Basic Life Support

Adult and Paediatric

Instructor Resource Manual

Community, Indigenous and Subacute Services (CISS)
Metro North Hospital & Health Service

Documentation Details

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For more information, contact:
The Education Unit, Community, Indigenous and Subacute Services, Metro North Hospital and Health Service,
Brighton Qld 4017,
Email CISS-Education@health.qld.gov.au
Phone (07) 3631 7613.

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Version Control

This is Version (3.0) of the ‘Basic Life Support – Adult and Pediatric Instructor Resource Manual’ and will remain current until (2021) or earlier when modifications required.

Authors

Initiated by: Sarah-Jane Manley   Nurse Educator, Community, Indigenous and Subacute Services (CISS)
Developed by: Sarah-Jane Manley   Nurse Educator, Community, Indigenous and Subacute Services (CISS)

Contribution of the original authors, reviewers and editors of the BLS and PLS Manuals TPCH and RBWH is acknowledged.
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INTRODUCTION

This manual outlines the knowledge and skills required to perform Basic Life Support (BLS) and Basic Paediatric Life Support (PLS) for clinical staff within CISS. The PLS Instructor Course will only be available to clinical staff working in areas who care for paediatric patients. Additional Training is required to complete the PLS Instructor Program.

The Australian and New Zealand Resuscitation Council (ANZCOR) Guidelines have guided the directives within this manual.

All CISS Clinical Staff (those involved in direct patient care) are required to be competent in performing BLS as per the recommendations outlined in Standard 9.6.1 of the National Safety and Quality Health Service Standards (NSQHSS, 2012 & MNHHS Legislative, Mandatory and Requisite Training Pol014).

Only those areas that care for the paediatric patient are required to complete an annual Paediatric Life Support (PLS) Theory and Practical Assessment (MNHHS Legislative, Mandatory and Requisite Training Pol014).

Program Aims:
Develop and maintain BLS and PLS instructor’s ability to provide effective teaching and assessment related to the principles of PLS & BLS to their colleagues within their clinical environment.

Program Objectives:
At the completion of the BLS Instructors Course and of this module the participants will be able to:

- Identify the criteria related to the management of Cardiopulmonary Arrest in the infant /child and adult client.
- Demonstrate effective assessment of staff learning needs in relation to BLS and planning of training using the Principles of Adult Teaching and Learning.
- Demonstrate the ability to assess staff performing BLS utilising the Assessment Tool Criteria.

**BLS Instructor**

Is an Enrolled or Registered Nurse or Health Care Professional, who has the knowledge and skills in the training and assessment of the BLS management of Cardiopulmonary Arrests.

**Responsibilities**

An effective BLS Instructor demonstrates the following responsibilities:

- Acts as a role model for professional practice and clinical resource/support for BLS
- Maintain their competency in Adult BLS and/or PLS (as required)
- Maintains sound knowledge of safety protocols
- Identify staff members’ BLS learning objectives and goals, and monitors and evaluates their progress.
- Plan and initiates training / in-service through liaison with Line Manager and Nurse Educator
- Complete and maintain in-service records
- Coordinates mock arrests around clinical workloads
- Provide constructive feedback
- Evaluate the outcomes of each training and assessment experience
- Identify problems and refers them to the Line Manager and BLS Nurse Educator
Post-workshop requirements
The BLS instructor is required to deliver regular and ongoing education and training within their clinical settings.

To maintain currency in the role, the BLS Instructor is also required to:

1. Maintain an In-service Session Record – a minimum of 2 in-services and 12 BLS assessments of staff per calendar year. These are to be recorded and countersigned by their Line-Manager on the session attendance sheet.

2. Attend a BLS Instructors Refresher session (1hr) every 12 months.

3. Maintain a current BLS Assessment with an annual assessment performed by the BLS Nurse Educator during the annual BLS Instructor Refresher Session.
Cardiopulmonary Arrest

Cardiopulmonary Arrest is the cessation of cardiac and respiratory function. Cardiac Arrest is often used to describe Cardiopulmonary Arrest. The heart has either stopped or is not pumping an adequate volume of blood to perfuse the brain and heart. This can either occur suddenly or can be preceded by warning signs (peri-arrest).

