

# Out-of-hospital resuscitation 3: paediatric basic life support

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**Abstract** Nurses will be familiar with the procedure for advanced life support but may be less confident with paediatric basic life support skills, which are required to manage out-of-hospital cardiac arrest. This article, the third in a four-part series, describes current guidance and additional precautions required during the Covid-19 pandemic.

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## Professional responsibilities

This procedure should be undertaken only after approved training, supervised practice and competency assessment, and carried out in accordance with local policies and protocols.

## Box 1. Paediatric CPR during Covid-19

Paediatric cardiac arrest is more likely to have a respiratory, rather than a cardiac, cause so rescue breathes are important. The Resuscitation Council UK (2020) gives the following advice:

"It is likely that the child/infant having an out-of-hospital cardiac arrest will be known to you. We accept that doing rescue breaths will increase the risk of transmitting the Covid-19 virus, either to the rescuer or the child/infant. However, this risk is small compared to the risk of taking no action as this will result in certain cardiac arrest and the death of the child".

CPR = cardiopulmonary resuscitation. Source: Resuscitation Council UK (2020)

This series provides an update on basic life support for out-of-hospital cardiac arrest and adheres to guidance from the Resuscitation Council UK (RCUK). Skellett et al (2021) note that "Regular training in paediatric BLS [basic life support] is essential, as cardiorespiratory arrest occurs less frequently in children than in adults; thus, both healthcare professionals and members of the public are less likely to be involved in paediatric resuscitation". Information and advice about acting as a good Samaritan can be found in part 1 of this series.

The majority of paediatric cardiorespiratory arrests are not caused by cardiac problems; they are usually secondary to causes such as hypoxia, so ventilation is an important part of the initial response (Skellett et al, 2021). If an infant or child shows no signs of life, or abnormal or absent breathing, cardiopulmonary resuscitation (CPR) should be started immediately. RCUK recommend that "rescuers who have been taught adult BLS, and have no specific knowledge of paediatric resuscitation, should use the adult sequence" (Skellett et al, 2021). This article follows this guidance.

## Infection prevention

During the Covid-19 pandemic, it is important to wear personal protective equipment – such as a face mask and gloves – if available, and follow RCUK (2020) guidelines on out-of-hospital resuscitation during the pandemic (Box 1).

## Primary survey

If you witness an infant or child who appears to have collapsed, it is important

that you conduct a primary survey to find and treat any life-threatening conditions in order of priority (Wardrope and MacKenzie, 2004). Rescuers need to determine if a victim is an infant (<1 year of age) or a child (aged 1-18 years), as there are differences in management (Skellett et al, 2021).

When you find a collapsed casualty, you must consider the following:

1. **Danger** – do not put yourself or the casualty in danger. Where possible, remove or manage any hazards, rather than removing the casualty.
2. **Response** – if the infant or child is not responding, shout for help. If possible, get a bystander to call for an ambulance and locate a defibrillator.
3. **Airway** – open the airway and check for breathing.
4. **Check for breathing for no more than 10 seconds** – if the casualty does not appear to be breathing normally, or breathing is absent, you should start CPR and contact the emergency services. Feeling for a pulse to assess circulation in children is unreliable hence the importance of the need to look for signs of life (Skellett et al, 2021).

## Calling for assistance

If you are alone, perform CPR for one minute before telephoning for an ambulance – do five initial breaths followed by compressions and breaths at a ratio of 30:2, (30 compressions to two breaths) (Skellett et al, 2021). These are recommendations for lay persons but, if you are an experienced paediatric professional trained in paediatric first aid, follow your specific training.

If you are using a mobile phone, put it on speaker so the emergency operator can give you advice and instructions. If there is someone else available, they should call for an ambulance while you start CPR. Ask someone to locate the nearest automated external defibrillator (AED) and send someone to collect it.

