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Version Control

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Acknowledgements

The following people have contributed to the development of these learning resources:
The Paediatric Basic Life Support Working Party convened by the SESIH Education
Assessment and Training Subcommittee (EATS) as of February 2009:

- Carolyn Smith Sydney Children’s Hospital (Chairperson)
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**IMPORTANT NOTE**

The provision of Paediatric Basic Life Support within SESIAHS Facilities and Services must take into account application aspects of the setting in which Basic Life Support is provided, which include:

- Local emergency response systems;
- The use and availability of resuscitation equipment and resources;
- Occupational Health and Safety requirements (e.g. situational risks associated with electrical and biological hazards and the use of Personal Protective Equipment);
- Infection Control Policies and Procedures (e.g. the use if standard and additional precautions).
SESIIH Facility Emergency Numbers

Albion Street Centre  Dial 0-000
Bulli Hospital  Dial 666
Calvary Healthcare Kogarah  Dial 777
Coaldale Hospital  Dial 0-000
David Berry Hospital  Dial 0-000
Garrawarra Centre  Dial 333
Kiama Hospital  Dial 0-000
Langton Centre  Dial 0-000
Milton Ulladulla Hospital  Dial 0-000
Prince of Wales Hospital  Dial 777
Port Kembla Hospital  Dial 222
Royal Hospital for Women  Dial 777
Shellharbour Hospital  Dial 222
Shoalhaven District Hospital  Dial 9222
St George Hospital  Dial 666
St Vincent’s Hospital  Dial 555
Sydney Children’s Hospital  Dial 777
Sydney/Sydney Eye Hospital  Dial 55
The Sutherland Hospital  Dial 777
The Wollongong Hospital  Dial 222
War Memorial (Waverley)  Dial 777
Glossary

Airway  The passage from the nose and mouth through which air passes into the lungs.

Aspiration  The act of inhaling fluid and particles into the lungs.

Brachial Pulse  The pulse that can be felt on the inner side of the upper arm midway between the elbow and the shoulder.

Broselow-Hinkle System  This is a colour coded system which provides a fast accurate method for the selection of emergency equipment and drugs. (See Appendix 1)

Cardiac Arrest  Cessation of heart function.

Carotid Pulse  The pulse that can be felt over one of the two main arteries in the neck located either side of the windpipe (trachea).

Child  A child is aged between one year and puberty.

Choking  Life threatening blockage of the airway.

Defibrillation  The application of a controlled electric shock to the heart through the chest wall in order to stop a cardiac arrhythmia (ventricular fibrillation or ventricular tachycardia). The aim of the shock is to restore the heart’s normal rhythm.

External Cardiac Compressions  Rhythmic pressure applied through the heel of both hands over the sternum (breastbone) during cardiac arrest in an attempt to circulate blood around the body.

Femoral Pulse  The pulse that can be felt by placing the tips of two fingers in the thigh just below the inguinal ligament halfway between the symphysis pubis and the iliac crest.

Finger Sweep  Using the fingers to attempt to dislodge a foreign body from the mouth or throat of an unconscious person.

Head Tilt  The backward tilting of the head in an attempt to open the airway in an unconscious person.

Infant  An infant is less than 1 year of age.

Inflation  The movement of air into a person’s lungs using a rescuer’s expired air or with the aid of special ventilation equipment.

Jaw Thrust  The forward pressure applied behind the boney part of the jaw (below the ears) to move the jaw upward and away from the chest in order to open the airway in an unconscious person.

Poor Perfusion  This describes a state in which blood flow to the tissues is significantly decreased and may be insufficient to sustain vital functions.
Paediatric Basic Life Support Mandatory Training and Assessment

These guidelines provide the foundation for the South East Sydney and Illawarra Health Service (SESIH) Paediatric Basic Life Support Mandatory Training and Assessment Program which consists of:

1. A theoretical component
2. A practical component
3. An assessment component

Learning outcomes
The learning outcomes for the SESIH Paediatric Basic Life Support (BLS) Mandatory Training and assessment program are as follows:

1. Theoretical Foundations
   - Discuss individual responsibility related to Paediatric BLS;
   - Explain each step in the ARC or APLS Paediatric basic life support algorithm (DRABC or SAFE approach);
   - Identify the process for summoning assistance in an emergency;
   - Outline the responsibilities of the single rescuer in a hospital resuscitation;
   - Discuss the use of personal protective equipment during resuscitation.

2. Skills Assessment
   - Identifies hazards to health and safety of self and others;
   - Minimises immediate risk to health and safety of self and others by isolating hazards;
   - Assesses vital signs of collapsed infant/child;
   - Recognises the need for CPR;
   - Summons assistance;
   - Performs CPR in accordance with ARC and/or APLS guidelines.

