving.
 - Commence basic life support.
 - Note the time of patient collapse.

Second Responder or First Responder (If no response to call):

1. Dial 55; State ‘Code Blue emergency in Ward ... or ... Department, Identify the exact site and state your name’.
2. Collect resuscitation trolley and return to the patient.
3. Select appropriate size self-inflating Bag-Valve-Mask with reservoir bag attached. Connect to high flow oxygen then give to responder one to continue ventilation.
4. Place a cardiac board underneath the patient and perform external cardiac compressions until further help arrives.

Note:

Self-inflating Bag-Valve-Masks are available in three different sizes, manufacturer recommendations for the Laerdal Silicone Resuscitators (LSR) are: ⁸

	LSR Preterm™	LSR Paediatric™	LSR Adult™
Weight	Infants < 2.5kg	2.5kg – 25kg	> 25kg
O ₂ Flow (to achieve 100% concentration)	6 – 8 L/min	10 - 15 L/min	15 L/min

Third Responder

1. Allocate a staff member to direct resuscitation team to appropriate area.
2. Commence drawing up and labelling:
 - 10mL Adrenaline **1:10,000** dose is 0.1mL/ kg (IV/IO)
 - 10mL 0.9% sodium chloride (draw up several flushes)
3. Prepare for IV insertion; and administration of fluid bolus of 0.9% Sodium Chloride.

4. Commence MET/ Code Blue events record; include drug administration, observations (minimum every 2 minutes), interventions and patient assessment. At the end of the Code Blue or MET call ensure that the original document is placed in the notes and a copy of the record sent to the Director of PICU.

Other staff


1. Remove excess furniture and the head of the bed from the immediate area to facilitate access.
2. Ensure privacy and support is provided for family members who may be present. Where available a support person is to be allocated to stay with the family during this time and is to provide frequent and accurate updates using plain language.
3. Only those staff actively engaged in the resuscitation should be present.
4. Following the arrival of the PICU resuscitation trolley, consider the removal of the ward resuscitation trolley from the immediate area. Ward staff should continue to assist in the resuscitation as directed by the resuscitation leader.

Related policy, procedures and guidelines.
Hospital Paediatric Life Support Training (PNPM 4.3)
Checking the Resuscitation Trolley (PNPM 4.2)
Children’s Early Warning Tool (PNPM 3.1.9)
Clinical Handover (PNPM 17.4)
Emergency Preparedness Procedures
Adrenaline Drug Monograph (Pharmacy)

Useful resources.
Australian Resuscitation Council Guidelines
NSQHS Standard 9 Recognising and Responding to Clinical Deterioration in Acute Health Care.
Hospital Paediatric Life Support online learning

References:

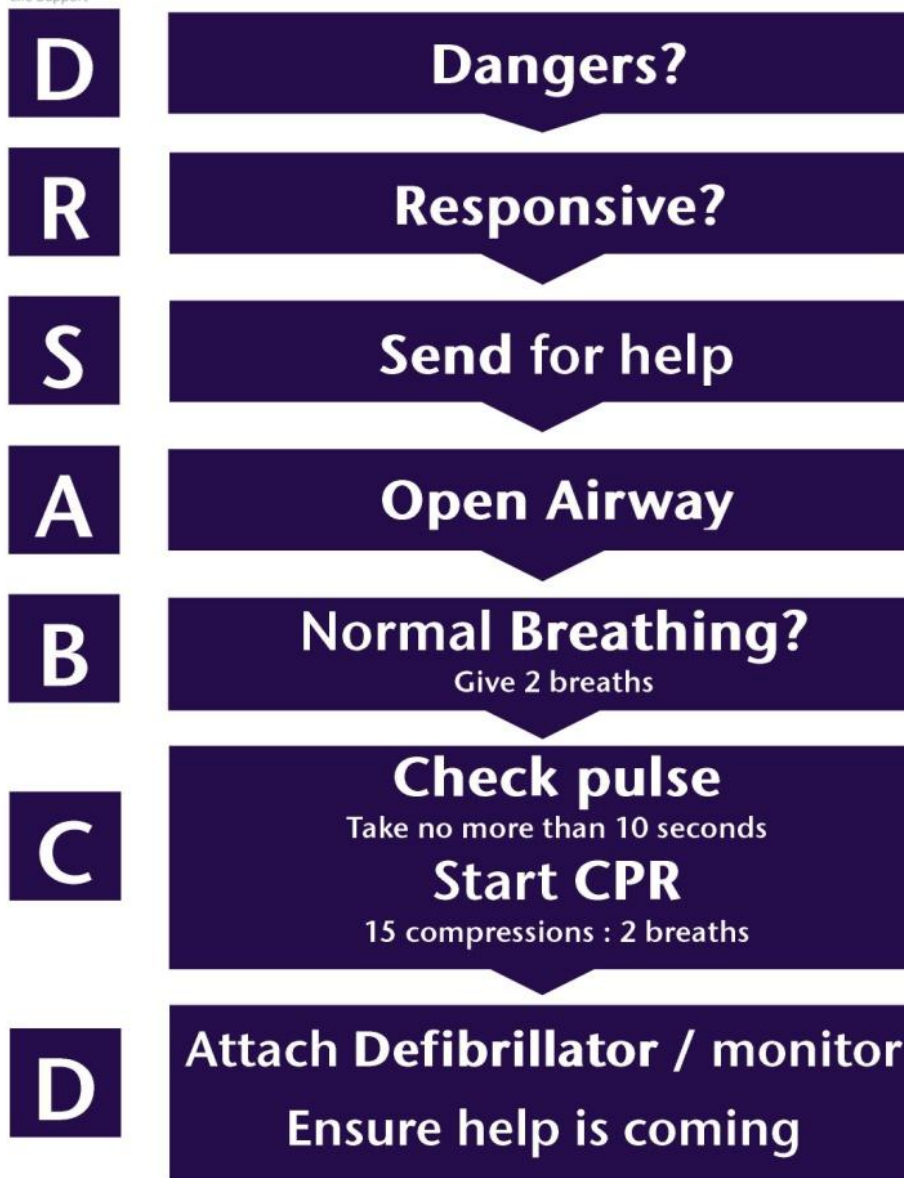
1. Advanced Paediatric Life Support: The Practical Approach, 5th Edition. Wiley-Blackwell, 2012.
2. Standard 9 Recognising and Responding to Clinical Deterioration in Acute Health care. Safety and Quality Improvement Guide, October 2012
http://www.safetyandquality.gov.au/wp-content/uploads/2012/10/Standard9_Oct_2012_WEB.pdf
3. Australian Resuscitation Council. Section 12.1 - Guidelines for Paediatric Advanced Life Support. 2010. Available from: <http://www.resus.org.au/>. Accessed: 5th Septmeber 2014.
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10. Australian Commission on Safety and Quality in Health Care. A Guide to Support Implementation of the National Consensus Statement: Essential Elements for Recognising and Responding to Clinical Deterioration. Sydney, ACSQHC. 2011 Available from: <http://www.safetyandquality.gov.au/wp-content/uploads/2012/02/Nat-Consensus-Statement-PDF-Complete-Guide.pdf>
11. Starship Children’s Health Clinical guideline: Cardiopulmonary Resuscitation (CPR), August 2011