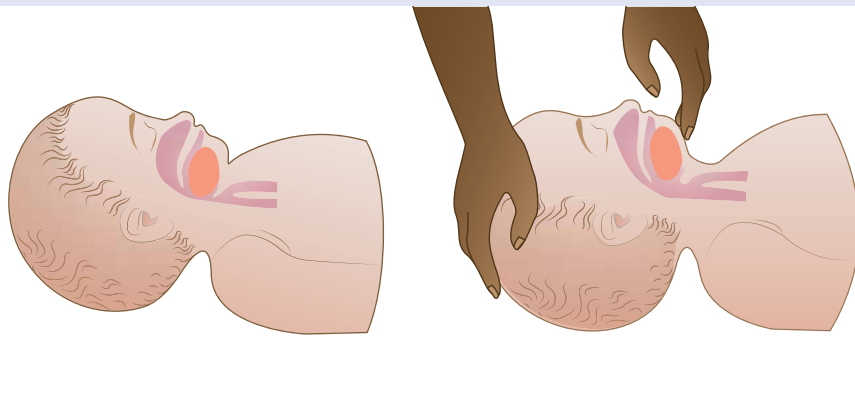
## Commencing CPR

Ensure the infant/child is on a firm surface and position them on their back.

## Clinical Practice

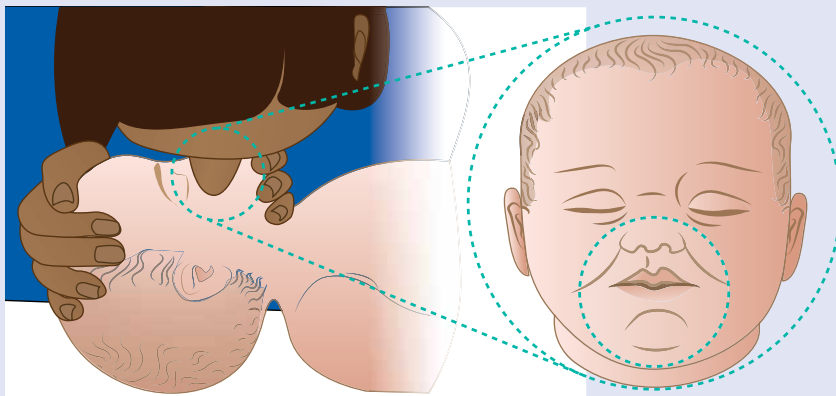
### Practical procedures

Fig 1. Opening the airway



Open the airway using the 'tilt and lift' technique

Fig 2. Positioning your mouth



Seal your mouth around the infant's mouth and nose

#### Open the airway

1. Place your hand on the infant/child's forehead and tilt their head back gently (Fig 1). In infants, just move the head so it is horizontal – overextending can occlude the airway.

2. Place your fingertips under the chin and lift it, taking care not to put pressure on the tissues as this may block the airway (Skellett et al, 2021) (Fig 1).

#### Rescue breaths

*Infants – aged <1 year*

1. Seal your mouth around the infant's mouth and nose (Fig 2). Blow gently with a puff of your cheeks for about one second.

2. Check to see whether the chest rises and recoils to its original position.

3. Repeat four more times, so you have given five breaths in total.

*Children – aged >1 year*

1. Pinch the child's nose closed, using the hand positioned on their forehead.

2. Open the child's mouth and blow for one second to inflate the lungs and allow the chest to rise. If you overinflate, you may fill the stomach with air, which can displace its contents.

3. Check that the lungs deflate, and then repeat the process four more times. You should make sure you have given five breaths in total.

Difficulty achieving an effective breath may indicate that the airway is obstructed. It is important to examine the mouth and remove any visible obstruction but do not perform a 'blind sweep' of the mouth – this can push any obstruction further down the respiratory tract and cause mucosal damage. You should also check that the head tilt is adequate (Skellett et al, 2021).

If the infant/child starts to breathe normally again, stop rescue breaths; however, if they are unconscious, protect the airway by continuing with the appropriate head tilt-chin lift or place the child in the recovery position.