Note: See Appendix 1 for the SESIH Paediatric Basic Life Support Assessment Criteria

Skills assessment frequency
All staff for whom Paediatric Basic Life Support is deemed a mandatory skill are required to have their Paediatric BLS skills assessed on a yearly basis.
Foreword to Guidelines

Basic Life Support

Has been defined by the Australian Resuscitation Council (ARC) as “...the preservation of life by the initial establishment of and/or maintenance of airway, breathing and circulation, and related emergency care.” (ARC, 2006: Glossary of Terms)

Cardiopulmonary Resuscitation

Cardiopulmonary resuscitation (CPR) includes the technique of combining rescue breathing with chest compression. The aim of CPR is to maintain temporarily a critical amount of circulation to the heart and the brain (ARC, 2006: Guideline 7)

Paediatric Basic Life Support

Paediatric BLS guidelines differ from adult guidelines due to the differing aetiology of cardiac arrest and the significant anatomical and physiological differences between infants, children and adults.

Cardiorespiratory arrest in infants and children can occur in a wide variety of conditions and is usually the result of hypoxia and/or hypovolaemia. Therefore early recognition and management is required to rectify hypoxia and hypovolaemia to reduce the risk of early cerebral injury. Cardiorespiratory arrest in infants and children is rarely from a cardiac origin, as with adults, so oxygen delivery rather than defibrillation is the critical step in BLS.

Respiratory arrest may occur alone therefore prompt recognition and initiation of expired air resuscitation with oxygen is crucial.

Examples of conditions that may lead to significant hypoxia and hypovolaemia in infants and children include:

- Severe respiratory illness and airway obstruction (bronchiolitis, croup, whooping cough, asthma),
- Sepsis
- Dehydration
- Drowning
- Anaphylaxis
- Congenital cardiac disease
- Trauma and accidents (head injuries)
- Drug overdose.

The outcome for children following cardiac arrest is in general poor, therefore early recognition that a child’s condition is deteriorating and for them to receive appropriate management as soon as possible is crucial.


Note that in cardiac arrests occurring in children there is potential benefit in commencing resuscitation before calling for help. In these cases, ”the phone fast” approach is recommended. In many situations the call for help will occur at the same time as the commencement of resuscitation. (ARC, 2002: Guideline 2.1)
Paediatric Flowcharts

Facilities may choose to follow a flow chart for the recommended sequence of Basic Life Support. The Australian Resuscitation Council (ARC) and Advanced Paediatric Life Support (APLS) flowcharts are taught in advanced life support courses for paediatrics held throughout paediatric hospitals/units in Australia.

The flowchart of choice used for each facility should be recommended by the facility Clinical Emergency Response System (CERS) committee to ensure standardisation for local teaching.

Advance Paediatric Life Support Group Flow Chart for Basic Life Support

The overall sequence of basic life support in cardiopulmonary arrest is as follows

![Flowchart Image]

Figure 1: The overall sequence of basic life support in cardiopulmonary arrest
Basic Life Support Flow Chart

D
Check for Danger
Hazards / Risks / Safety?

R
Responsive ? (Unconscious ?)
If not, Call for help
Call 000 / Resuscitation Team

A
Open Airway
Look for signs of life

B
Give 2 Initial Breaths if not breathing normally

C
Give 30 chest Compressions
(almost 2 compressions / second)
followed by 2 breaths

D
Attach AED as soon as available and follow its prompts

Continue CPR until qualified personnel arrive or signs of life return

NO SIGNS OF LIFE = Unconscious, Unresponsive,
Not Breathing Normally, Not Moving
AED = Automated External Defibrillator

Figure 2: Basic Life Support Flow Chart (Australian Resuscitation Council)
Steps in Paediatric Basic Life Support

When an infant or child collapses, his/her life may depend on the successful application of the principles of resuscitation.

The use of one of the DRABC or SAFE approach acronyms (See flow charts) will assist staff in remembering the sequence of resuscitation

<table>
<thead>
<tr>
<th>DRABC</th>
<th>SAFE Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>D = Danger</td>
<td>Shout for help</td>
</tr>
<tr>
<td>R = Response</td>
<td>Approach with care</td>
</tr>
<tr>
<td>A = Airway</td>
<td>Free from Danger</td>
</tr>
<tr>
<td>B = Breathing</td>
<td>Evaluate (Airway, Breathing, Circulation)</td>
</tr>
<tr>
<td>C = Circulation</td>
<td></td>
</tr>
<tr>
<td>D = Defibrillation with AED (in facilities where AED’s available)</td>
<td>(APLS, 2005)</td>
</tr>
</tbody>
</table>

(APRC, 2006, Guideline 7)

If someone collapses in your presence, or you find someone collapsed, take the following steps:

**DRABC**

Assess for danger and remove the infant/child and yourself to a safe environment if necessary (APRC, Guideline: 2.1 2002; Guideline 2.3 2005). Note: Do not attempt to move an older child by yourself, wait until help arrives to assist you.

**The SAFE Approach**

Help should be summoned rapidly. Additionally, it is essential that the rescuer does not become a second victim and that the child is removed from continuing danger as quickly as possible. These considerations should precede the initial airway assessment (APLS, 2005).

**Checking response**

- To determine responsiveness gently grasp and squeeze the infant/child’s shoulders, speak to the person by name if it is known. (APRC, 2006, Guideline: 3.1). Ask loudly “are you all right?”

- Note that infants and children who cannot talk yet and older children who are scared are unlikely to reply meaningfully but may make some sound or open their eyes to the rescuers voice (APLS, 2005).