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Appendix 1
Paediatric Algorithm in Hospital



Basic Life Support

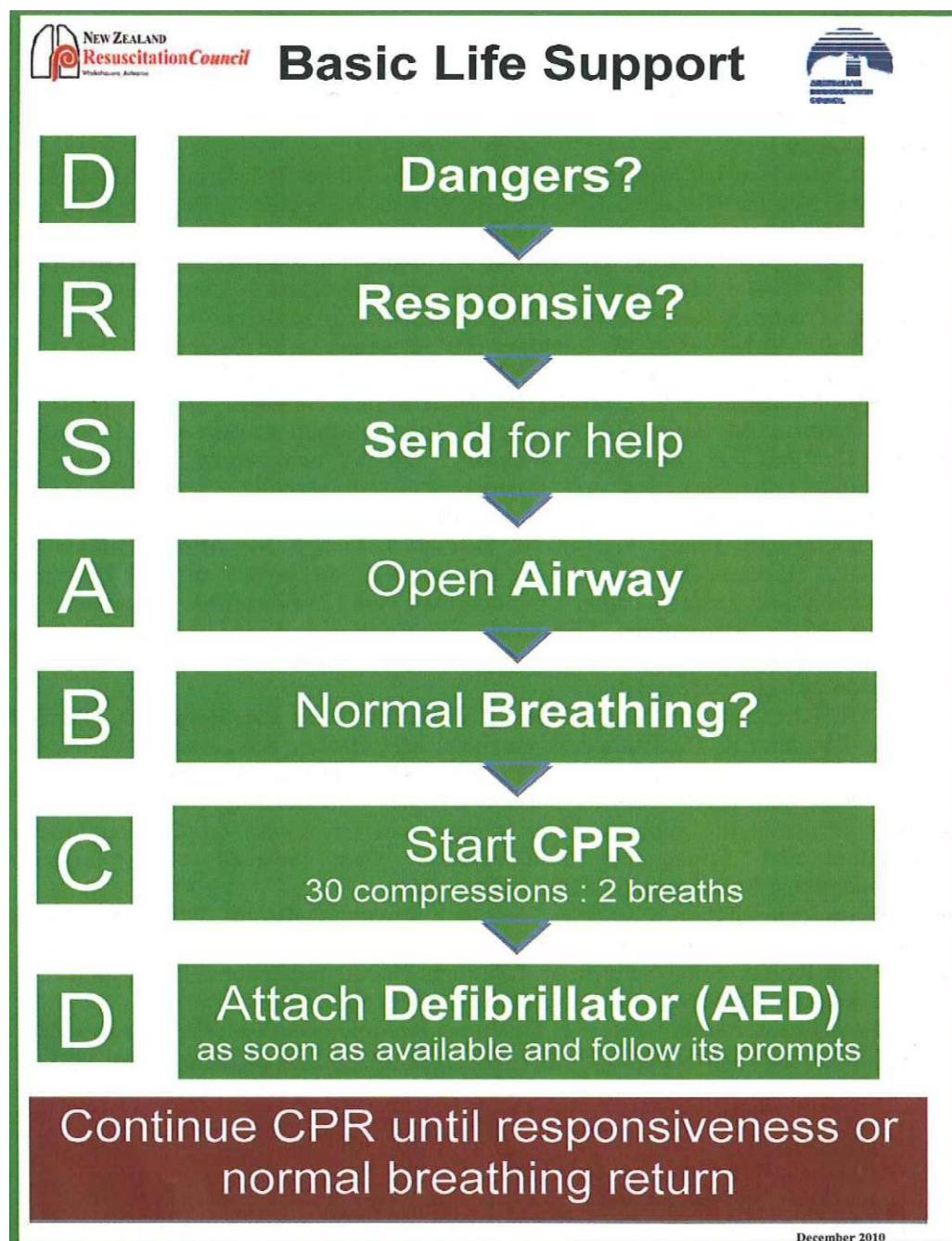


Continue CPR until responsiveness or normal breathing return

April 2011. Modified from Australian Resuscitation Council and New Zealand Resuscitation Council for use by trained health professionals. Original ARC/NZRC algorithm available at www.resus.org.au

[Back to page 2](#)

Appendix 2
ARC BLS Algorithm



[Back to page 2](#)