A Cardiopulmonary Arrests in Paediatric clients is predominately caused by a Respiratory Arrest. Please refer to the Airway section for airway management of paediatrics.

The patient in Cardiac Arrest presents as unconscious and unresponsive with either poor or no respiratory effect. Causes of cardiac arrest include;

- Ischemic Heart Disease
- Electric Shock
- Drug overdose/toxicity
- Trauma
- Electrolyte abnormalities
- Drowning

These are best summarised as 4Hs and 4Ts;

<table>
<thead>
<tr>
<th>Four H’s</th>
<th>Four T’s</th>
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</thead>
<tbody>
<tr>
<td>Hypoxaemia</td>
<td>Tamponade</td>
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<td>Hypo/hyperthermia</td>
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<td>Hypo/Hyperkalemia and metabolic disorders</td>
<td>Thrombosis (pulmonary/coronary)</td>
</tr>
</tbody>
</table>

Cardiopulmonary Resuscitation (CPR) is the term used to describe chest compressions combined with rescue breathing. The purpose of CPR is to temporarily maintain a circulation sufficient to preserve brain function until specialised treatment is available (ARC, 2010).

Regardless of the cause of the cardiac arrest, a hypoxic brain injury will occur after 5 minutes if adequate blood flow to the brain is not maintained.
The *ultimate* aim of CPR is to restore normal electrical and mechanical function of the heart. Merely re-establishing a heart rate and blood pressure however is not sufficient. Significant abnormalities in normal body functioning must have occurred for the patient to have suffered a cardiac arrest. In the immediate period following cardiac arrest, cardiovascular function is often less than optimal and insufficient to prevent ongoing tissue damage and organ dysfunction. Resuscitation therefore includes measures to support cardiovascular function to an optimum level and to correct abnormalities that precipitated the arrest.

BLS and Advanced Life Support (ALS) are best summarised in “The Chain of Survival”

Patients who receive early cardiac compressions and defibrillation have the most successful outcomes. Weakness in any link and loss of connection between the links lessens the chance of survival for the patient.

BLS is the preservation or restoration of life by the establishment of and/or maintenance of airway, breathing, circulation and related emergency care. It is a temporary measure used to maintain myocardial and cerebral oxygenation until the patient receives advanced care.
Defibrillation

Defibrillation is the delivery of an unsynchronised electrical current to the myocardium. The aim of defibrillation is to simultaneously depolarise all myocardial cells and cause a short period of electrical asystole to allow the normal pacemaker site (sinoatrial node) and conduction pathways to resume the pacemaker (Capriccioso, 2016). A defibrillator is a device, which is capable of storing electrical energy and discharging the energy on demand through the myocardium. They are classified according to the method in which they deliver the energy. **Monophonic** defibrillators deliver the current from paddle/pad to the other. **Biphasic** defibrillators deliver the current in two directions resulting in a lower peak current which is less damaging to the myocardium (Capriccioso, R. 2016).

Effective defibrillation depends upon appropriate electrical current passing through the myocardium. The resistance and the impedance between the defibrillator electrodes and the heart determine the delivered current (Phillips, 2016).

Semi-Automatic External Defibrillators (SAED) automatically interpret the rhythm advising the operator when to press the shock button (Phillips, 2016).

The two types of defibrillators used throughout Community Indigenous and Subacute Services (CISS) are:

**Phillips HeartStart FR3**

**Phillips HeartStart FR2**
The Phillips Heartstart FR2 and FR3 AED electrical charge is delivered in a Biphasic method. Delivering a 150 joules non-escalating shock in adult mode and a 50 joule shock to children (1-8 years or less than 25Kg) when “Child mode” is selected (Phillips, 2016).

- The Phillips Heartstart FR3 AED requires a paediatric key to be inserted to change the AED into Child mode.
- The Phillips Heartstart FR2 requires specific paediatric pads to change into Child mode.

The AED is not to be used on an Infant or a child under the age of 1 year. The AED does not have the capability to deliver shocks in the range required for this age group (ANZCOR, 2016, Guideline 12.6).

“The time to defibrillation is a key factor that influences survival” (ARC, 2010, Guideline 7)

![Graph of Resuscitation: Success vs Time](image)

The Automated External Defibrillator: for every minute the defibrillator is delayed there is approximately 7-10% reduction in survival.
Basic Life Support

D
Dangers?