- Do not shake infants or children (Biarent et al., 2005).
Checking response (cont)

<table>
<thead>
<tr>
<th>If Responsive</th>
<th>If Unresponsive</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Make the infant/child comfortable and observe Airway, Breathing and Circulation. (ARC, 2004, Guideline: 3.1)</td>
<td>• Shout for help;</td>
</tr>
<tr>
<td>• Call for nursing/medical help to review infant/child promptly.</td>
<td>• Note the time;</td>
</tr>
<tr>
<td>• Monitor his/her condition regularly (Blarent et al., 2005)</td>
<td>• Assess Airway, Breathing and Circulation;</td>
</tr>
<tr>
<td></td>
<td>• When more than one rescuer is present, one person should start BLS whilst the other should dial the emergency number for your facility or service;</td>
</tr>
<tr>
<td></td>
<td>• State the nature of the emergency;</td>
</tr>
<tr>
<td></td>
<td>• Give location;</td>
</tr>
<tr>
<td></td>
<td>• Identify whether emergency involves an adult or child;</td>
</tr>
<tr>
<td></td>
<td>• If there is only one person and no help has arrived after one minute of CPR then the rescuer must activate the facility response system themselves (APLS, 2005)</td>
</tr>
</tbody>
</table>

Airway

Opening the airway

When a child is unconscious, all muscles are relaxed. If the infant/child is lying on their back the tongue falls against the back of the throat and obstructs the airway.

To open the airway:

- Lay infant/child flat on the back on a firm surface (do not roll onto side);
- Apply head tilt/chin lift and/or jaw thrust.

KEY POINT: THE INFANT AIRWAY

The upper airway in infants is easily obstructed because of the narrowness of the nasal passages, the entrance to the vocal cords and the trachea. The trachea is soft and pliable and may be distorted by excessive backward head tilt or jaw thrust. Therefore in infants the head should be kept neutral and maximum head tilt should not be used.

(ARC, 2006, Guideline 4)
Airway (cont)

Manoeuvres to the open Airway: Head Tilt/Chin Lift

The simplest way of ensuring an open airway in an unconscious person is to use a head tilt chin lift technique, thereby lifting the tongue from the back of the throat. The best way to perform this manoeuvre is to place one hand on the infant/child’s forehead and gently tilt the head back.

The desirable degree of tilt is:

- Neutral in an infant (See Figure 3 below)
- Sniffing position in the child (See Figure 4 below)

Manoeuvres to the open Airway: Jaw Thrust

If the head tilt/chin lift is not possible or contraindicated the jaw thrust manoeuvre can be performed.

In the jaw thrust manoeuvre the jaw is displaced forward, pulling the tongue away from the back of the throat:

- Position yourself behind the head of the infant/child
- Place the first two fingers of each hand behind each side of the infant/child’s mandible and push the jaw forward (Biarent et al., 2005).

This technique may be easier if the rescuers are resting on the same surface as the child (APLS, 2005).
Clearing the airway:

- The airway must be cleared of food, saliva, vomit, blood or loose teeth
- If safe to do so manually remove any visible solids using gloved hands
- Use suction if available to clear the airway. If suction not available roll person on side, if safe to do so, and drain fluid from the mouth.

KEY POINT: NO 'BLIND FINGER-SWEEP' TO CLEAR THE AIRWAY

A blind ‘finger sweep’ technique should not be used in children. The child’s soft palate is easily damaged, and bleeding from within the mouth can worsen the situation. Furthermore, foreign bodies may be forced further down the airway; they can become lodged below the vocal cords (vocal folds) and be even more difficult to remove.

(APLS, 2005)
**Breathing**

Once the airway is cleared and open, check for normal breathing for a period of up to 10 seconds, using the following method. Note that an occasional gasp or noisy breathing is not considered normal breathing.

- Look and Feel: for movement of lower chest or upper abdomen;
- Listen and Feel: for escape of air from nose and mouth.

(ARC, 2008, Guideline: 5)

<table>
<thead>
<tr>
<th>If Breathing Normally</th>
<th>If Breathing is absent / not normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Place infant/child in the recovery position:</td>
<td>• Ensure infant/child is on a firm surface;</td>
</tr>
<tr>
<td>[Image: Figure 7: Recovery position (AHA, 2005)]</td>
<td>• Using a barrier device (see appendix 2), give up to 5 breaths to achieve 2 effective breaths each of 1-1.5 seconds' duration. (APLS, 2005)</td>
</tr>
<tr>
<td>• Check for continued breathing and administer oxygen via mask at a flow rate of up to 15 litres/minute, if available;</td>
<td>• If there is an oxygen source available attach to the mask at a flow rate of 15 litres/minute (Laerdal);</td>
</tr>
<tr>
<td>• Note: Stay with the child until help arrives.</td>
<td>• Deliver a breath of sufficient volume to see the chest rise. Note: If the chest does not rise recheck head tilt and chin lift; recheck mask seal; and do not attempt more than two breaths each time before commencing or returning to chest compressions;</td>
</tr>
</tbody>
</table>

(ARC, 2008, Guideline: 5)
Circulation

If there are no signs of life (i.e. unconsciousness, no movement, no normal breathing or coughing) commence chest compressions immediately. Experienced clinicians may check for a pulse (for no more than 10 seconds) while simultaneously assessing for signs of life.

