INTRODUCTION

Paediatric basic life support (BLS) is not simply a scaled down version of that provided for adults. The pathways leading to cardiorespiratory arrest are rarely due to primary cardiac disease as in adults, and the anatomy and physiology are also different. When resuscitating children, oxygen delivery rather than defibrillation is the critical step, as ventricular fibrillation is rare. Resuscitation techniques also need to reflect the anatomy and physiology of the different age groups.

Although the general principles of paediatric resuscitation are the same as for adults, the exact techniques employed need to be varied according to the size of the child. A somewhat artificial distinction is therefore made between:

- Infants (less than 1 year old)
- Children (aged between 1 year and puberty)

By applying the basic techniques described, a single rescuer can support the vital respiratory and circulatory functions of a collapsed child, with no equipment.

Basic life support is the foundation on which advanced life support is built. Therefore, it is essential that all advanced life support providers are proficient at basic techniques and that they are capable of ensuring that basic life support (Figure 3.1) is provided correctly and continuously during resuscitation.
BASIC LIFE SUPPORT

**Figure 3.1. Basic life support algorithm**

*1 rescuer 30:2 (1 min = 2.5 cycles of 30:2)  
2 rescuers 15:2 (1 min =4 cycles of 15:2)
SAFE approach

Additional help should be summoned rapidly. Furthermore, 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 an assessment of the victim.

- S - Shout for help
- A - Approach with care
- F - Free from danger
- E - Evaluate ABC

Check responsiveness

The initial simple assessment of responsiveness consists of asking the child “Are you alright?”, and gently shaking him or her by the shoulders. Infants and very small children who cannot talk yet, and older children who are very scared are unlikely to reply meaningfully, but may make some sound or open their eyes to the rescuer’s voice. In cases associated with trauma, children and infants must not be shaken.

Airway opening manoeuvres

An obstructed airway may be the primary problem, and correction of the obstruction can result in recovery without further intervention. If a child is having difficulty breathing, but is conscious, then transport to hospital should be arranged as quickly as possible. Children will often find the best position to maintain their own airway, and should not be forced to adopt a position, which may be less comfortable or physiologically effective. Attempts to improve a partially maintained airway in an environment where immediate advanced support is not available can be dangerous, since total obstruction may occur.

To open the airway, try

- Head tilt, (do not use if history of trauma) chin lift
- Jaw thrust
- The desirable degrees of tilt are: neutral in the infant and sniffing in the child. This is shown in figure 3.1 and detailed in Table 3.1.

Check breathing

- Looking for chest movement
- Listening at the child’s mouth and nose for breath sounds
- Feeling with your cheek for air movement.
BASIC LIFE SUPPORT

Effective breaths
- The chest should be seen to rise
- Slow breaths at the lowest pressure reduce gastric distension.

Check for signs of circulation
- Inadequacy of the circulation is recognised by the absence of a central pulse for 10 seconds or by the presence of a pulse at an insufficient rate.
- Any signs of circulation including movement, swallowing or breathing (other than an occasional gasp) should be noted during the diagnosis of cardiac arrest.
- If the pulse is present and at an adequate rate, but apnoea persists, exhaled air resuscitation must be continued at a rate of 12-20 breaths per minute, until spontaneous breathing resumes.
<table>
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<th>Infant (&lt;1 yr)</th>
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<td>Landmark</td>
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<td>One finger-breadth above xiphisternum</td>
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<td><strong>Cardiopulmonary resuscitation ratio</strong></td>
<td></td>
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<tr>
<td>One rescuer</td>
<td>30:2</td>
<td>30:2</td>
</tr>
<tr>
<td>Two rescuers</td>
<td>15:2</td>
<td>15:2</td>
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</tbody>
</table>
Figure 3.2. Choking Child algorithm
THE CHOKING CHILD

The vast majority of deaths from foreign body aspiration occur in preschool children. Virtually anything may be inhaled. The diagnosis is rarely clear-cut, but should be suspected if the onset of respiratory compromise is sudden and is associated with coughing, gagging and stridor. Airway obstruction may also occur with infections such as acute epiglottitis and croup. In such cases attempts to relieve the obstruction using the methods shown in Figure 3.2 are dangerous. Children with known or suspected infectious causes of obstruction, and those who are still breathing and in whom the cause of obstruction is unclear, should be taken to hospital urgently.

If a foreign body is easily visible and accessible in the mouth then remove it but, while attempting that, take great care not to push it further into the airway. Do not perform blind finger sweeps of the mouth or upper airway as these may further impact a foreign body and damage tissues without removing the object.

The physical methods of clearing the airway, shown in Figure 3.2, should therefore only be performed if:

- The diagnosis of foreign body aspiration is clear-cut, and apnoea has occurred.
- Head tilt/chin lift and jaw thrust have failed to enable ventilation of an apnoeic child.