R
Responsive?

S
Send for help

A
Open Airway

B
Normal Breathing?

C
Start CPR
30 compressions : 2 breaths

D
Attach Defibrillator (AED)
as soon as available, follow prompts

Continue CPR until responsiveness or normal breathing return
BASIC LIFE SUPPORT

CHECK FOR DANGER
- from body fluids, fire, electricity and water
- Ensure safety for the patient/client, staff and bystanders
- Don Personal Protective Equipment (PPE)
- If concerned for personal safety, it has been recommended by the Occupational Violence Prevention group (OVP) unit to touch patient on hip. This minimises the risk of being hit or kicked by the patient.
- If no response progress to assessing responsiveness.

CHECK RESPONSE - TO VERBAL AND TACTILE STIMULI (talk and touch).
- Firmly place your hand on patient’s chest and ask the patient to respond to a simple command – “open your eyes” or “poke your tongue out”.
- If no response, elicit pressure to the Trapezius muscle (the large muscle between the shoulders and neck) by grasping and squeezing both shoulders firmly. Please remember to communicate to patient / client intended action and that it will cause pain. Only Registered Nurses trained in this technique should provide this assessment.

In children – assess RESPONSIVENESS using the AVPU tool.
- A – alert
- V – responds to Voice (talk loudly, “are you alright” or “open your eyes”)
- P – responds to Pain, progress to physical stimuli e.g. Trapezius Squeeze
- U – Unresponsive

Do not shake a child or use a sternal rub to elicit a response

SEND FOR HELP
- Press emergency call button/alert fellow staff to “Code Blue”
- Call “0” for external line and then dial “000” or in community setting call “000” for the Ambulance.
- Stay with the patient, continue DRABCD
A

ESTABLISH AIRWAY

- Assess
- Clear
- Open airway

**ALERT**

In the unconscious patient, care of the airway takes precedence over any other injury, including the possibility of spinal injury (ANZCOR, 2016, Guideline 4). All unresponsive patients should be handled gently with no twisting or bending of the spinal column. The only exception to this would be where the airway is obstructed with fluid or particular matter. In this circumstance the victim should be promptly rolled onto the side to clear the airway (ANZCOR, 2016, Guideline 4).

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**Head Tilt Chin Lift Manoeuvre**

It is recommended the Head Tilt Chin Lift Manoeuvre be used for both the child and adult patient (ANZCOR, 2016, Guideline 4).

Ensure patient is lying on their back in the supine position

- Place one hand on the forehead or top of the head
- Use other hand to support chin
- Tilt the head backwards (not the neck)
- Avoid excessive force
- Dentures can remain in situ only if well fitting

Source: European Resuscitation Council, 2010
Infant (< 1 year old) – Neutral Position
The upper airway in an infant is easily obstructed because of the narrow nasal passages, the entrance to the windpipe (vocal cords) and the trachea (windpipe) (ANZCOR, 2016, Guideline 4). Hyperextension of the neck can lead to further airway obstruction (ARC, 2010, Guideline 4).

Infant – neutral position
The lower jaw should be supported at the point of the chin with the mouth maintained open. The infant’s head should remain in a neutral position (ANZCOR, 2016, Guideline 4).

ALERT
The blind finger sweep is done with caution in infants and small children as this could damage the soft palate of the mouth, potentially pushing foreign bodies deeper into the airway (ARC, 2010, Guideline 4).

B
ASSESS FOR BREATHING (1) look (2) listen and (3) feel:
• Look for movement of upper abdomen and lower chest.
• Listen for air escaping from nose and mouth.
• Feel for movement of the chest and upper abdomen

If patient is unresponsive and not breathing normally, the patient is to remain on their back in the supine position and commence chest compressions then followed by rescue breathing (30:2) (ANZCOR, 2016, Guideline 5).

Patients who are unresponsive and breathing normally should be positioned into a side lying recovery (lateral recumbent) position (ANZCOR, 2016, Guideline 2).

ALERT - Risk of danger to self
There have been minimum human studies to address the safety, effectiveness, or feasibility of using barrier devices to prevent victim contact during rescue breathing (ANZCOR, 2016, Guideline 5).