(ARC, 2006, Guideline 6)

In children the carotid artery can be palpated. In infants the neck is generally short and fat and the carotid artery may be difficult to identify. Therefore the brachial artery in the medial aspect of the antecubital fossa (see Figure 9) or the femoral artery in the groin should be felt (APLS, 2005).

If circulation is adequate continue with rescue breathing. See ‘key point’ below

Figure 9: Brachial Pulse
(Courtesy of SCH, 2009)

KEY POINT: RESCUE BREATHING WITHOUT CHEST COMPRESSIONS.

In the event it is determined that an infant or child has signs of circulation but do not demonstrate adequate respirations, rescue breathing should continue using the following guidelines.

- Rescue breaths can be delivered at a rate of 12-20 breaths per minute to achieve a normal pC02. Note that hyperventilation is harmful;
- Each breath should be of sufficient volume to see the chest rise. If the chest does not rise, head tilt/chin lift and mask seal should be rechecked;
- Avoid inflating lungs with too much force as there is a risk that air will inflate the stomach resulting in regurgitation of stomach contents and aspiration into the lungs;
- Reassess for a pulse every 10 breaths but spend no more than 10 seconds doing so;
- Be prepared to commence compressions if a pulse is no longer palpable;
- If the person resumes breathing normally place in recovery position.

(ARC, 2006, Guideline 6; Nolan et al, 2005; Biarent et al., 2005)
Circulation (cont)

Chest compressions should be commenced if there is:

- No signs of circulation;
- An absence of a pulse;
- Slow pulse:
  - Infants pulse less than 60 beats per minute with signs of poor perfusion (APLS, 2005).
  - Children pulse less than 40 beats per minute (ARC, 2008, Guideline 12.2).

Chest compressions are performed as follows

- The infant/child should be on a flat hard surface;
- Children and rescuers vary in size; the method of chest compressions should reflect this;
- For all age groups compress over the lower half of the sternum, this equates to the ‘centre of the chest’
- For all age groups compress the sternum hard and fast approximately one third of the depth of the chest
- Compression time should equal release time i.e. 50% down motion, 50% up motion, smoothly and rhythmically. Do not remove your hands from the sternum during compressions.
- Kneel or stand vertically over the infant/child so that your shoulders are over the sternum and your arms are straight;
- The following techniques should be used for compressions:

Compression Techniques

Infants

For single rescuer use the tips of two fingers, press down on sternum approximately one third of the depth of infants chest

![Figure 10: Finger placement for compressions in infants](https://example.com/figure10)

(Courtesy of SCH, 2008)
Compression Techniques Infants (cont)

If there are 2 or more rescuers use the encircling technique:

- Place both thumbs flat side by side on lower half of sternum with tips pointing to infants head;
- Spread the rest of both hands with the fingers together to encircle the lower part of the infants rib cage with the tips of fingers supporting the infants back;
- Press down on the sternum applying pressure through the thumbs to depress it approximately one third of the infant’s chest.

(Biarent et al., 2005)

Figure 11: Two thumb encircling hand technique for cardiac compressions in infants
(Courtesy of SCH, 2009)

KEY POINT: TECHNIQUES FOR PERFORMING COMPRESSIONS IN CHILDREN

Chest compressions can be performed using either the heel of one hand or the two handed technique. The rescuer should choose the most appropriate method, depending on the size of the child and the size of the rescuer, to compress the sternum one third the depth of the chest.
Compression Techniques Children (cont)

<table>
<thead>
<tr>
<th>Compressions in Children</th>
<th>Compressions in Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>To perform chest compressions on children over 1 year</td>
<td>In larger children or for small rescuers the two handed technique should be used</td>
</tr>
<tr>
<td>• Place the heel of one hand over the lower half of the sternum;</td>
<td></td>
</tr>
<tr>
<td>• Lift the fingers to ensure that pressure not applied over the child’s ribs.</td>
<td></td>
</tr>
</tbody>
</table>

![Figure 12: Hand placement for one-hand technique](image)  
(Courtesy of SCH, 2008)

![Figure 13: Hand placement for 2 hand technique](image)  
(ERC, 2005)

Rate of compressions

- For all age groups compression rate should be 100 times per minute;
- Note that this does not imply that 100 compressions will be delivered each minute since the number will be reduced by interruptions for breaths.

KEY POINT: COMPRESSION: VENTILATION RATIOS FOR INFANTS AND CHILDREN

- For single rescuers the compression to ventilation ratio is 30 compressions to two (2) ventilations;
- When there are two or more experienced clinicians performing CPR (i.e. medical, nursing staff) the ratio of compressions to ventilations is 15 compressions to two (2) ventilations. For all other staff groups maintain a ratio of 30 compressions to two (2) ventilations.
Circulation (cont)

Points on compressions

- Effective chest compressions generate a small, but critical amount of blood flow to the myocardium and brain and increase the likelihood of effective defibrillation.