#### Chest compressions

If there is no sign of life following the five rescue breaths, start chest compressions.

In infants and children, it is important to locate the xiphisternum at the angle where the lowest ribs join the sternum. Compressions should be administered one finger's width above this point (Skellett et al, 2021).

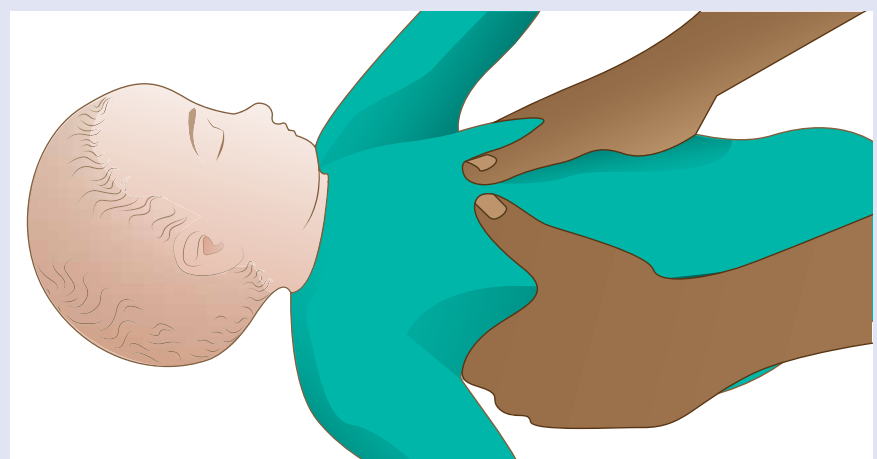
#### Infants

RCUK suggests using a two-thumb encircling technique for chest compressions (Skellett et al 2021; Fig 3):

1. Place both thumbs side by side on the lower half of the sternum. In smaller infants you may need to overlap your thumbs.

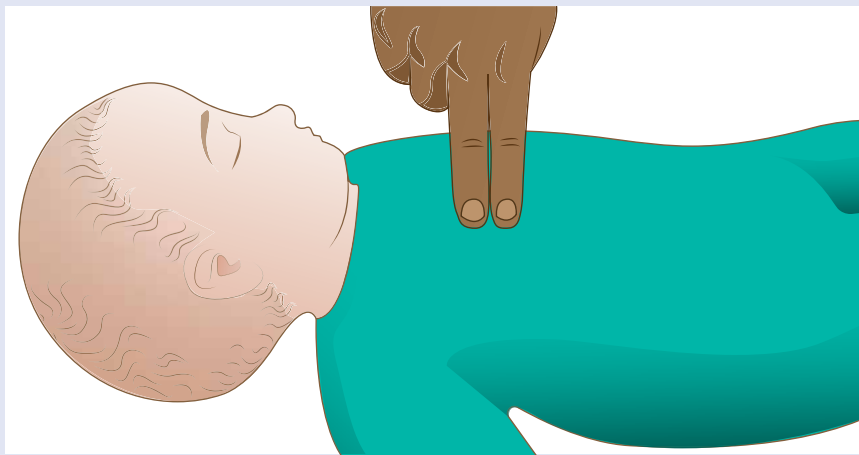
2. With fingers together, encircle the lower part of the infant's rib cage.