It is advised that staff members provide rescue breathing only if equipment is available to do so safely (Work health and Safety act, 2011).
Bag valve mask ventilation

If **NOT** breathing normally:

When using bag-mask-valve resuscitation two trained operators may be required to operate the equipment, the first rescuer to manage the airway and the second to manage the air viva or bag (ARC 2010, Guideline, 11.6).

Positioning:

**Top landmark** – the edge of the plastic seal on the top of the mask (narrow end of mask) should extend to the bridge of the nose.

**Lower landmark** – the edge of the plastic seal on the bottom of the mask (wider end of mask) should extend to the cleft of the chin.

Disposable bag-valve-mask (BVM) sets are available in 3 sizes. The below two sizes are available in the emergency equipment in CISS.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Bag volume</th>
<th>Body mass range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>1500mls</td>
<td>&gt;40 Kg</td>
</tr>
<tr>
<td>Paediatric</td>
<td>500mls</td>
<td>&lt;20Kg</td>
</tr>
</tbody>
</table>

Each bag has a 1000ml reservoir bag attached and is to be connected to **15L/min** of oxygen if oxygen source available.

Ensure that the force of inflation is adequate to make the chest **gently** rise.
The “C” Hold – Face Mask Position
Use the thumb and first finger to roll the mask onto the face, apply downward pressure to the top and bottom of the anterior surface of the mask – “C”.

C COMMENCE COMPRESSIONS – interruption to compressions should be minimized at all times (ANZCOR, 2016, Guideline 6).

For children and adults chest compressions should be delivered:

- At a speed of 100 – 120 compressions per minute
- At a depth of 1/3 of the chest
- At a ratio of 30:2 (Please refer to alert for Halwyn Centre on page 18)

Locate the correct compression position:

![Correct Compression Position Image]

Source: European Resuscitation Council, 2010

Place your hands on the lower half of the sternum
Place the heel of your hand in the centre of the chest with the other hand on top (ARC, 2010).

**Compression Method:**
Having obtained the compression site, take the following steps:

- The rescuer’s shoulders should be directly (vertically) over the patient’s sternum
- The compression arms should be kept straight
- Compressions should be rhythmic with equal time for compression and relaxation
- Avoid leaning on the patient
- Allow for full recoil of the chest between compressions
- Ideally the patient should be on a hard or flat surface

Compression duties should be alternated every 2 minutes to prevent rescuer fatigue and deterioration in chest compression quality (ARC, 2010, Guideline 6.).

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**ALERT**

**The Halwyn Centre** provides a respite service for children from 6 years and above. It is identified as an acute care facility for the purpose of PLS and is required to deliver Compression to Inflation ratio at **15:2**. Two rescue breathes should be delivered prior to commencing CPR when providing BLS for a child in their care.

**The Community Services** within CISS that care for the paediatric clients have been identified as the Diabetes Team and HiTH. For the purpose of providing PLS within the ambulatory setting the Compression to Inflation Ratio remains **30:2**. This has been recommended by the Child and Youth Community Health Services governed by Children’s Health Queensland.
Child – compressions can be performed using a one or two handed technique;

![One handed technique](image1)

![Two handed technique](image2)

Infant – compressions can be performed using the two-finger or thumb encircling technique;

![Two finger technique](image3)

![Thumb encircling technique](image4)

**Compression to inflation ratio:**

**1 RESCUER** - 30 compressions: 2 inflations: (1 cycle). Provided you can safely deliver rescue breathes otherwise continue with compression only CPR until second rescuer arrives. Please refer to Breathing section.

**2 RESCUERS** - 30 compressions: 2 inflations: (1 cycle)
- Stop compressions to deliver the breaths.
- Deliver inflations at 1 second each (ARC, 2010)
- Allowing for gas to be expelled from the lungs
D Attach Defibrillator

Pads should be placed on exposed chest in **anterior-lateral position**: one pad slightly below the collar bone on the person’s right chest and one pad on the person’s left side below the arm pit (ANZCOR, 2016, Guideline 7).