- Once an advanced airway has been secured (i.e. tracheal intubation) continue compressions uninterrupted. Ventilations should be delivered at 12-20 breaths per minute (Biarent et al., 2005) Note: Compressions should only be interrupted to perform rhythm analysis or to defibrillate (Nolan et al., 2005);

- Note that performing chest compressions at 30:2 or 15:2 is tiring; it is therefore recommended that the person doing compressions be changed every 2 minutes or when he/she becomes fatigued (ARC, 2006, Guideline 6).

Duration of CPR

Cardiopulmonary resuscitation should continue until:

- Signs of life return;
- Qualified help arrives to assist you;
- It is impossible to continue (e.g. exhaustion);
- An authorised person pronounces life extinct.

(ARC, 2006, Guideline 7)

- Note: If, after 1 minute of CPR, no help has arrived the rescuer must ensure the clinical emergency response team has been called.

Automatic external defibrillators (AEDs) in children

The use of an AED is now included in basic life support teaching for adults, because early defibrillation is the most effective intervention for the large majority of unpredicted cardiac arrests in adults. As has been stated, in children circulatory or respiratory causes of cardiac arrest predominate.

The use of AED’s in paediatrics therefore is not covered in the paediatric basic life support guideline.

KEY POINT: CARDIORESPIRATORY MONITORING

It is important that cardiorespiratory monitoring is commenced as soon as possible either displayed using chest leads or defibrillator pads to enable differentiation of shockable and non shockable rhythms. (Barents et al., 2005)

Staff should send for a manual defibrillator or AED as quickly as possible
Broselow - Hinkle System

The Broselow-Hinkle system is a colour coded patient safety system guide which is used in paediatric emergency situations.

The Broselow® Paediatric Emergency Tape (Broselow and Luten, 1998) measures the child’s length and provides colour coded zones that contain an estimated weight and a guide to the equipment (e.g. cannulation set ups, nasogastric set ups and intubation set ups) required for a child of that weight in an resuscitation situation. The tape is placed at the head of the child and you look down at the child’s feet and this will give you the appropriate zone.

In some departments there may also be a specific Broselow trolley, colour coded packs or the department paediatric resuscitation trolley may be reorganised to correlate with the Broselow Paediatric Emergency colour coded system. The trolley has different coloured drawers which contain age specific equipment. To determine the appropriate drawer the Broselow tape should be used as demonstrated in figure 14.

Other resources which may assist staff with determining equipment and drugs in paediatric resuscitation situations are the NSW Child Health Networks paediatric resuscitation cards which have an aged based column that will also lead you to the appropriate colour zone and drawer.
Paediatric Basic Life Support Assessment Criteria (assessment form)

BLS assessment tool is currently under development, please use local BLS assessment tools.
APPENDIX 3
Airway management:

Resuscitation devices must be used during cardiopulmonary resuscitation to prevent direct contact between the mouth of the resuscitator and the person being resuscitated. Individual resuscitation devices (masks) must be available and accessible in all patient care areas (NSW Health Infection Control Manual 2007).

In the event of an emergency where a barrier device is not available the mouth to mouth or mouth to mouth and nose may be required.

Rescue Breathing

Four methods are used for rescue breathing

- Mouth to mask;
- Mouth to Mouth;
- Mouth to mouth and nose;
- Bag Valve Mask (BVM);

Mouth to Mask resuscitation

This method can be used until a BVM is available and help arrives to secure a definitive airway. Follow facility guidelines for assembly and use of the mask.

Method:
- Position yourself at infant/child’s head
- Apply oxygen to inlet if immediately available at 15 litres per minute flow
- Apply the mask either;
  - Upside down in infants (See Figure 15);
  - As for adults in children (see Figure 16).

Figure 15: Mouth to Mask Ventilation (Infant) (Courtesy of SCH, 2008)
Figure 16: Mouth to Mask Ventilation (Child) (Courtesy of SCH, 2008)
**Mouth to Mask Method (cont)**

- Place mask (with filter/one way valve attached) over infant/child’s mouth and nose (this will cover majority of face in infants);
- Place mouth around filter/valve attached to the mask;
- Blow through filter/valve giving enough volume to see the infant/child’s chest rise
  N.B. Allow time for infant/child to exhale before delivering next breath;
- If chest does not rise re-check head tilt, chin lift and mask seal.

*(ARC, 2008, Guideline 5)*

**Mouth to Mouth and Nose method (under 1 year)**

This method should only be used in the event of an emergency where no barrier device is available.

- Maintain open airway in neutral position using head tilt/chin lift.
- Take a breath, seal lips around the outside of the infant's mouth and nose ensuring an airtight seal.
- Deliver up to 5 breaths to achieve two effective breaths, of sufficient volume to make the chest rise. Allow about 1-1.5 seconds for each breath;
- Remove your mouth to allow exhalation, watch the chest fall;
- If the chest does not rise then the airway is not clear. Check and re-open the airway, check the seal of your mouth and try again.

Figure 18: Mouth to Mouth and Nose position
*(APLS, 2005)*

**Mouth to Mouth method (over 1 year)**

This method should only be used in the event of an emergency where no barrier device is available.