Fig 3. Chest compression in infants: two-thumb encircling technique



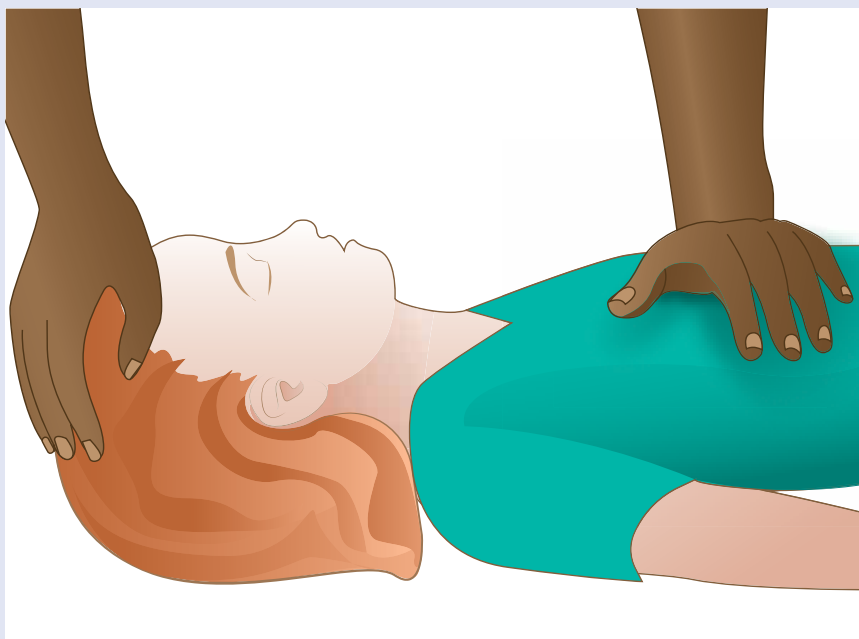
The two-thumb circling technique should be done with the thumbs side by side, and the hands encircling the infant's rib cage

Fig 4. **Chest compression in infants: two-finger technique**



In the two-finger technique, compressions are carried out using the tips of two fingers

Fig 5. **Chest compressions in children aged >1 year**



Place the heel of one hand on the lower half of the child's sternum

3. Press down with your thumbs to depress to at least a third of the depth of the infant's chest (around 4cm) (Skellett et al, 2021).
4. Continue compressions at a rate of 100-120 beats per minute (Skellett et al, 2021).
5. Ensure the chest recoils after each compression.
6. After 30 compressions, tilt the head, lift the chin, and give two rescue breaths.
7. Continue compressions and breaths at a ratio of 30:2.

When doing the chest compressions, you can employ a two-finger technique using the tips of your index and middle fingers (Fig 4).

#### Children aged >1 year

1. Place the heel of one hand over the lower half of the sternum (Fig 5).
2. Ensure that pressure is applied to the sternum, rather than the ribs, by lifting your fingers away from the chest.
3. Positioning yourself vertically above the child's chest and with your arm straight, press down by at least a third of the depth

of the child's chest (no deeper than 6cm) (Skellett et al, 2021).

4. In larger children, you may need to use both hands with the fingers interlocked.

#### Automated external defibrillation

Skellett et al (2021) recommends using an AED with a paediatric attenuator in children, as this reduces the shock delivered; however, they note that if this is not available, a standard AED should be used. (More information about using AEDs can be found in part 2 of this series).

AED pad placement may be similar to that for an adult; alternatively, one pad may be placed mid-chest and one in the middle of the back.

#### When to stop

You should stop CPR:

- If the casualty starts breathing normally;
- If you are too tired to continue;
- When the paramedics have taken over;
- While the defibrillator is analysing the heart rhythm and if a shock is advised. Be ready to recommence as soon as the shock has been given.

#### Following the incident

It is normal to feel any of the following;

- Elation and an adrenaline buzz;
- Anger;
- Confusion;
- Flashbacks and bad dreams;
- Depression.

Dealing with a medical emergency in an unfamiliar situation – particularly when it involves an infant or child – can be extremely stressful. It is important to remember that some people may need professional help and counselling after such an episode. **NT**

#### References

- Resuscitation Council UK** (2020) Resuscitation Council UK statement on Covid-19 in relation to CPR and resuscitation in first aid and community settings. [resus.org.uk](https://www.resus.org.uk), 13 May.
- Skellett S et al** (2021) *Paediatric Basic Life Support Guidelines*. London: Resuscitation Council UK.
- Wardrope J, Mackenzie R** (2004) The ABC of community emergency care: the system of assessment and care of the primary survey positive patient. *Emergency Medicine Journal*; 21: 2, 216-225.

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