- **Lateral Pad** - The **First** pad with **red heart**, placed mid axilla 6\(^{th}\) intercostal space

- **Anterior Pad** - The Second pad right mid-clavicular space 2\(^{nd}\) intercostal space

Good Pad to skin contact is important for successful defibrillation;

- Moisture or excessive chest hair should be removed prior to the application of the pads. Application of pads should not delay shock delivery.
- Remove anything from skin that will prevent direct contact with the pads e.g. medication patches, jewellery and ECG dots.
- Do not place pads over implanted devices (i.e. pacemaker, central venous access devices). The Defibrillator pad should be placed 8cm away from device (ANZCOR, 2016, Guideline 7)
Defibrillator Safety:

Look for danger
Water, contact with metal, oxygen or other flammable substances

Prior to administering shock
Call "stand clear"

Perform visual sweep to ensure:
- No team member has contact with patient or bed
- The patient has no contact with metal fixtures/fluid
- O2 source is away from patient

*The rescuer operating the defibrillator is responsible for the safety of the patient and all members of the team.*

AND REMEMBER

The AED will identify shockable and non-shockable rhythms and prompt users to respond appropriately (ARC Guideline, 11.2, 2010).

Once the AED is connected, the pads do not get removed unless to be replaced or directed by a Medical Officer (MO).

Defibrillation for Paediatrics

Defibrillation is included as essential therapy in BLS. Most cardiac arrests in paediatrics are not caused by heart problems (Phillips, 2016). However in some circumstances children may suffer a primary cardiac arrest and defibrillation maybe a lifesaving intervention (TPCH manual, 2012).

For the purpose of BLS the term “infant” refers to a child 0-1 years of age and the term “child” refers to a person 1-8 years in age or less than 25 kg (ANZCOR, 2016, 12.1). The Semi-AED is not to be used on an infant or a child less than 1 year old. The AED does not have the capability to deliver shocks at the reduced level of joules required for this age group (ARC, 2016, Guideline 12.6).

It is recommended paediatric pads or an AED with Paediatric capability should be used on a child aged 1-8 years or less than 25 kg (ANZCOR, 2016, Guideline 7). The Phillips Heartstart AED FR2 and FR3 utilised in the health care settings of CISS have this capability.
For children greater than 8 years and 25kg, it is recommended that Adult mode be used.

Phillips Heartstart FR3 – requires a pediatric key when used on child client

1. The pediatric key should be secured to the defibrillator when the device is set up.
2. If a child (1-8 years or < 25 kg) requires defibrillation insert the pediatric key as demonstrated in the diagram below.
3. The defibrillator will identify that the pediatric key has been inserted and that it is running in pediatric mode.
4. The defibrillator will continue to provide visual and vocal prompts
Phillips Heartstart FR2 – requires **Paediatric pads** when used on a child client

1. 2 sets of Paediatric Pads should be available with the defibrillator at all times. If a set is used it should be replaced immediately.
2. If a child (1-8 years or < 25 kg) requires defibrillation the paediatric pads should be placed on the child as demonstrated in the diagram below.
3. The defibrillator will identify that the paediatric pads are being used and that it is running in paediatric mode.
4. The defibrillator will continue to provide visual and vocal prompts

**Pad placement in children**

*Anterior-Lateral position (as used in adults)* – place in this position if the pads are not too big and touching (ARC, Guideline 7, 2011).
Anterior - Posterior position

**Posterior** pad placed on upper back (between the shoulder blades)

**Anterior** pad on the front of the chest slightly to the left (ARC, Guideline 7, 2011).

**ALERT**
If the pads are too large and are touching the anterior-posterior position is recommended in children. This minimises the danger of the electrical charge arching between the pads (ARC, Guideline 7, 2011).
CPR is to **CONTINUE** UNTIL **RESPONSIVENESS OR NORMAL BREATHING RETURNS**

ARC GUIDELINES SPECIFY THAT IF THE PATIENT IS

**UNRESPONSIVE**

**AND**

**NOT BREATHING**

**COMPRESSIONS ARE TO BE PERFORMED**

(Guideline, 11.2, 2010).

**OR**

If it is impossible to continue resuscitation attempt i.e. rescuer exhaustion, compressions can be stopped.