- Maintain open airway with head tilt/chin lift
- Pinch nostrils with thumb and forefinger of hand maintaining the head tilt.
- Take a breath and place mouth over victim's mouth, ensuring an airtight seal.
**Mouth to Mouth method (over 1 year) (cont)**

- Deliver up to 5 breaths to achieve two effective breaths, of sufficient volume to make the chest rise. Allow about 1-1.5 seconds for each breath.
- Remove your mouth to allow exhalation, watch the chest fall.
- If the chest does not rise then the airway is not clear. Check and re-open the airway, check the seal of your mouth and try again.

![Figure 17: Mouth to Mouth in a child (Courtesy of SCH, 2009)](image)

**Bag - valve - mask Ventilation**

Bag-valve-mask ventilation is used to provide positive pressure ventilation in infants and children with respiratory failure.

**KEY POINT: SELF -INFLATING BAG -VALVE-MASK SYSTEMS**

This complex piece of equipment requires considerable education and practice for use. Personnel using the device must be familiar with its structure and function and may only initiate manual ventilation if they have attained competency in bag-valve-mask ventilation.

The device is comprised of a self-inflating bag and a non-rebreathing valve attached to a facemask. There is also the ability to have oxygen inflow and an oxygen reservoir to enable delivery of high flow oxygen (NSW Health, 2004.)

**Self-inflating bags come in three sizes**

- The 250 ml bag is reserved for use in intubated neonates <1.5kg only;
- The 500ml bag is for infant and children under 30kgs;
- The 1500ml is for children over 30kgs.

Recommended weight ranges for BVM systems may differ please check individual equipment recommendations.
**Bag - valve - mask Ventilation (cont)**

The paediatric and neonatal devices usually have a pressure limiting valve set at 35cm H₂O to protect the lungs from inadvertent barotrauma. This valve may be overridden under the supervision of a medical officer to permit use of high pressures to achieve visible chest expansion in patients with upper or lower airway obstruction or poor lung compliance (APLS, 2005).

The self-inflating bag delivers only room air (21% oxygen) unless supplementary oxygen is attached. To deliver consistently higher oxygen concentrations (60% to 95%), the device should have an oxygen reservoir. In order to deliver high oxygen concentrations an oxygen flow rate of at least 10 to 15 L/min of oxygen is required in the reservoir of the 500ml manual resuscitator and at least a flow rate of 15 L/min into the 1500ml bag (AHA, 2006).

**KEY POINT: HOW MUCH FORCE TO USE?**

Regardless of the size of the manual resuscitator used, the rescuer should only use the force and tidal volume necessary to make the chest rise. Each breath should be given over approximately one second (AHA, 2006).

Health care providers often deliver excessive ventilation during CPR, particularly when an advanced airway is in place. Excessive ventilation is detrimental because:

- **It impedes venous return and therefore decreases cardiac output, cerebral blood flow, and coronary perfusion by increasing intrathoracic pressure;**
- **In patients with small-airway obstructions (e.g. asthma and bronchiolitis), excessive tidal volume and ventilation rate can result in air trapping, barotrauma, air leak, and severely compromised cardiac output;**
- **It increases the risk of regurgitation and aspiration.**

(AHA, 2006)

**Technique for the use of the Self-inflating bag-valve-mask systems**

- **Wear personal protective equipment**
- **Select a bag and mask of appropriate size. The mask must be able to completely cover the victim’s mouth and nose without covering the eyes or overlapping the chin;**
- **Connect to an oxygen supply;**
- **Open the patient’s airway using the head tilt/chin lift manoeuvre or jaw thrust if spinal injury suspected;**
- **Position the mask on the face ensuring a good seal to the face;**
- **Place your thumb and forefinger in a “C” shape over the mask and exert downward pressure on the mask and position third, fourth and fifth fingers along the infant/child’s jaw. Compress the ventilation bag with the other hand until the chest visibly rises.**
Technique for the use of the Self-inflating bag-mask systems (cont)

- In larger children a two handed technique may be required if there are two rescuers.
- Observe for bilateral rise of the chest, and allow for passive exhalation.
- Where cardiac compressions are in progress ventilation with a self inflating bag mask system must be coordinated during the pause in compressions to achieve adequate expansion of the lungs at the compression to ventilation ratios of either 30:2 or 15:2 (ARC, 2006, Guideline 12.2).
- If the victim has a perfusing rhythm (i.e. pulses are present) but no breathing, give breaths at a rate of 12-20 per minute (1 breath every 3-5 seconds) (AHA, 2006).
- In spontaneously breathing patients ensure synchrony with patient effort.

![Figure 19: Bag-valve-mask ventilation](Image)  
(Courtesy of SCH, 2009)

- Assess effectiveness of ventilation throughout procedure. In most instances bag-valve-mask ventilation provides an adequate means of assisted ventilation.
- Regardless of how effective bag-valve-mask ventilation is achieved, some degree of gastric inflation will occur. If the abdomen becomes distended with bag-valve-mask ventilation, the passage of a nasogastric tube may be required to decompress the stomach.
Management of Foreign Body Airway Obstruction

The diagnosis of a foreign body airway obstruction (FBAO) may not be clear cut but should be suspected if the onset of respiratory compromise is sudden and is associated with coughing, gagging and stridor (APLS, 2005).