The sequence of instructions is shown in the algorithm.
Automated External Defibrillation (AED)

BLS

Switch defibrillator on
Attach electrodes
Follow spoken/visual directions
Use paediatric pads or paediatric attenuation programme up to 8 years*

ANALYSE

Shock indicated

1 shock

CPR 2 minutes (8 cycles 15:2)

No shock indicated

If no circulation CPR 2 minutes (8 cycles 15:2)

Continue until advanced life support is available

*If no paediatric equipment is available, use an unmodified adult AED.

Figure 3.3. AED algorithm
AUTOMATED EXTERNAL DEFIBRILLATION

The use of automated external defibrillation (AED) (Figure 3.3) is now included in basic life support teaching in adults as early defibrillation is the most effective intervention for the large majority of unpredicted cardiac arrests in adults. As has been stated, in children and young people circulatory or respiratory causes of cardiac arrest predominate. However, in certain circumstances children may suffer a primary cardiac cause for cardiac arrest and the use of an AED may be life saving. Recently there has been a large increase in the number of AEDs, together with trained operators, made available in public places such as airports, places of entertainment and shops so the opportunity for their use will correspondingly increase. Public access AEDs may result in a better outcome for this small group when guidelines for use by trained lay people in the under 8 year olds have been agreed. The introduction of automated external defibrillators in the pre-hospital setting and especially for public access has improved the outcome for VF cardiac arrest for some adults. Standard (“adult”) models have a fixed initial dose of electricity of 150–200 J, which significantly exceeds the recommended dose of 4 J/kg in young children and infants.

In the pre-hospital setting, standard AEDs are commonly used in adults to assess cardiac rhythm and to deliver defibrillation. In children these AEDs can accurately detect ventricular fibrillation at all ages, but there remains concern over their ability to correctly identify tachycardic rhythms in infants. At present, therefore, standard AEDs can be used to identify rhythms in children but not in infants.

The energy dose delivered by both standard monophasic and standard biphasic AEDs exceeds the recommended dose of 4 J/kg in most children < 8 years of age. The average weight of children > 8 years old is usually more than 25 kg. The initial dose from a standard AED (150–200 J) will be less than 10 J/kg. Children appear tolerant of high doses of energy. It is considered acceptable to use a standard AED in children over 8 years if indicated. Manufacturers are now making available attenuated devices, which allow delivery of a shock of lower energy and thus can be used used to treat children aged 1–8 years. The use of AEDs in infants (less than a year) cannot yet be recommended for the reasons considered above, but the healthcare professional must bear in mind that true ventricular fibrillation in an infant is likely to deteriorate to asystole if no intervention is made.
BASIC LIFE SUPPORT

To summarise therefore:

- The energy dose for a child in a shockable cardiac arrest rhythm is 4J/kg at all ages.
- Paediatric attenuated devices should be used if possible in children less than 8 years.
- An unattenuated AED can be used to treat a child of between 1 and 8 years if necessary if no paediatric attenuated device is available.
- Standard (adult) AEDs cannot be recommended under any circumstances in children under the age of one because of concern that a rapid tachycardia with an output may be confused by the machine with ventricular tachycardia (and result in a shock being delivered inappropriately).
- Ventricular fibrillation (at any age) if left untreated is likely to deteriorate into ventricular fibrillation and the earlier this rhythm is treated the better the outcome is likely to be.

BASIC LIFE SUPPORT AND INFECTION RISK

There have been a few reports of transmission of infectious diseases from casualties to rescuers during mouth-to-mouth resuscitation. The most serious concern in children is meningococcus, and rescuers involved in the resuscitation of the airway in such patients should take standard prophylactic antibiotics (usually rifampicin).

There have been no reported cases of transmission of either hepatitis B or human immunodeficiency virus (HIV) through mouth-to-mouth ventilation. Blood-to-blood contact is the single most important route of transmission of these viruses, and in non-trauma resuscitations the risks are negligible. Sputum, saliva, sweat, tears, urine and vomit are low risk fluids. Precautions should be taken if possible in cases where there might be contact with blood, semen, vaginal secretions, cerebrospinal fluid, pleural and peritoneal fluids, and amniotic fluid. Precautions are also recommended if any bodily secretion contains visible blood. Devices which prevent direct contact between the rescuer and the victim (such as resuscitation masks) can be used to lower risk; gauze swabs or any other porous material placed over the victim’s mouth are of no benefit in this regard.
The number of children in the UK with AIDS or HIV-1 infection in June 1992 was estimated at 501, while the number of adults similarly affected was estimated at 23,806 (a ratio of 1:47). If transmission of HIV-1 does occur it is therefore much more likely to be from adult rescuer to child rather than the other way around.

Although practice manikins have not been shown to be a source of infection, regular cleaning is recommended, and should be carried out as shown in the manufacturer’s instructions.