**Return of Spontaneous Circulation (ROSC)**

If adequate spontaneous breathing and responsiveness return, maintain an open airway and place the patient/client in the recovery position, with supplement oxygen.
# Basic Life Support and Paediatric Life Support

## The differences

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<th>Paediatric</th>
<th>(Halwyn/HITH/Diabetes)</th>
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<td>Check for danger</td>
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<tr>
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<td><strong>AVPU Tool – Paediatric</strong></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td><strong>A</strong> - Alert</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>V</strong> – response to voice (talk loudly, “are you alright” or “open your eyes”)</td>
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<tr>
<td></td>
<td></td>
<td><strong>P</strong> – response to Pain (progress to physical stimuli – Trapezius pressure)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>U</strong> – Unresponsive</td>
<td></td>
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<tr>
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<td>Send for help</td>
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<tr>
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<tr>
<td></td>
<td>head tilt, chin lift technique</td>
<td><strong>Infant</strong> – demonstrates the neutral head position</td>
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<tr>
<td></td>
<td></td>
<td><strong>Child</strong> – head tilt chin lift mauver (same as adult)</td>
<td></td>
</tr>
<tr>
<td><strong>Breathing</strong></td>
<td>Assess for normal breathing (look, listen, feel) for rise and fall of chest</td>
<td>Assess for normal breathing (look, listen, feel) for rise and fall of chest</td>
<td></td>
</tr>
<tr>
<td><strong>Compression</strong></td>
<td>Lower half of sternum</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1/3 chest depth</td>
<td>Rate of 100 -120 compression per minute</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 compression : 2 inflations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>As above</td>
<td><strong>Infant</strong> – use two fingers or thumb encircling technique</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Child</strong> - compressions delivered by either one hand or two handed technique.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Halwyn ONLY</strong> – demonstrates compression to inflation rate of 15:2 with 2 rescue breathes delivered prior to commencement of compressions</td>
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<tr>
<td><strong>Defibrillator</strong></td>
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<td>Infants less than 1yr old – do not defibrillate</td>
<td></td>
</tr>
<tr>
<td><strong>(Semi-AED)</strong></td>
<td></td>
<td><strong>Child</strong>, 1-8yrs old (&lt;25 kg) – use Semi-AED with either Paediatric Key or Paediatric Pads depending on the defibrillator within your area.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Pad placement for a child:</strong></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>➢ Anterior-Lateral position.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>➢ Anterior-Posterior position if pads touching or too close in Anterior-Lateral position. Reduces risk of arcing.</td>
<td></td>
</tr>
</tbody>
</table>

Adult and Paediatric BLS Algorithm – CISS 2016.
Basic Life Support - Emergency Equipment

It is the responsibility of each Clinical area within CISS to ensure that staff have access to equipment to safely provide BLS for their patient population.

The equipment below are recommended items to be included in the Emergency Equipment;

- Automatic External Defibrillator (Phillips Heartstart FR3 AED)
- 2x sets of adult AED pads
- 2x sets of paediatric AED pads if clinical appropriate for your area
- Adult Air-Viva (Bag-valve mask ventilator)
- Paediatric Air-Viva (Bag-valve mask ventilator) only areas with paediatric patients
- Oxygen tubing
- Oxygen cylinder (C size)
- Razor
- Scissors
- small/med/large gloves
- 2 pairs of goggles

Additional Equipment
- Hudson mask
- Nasal prongs
- Non-Rebreather mask
- Low flow suction unit
- Yanker sucker
- Torch

Equipment cleaning and checking
- Equipment should be cleaned after use
- All single use items should discarded and replaced as soon as possible
- If equipment stored on an emergency trolley – equipment should be cleaned once a week.
- Equipment should be checked as per unit guidelines or manufacturers recommendations.
- It is recommended that equipment be checked at weekly.

Training Equipment

It is suggested that each area provide staff with equipment to maintain their annual BLS and PLS Competency. If units do not have their own training equipment this can be borrowed from the Education Team based a Brighton Health Campus.
Reference:


15. National Safety and Quality Health Service Standards (2012)


17. The Australian and New Zealand Resuscitation Council (ANZCOR) - ARC Guidelines. (2016)

Acknowledgements:


3. Paediatric BLS Manual (TPCH ), Nicole Pearson