Airway obstruction may also occur with infections such as acute epiglottitis and croup and in these cases attempts to relieve the obstruction using methods below are dangerous.

If a foreign body is easily visible and accessible in the mouth then remove it taking care not to push it further into the airway. DO NOT perform a blind finger sweep of the mouth as this may further impact a foreign body and damage tissues without removing the object.

The following physical methods of clearing the airway should only be performed if

- The diagnosis of foreign body aspiration is clear and ineffective coughing and increased shortness of breath, loss of consciousness or apnoea have occurred
- Head tilt/chin lift have failed to open the airway of an apnoeic child

The sequence of actions for management of FBAO is shown below in Figure 20

![Figure 20: Foreign Body airway obstruction sequence (APLS, 2006)](image-url)
**The FBAO sequence**

If the child shows signs of an effective cough they should be encouraged to cough, reassured, kept calm and observed continuously but do nothing else. Place the child upright in a position they feel most comfortable and call for assistance.

If the child shows signs of severe airway obstruction and is conscious apply up to 5 back blows.

**Back Blows: In an infant**

- support them in a head downwards, prone position to enable gravity to assist removal of the foreign body;
- a seated or kneeling rescuer should be able to support the infant safely across their lap;
- Support the infants jaw in such a way as to keep the airway open in the neutral position;
- Deliver up to five sharp back blows with the heel of one hand in the middle of the back between the shoulder blades;
- Check to see if each back blow has relieved the airway obstruction.

**Back Blows: In a child over 1 year of age**

- Back blows are more effective if the child is positioned head down;
- A small child may be placed across the rescuers lap as with the infant;
- If this is not possible, support the child in a forward leaning position;
- Deliver up to five sharp back blows with the heel of one hand in the middle of the back between the shoulder blades;
- Check to see if each back blow has relieved the airway obstruction.

**Chest thrusts**

If back blows fail to dislodge the object and the infant/child is still conscious use 5 chest thrusts.

**Method**

- Check to see if each chest thrust has relieved the airway obstruction the aim is to relieve the airway obstruction with each rather than give all 5 chest thrusts;
- To perform chest thrusts identify the same compression point as that for BLS;
- These are similar to chest compressions but sharper and delivered at a slower rate;
In order to do chest thrusts you need to have the back of the patient supported.

**Chest thrusts (cont)**

**In an infant**
- The infant should be in a head downwards supine position across the rescuer’s thigh

**In a child over 1 year of age**
- Children may be treated in the sitting or standing position

If the obstruction is not relieved, continue alternating five back blows with five chest thrusts.

**If the infant/child at any time becomes unconscious**
- Support the person carefully to the ground - do not place yourself in danger by ‘catching the person’
- Summon HELP:
  - Call/Send for help;
  - Call the facility emergency number state Cardiac Arrest/Code Blue and give location, identify whether emergency involves child or adult.
  - Begin CPR at a compression to ventilation ratio of 30:2 if on own or 15:2 if two or more experienced rescuers

(APLS, 2005)
Paediatric Basic Life Support Quiz Questions

The following Quiz in designed to assess the readers understanding of the Guidelines outlined in this document. The quiz can be undertaken as a self directed exercise or as part of a facilitated question and answer session with other learners.

1. The causes of cardiorespiratory arrest in children are usually the result of:
   - [ ] cardiac arrhythmia
   - [ ] hypoxia and hypovolemia
   - [ ] snake bite
   - [ ] coronary artery disease

   (Need help? See Page 10)

2. For the purpose of resuscitation the definition of an infant is a child under 1 year and a child is between one year and puberty
   - [ ] True
   - [ ] False

   (Need help? See Page 7)

3. What are your first priorities when you find a collapsed child?
   - [ ] Give 2 breaths
   - [ ] Make a note of the time and run for help
   - [ ] The SAFE approach or the DRABC approach
   - [ ] The RACE approach and DRCAT approach

   (Need help? See Page 13)

4. How do you assess responsiveness in an infant / child
   - [ ] Shake the infant/child vigorously and ask loudly “are you all right?”
   - [ ] Gently grasp and squeeze the infant/child’s shoulders and ask loudly “are you all right?”
   - [ ] Check the infant/child’s pupils and ask loudly “are you all right?”
   - [ ] Take the infant/child’s pulse and shout loudly “are you all right?”

   (Need help? See Page 13)

5. Which head position is recommended to ensure an infant has an open airway?
   - [ ] neutral position
   - [ ] sniffing position
   - [ ] flexed position
   - [ ] Hyper-extended position

   (Need help? See Page 15)

6. Which head position is recommended to ensure a child has an open airway?
   - [ ] neutral position
   - [ ] sniffing position
   - [ ] flexed position
   - [ ] hyper-extended position

   (Need help? See Page 15)
7. You assess that the infant/child is not breathing, how many rescue breaths should initially be given?

- 1 breath per second
- Up to 5 breaths to ensure 2 effective breaths
- 5 quick breaths
- Up to 6 breaths to ensure 2 effective breaths

(Need help? See Page 17)

8. An infant/child with no signs of life is:

- Unconscious/unresponsive
- Not moving
- Not breathing normally
- All of the above

(Need help? See Page 18)

9. If you were checking for a pulse in an infant what sites could you use?

- either carotid or femoral arteries
- either femoral or brachial arteries
- either radial or carotid arteries
- either radial or femoral arteries

(Need help? See Page 18)

10. How long should you assess for circulation? (this includes checking for both signs of life and performing a pulse check)

- 5 seconds
- 10 seconds
- 15 seconds
- 20 seconds

(Need help? See Page 18)

11. Which of the following are indications to commence cardiac compressions in infants and children?

- No pulse
- Slow pulse less than 60 per minute in an infant with poor perfusion
- No signs of life
- All of the above

(Need help? See Page 19)

12. When locating the site for chest compressions in an infant/child it is recommended to compress over the lower half of the sternum

- True
- False

(Need help? See Page 19)
13. When performing CPR on an infant or child the recommended ratio of breaths to compressions if you are a single rescuer is?
- 30 compressions: 1 breath
- 30 compressions :2 breaths
- 15 compressions: 2 breaths
- 15 compressions :1 breath

(Need help? See Page 21)

14. If you are the sole rescuer performing cardiac compressions on an infant what technique is recommended?
- the heel of one hand
- thumbs encircling the chest
- tips of 2 fingers
- 2 handed technique

(Need help? See Page 19)

15. If you are performing cardiac compressions on a child what depth do you compress the chest?
- Compress the chest approximately 1/3rd depth of the chest
- Compress the chest approximately ½ depth of the chest
- Compress the chest approximately 1 cm
- Compress the chest as far as possible

(Need help? See Page 19)

16. How many compressions do you need to aim for to maximise cerebral perfusion?
- 120 compressions per minute
- 100 compressions per minute
- 90 compressions per minute
- 80 compressions per minute

(Need help? See Page 21)

17. It is recommended that CPR continue until:
- An authorised person pronounces life extinct
- Qualified help arrives to assist
- Exhaustion prevents you continuing
- Signs of life return
- All of the above

(Need help? See Page 22)

18. If a child has a pulse but is not breathing spontaneously how many breaths/ minute do you aim for?
- Approximately 30- 40 breaths per minute
- Approximately 20- 30 breaths per minute
- Approximately 12-20 breaths per minute
- Approximately 8-12 breaths per minute

(Need help? See Page 18)
19. Why should a blind finger sweep technique to clear an airway never be used in infants and children?

☐ It may cause tissue damage to the soft palate
☐ The child may bite you
☐ The child may have loose teeth
☐ It may cause the infant to cry

(Need help? See Page 16)

20. Severe airway obstruction in a child who is still conscious should be managed by

☐ CPR
☐ the Heimlich manoeuvre
☐ a series of back blows and chest thrusts
☐ Rescue breathing

(Need help? See Page 30)

21. What information do you need to give when making an emergency call?

☐ Emergency type (i.e. Code blue / Cardiac Arrest)
☐ Location of emergency
☐ Whether it is an adult or child
☐ All of the above

(Need help? See Page 14)

22. What number do you call in your facility in the event of a Cardiac Arrest?

(Need help? See Page 5)
References:


Laerdal. Product information: Pocket mask directions for use.


Diagrams and Appendices:

Figure 1: Basic Life Support Flow Chart (Page 9)

Figure 2: Basic Life Support Flow Chart (Page 10)

Figure 3: Airway opening manoeuvres- Infant head position
Courtesy of Sydney Children’s Hospital (2008)

Figure 4: Airway opening manoeuvres- position in children
Courtesy of Sydney Children’s Hospital (2008)

Figure 5: Airway opening manoeuvres- jaw thrust in infants
Courtesy of Sydney Children’s Hospital (2009).

Figure 6: Airway opening manoeuvres- jaw thrust in children
Courtesy of Sydney Children’s Hospital (2009).

Figure 7: Recovery position.

Figure 8: Mouth to mask method in an infant.
Courtesy of Sydney Children’s Hospital (2008)

Figure 9: Brachial pulse
Courtesy of Sydney Children’s Hospital (2009).

Figure 10: Finger placement for compressions in infants
Courtesy of Sydney Children’s Hospital (2008).

Figure 11: Two thumb encircling technique for cardiac compressions in infants.
Courtesy of Sydney Children’s Hospital (2009).

Figure 12: hand placement for one-hand technique in compressions
Courtesy of Sydney Children’s Hospital (2008).

Figure 13: Hand placement for 2 hand technique in compressions

Figure 14: Broselow paediatric emergency tape

Figure 15: Mouth to mask ventilation in an infant.
Courtesy of Sydney Children’s Hospital (2008)

Figure 16: Mouth to mask ventilation in a child.
Figure 17: Mouth to mouth method in a child
Courtesy of Sydney Children’s Hospital (2009)

Figure 18: Mouth to mouth and nose position in an infant

Figure 19: Bag-valve-mask ventilation
Courtesy of Sydney Children’s Hospital (2009)

Figure 20: Foreign body airway obstruction sequence