

Out-of-hospital resuscitation 1: adult 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 basic life support skills that are required to manage out-of-hospital cardiac arrest. This article, the first in a four-part series, describes how to assess a casualty, and perform chest compressions and mouth-to-mouth resuscitation. Advice is also given on managing patients with suspected respiratory infections.

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Nurses should be confident participating in a resuscitation attempt in their clinical workplaces. However, it can be a very different situation when acting as a 'good Samaritan' when there is an out-of-hospital cardiac arrest – particularly if the nurse lacks training in first aid. Many registered nurses were historically not taught first aid, but this is changing as the Nursing and Midwifery Council (NMC) (2018) now requires that nurses learn skills in basic physical first aid. Guidance from the NMC (2017) and the Royal College of Nursing (2021) for nurses acting as a 'good Samaritan' are outlined in Box 1.

Immediate, effective cardiopulmonary resuscitation (CPR) improves survival and post-arrest quality of life (Perkins et al, 2016), but out-of-hospital cardiac arrest is associated with poor outcomes (Wissenberg et al, 2013). In the UK, fewer than one in 10 people survive an out-of-hospital cardiac arrest ([Bit.ly/ResusUKSurvival](https://bit.ly/ResusUKSurvival)) but evidence from Scandinavia demonstrates that, if the public had received training in basic life

support, better outcomes can be achieved for the whole population (Wissenberg et al, 2013). Resuscitation Council UK (RCUK) guidance by Perkins et al (2021) suggests that: "Bystander cardiopulmonary resuscitation and use of an automated external defibrillator (AED) increase the chances of survival by two-to-four-fold and are a critical part of UK government's strategies to improving survival from cardiac arrest".

This series provides an update on basic life support for out-of-hospital cardiac arrest and adheres to the RCUK (2021) guidance. Management of cardiac arrest in patients with known or suspected Covid-19 is not included in the updated RCUK resuscitation guidance and is covered separately in RCUK's (2020) Covid-19 statement.

Function of CPR

The function of CPR is to maintain circulation and oxygenation to vital organs such as the heart and brain. It is advised to do 30 compressions during a CPR attempt, followed by two short breaths (Perkins et al, 2021). Early use of an automated external

Box 1. Offering 'good Samaritan' first aid

Nursing and Midwifery Council (NMC) advice on professional duty to help

There may be occasions where nurses are involved in an unexpected incident or emergency away from their normal place of work such as accident or terrorist incidents.

Paragraph 15 of the NMC's (2018) guidance states: "Always offer help if an emergency arises in your practice setting or anywhere else. To achieve this, you must:

- Only act in an emergency within the limits of your knowledge and competence
- Arrange, wherever possible, for emergency care to be accessed and provided promptly
- Take account of your own safety, the safety of others and the availability of other options for providing care."

The NMC's (2017) guidance notes: "As a healthcare professional, your first instinct is often to go to the aid of others in need. However, it is important that if you find yourself in an unclear situation you should follow official government guidance to run, hide and tell.[...]"

"There is no expectation that you should put your own safety at risk. The NMC's Code makes clear that nurses and midwives must take account of their own safety, the safety of others and the availability of other care options (this may include paramed-

ics, ambulance crews or military personal on the scene of an incident or emergency). [...]"

"When delivering any type of care it is important that you only act within the limits of your knowledge and competence. It is acknowledged that not all health care professionals are qualified first aiders but they may be able to support other members of the emergency services or those injured or distressed in other ways".

Royal College of Nursing's (2021) advice on legal and professional duty

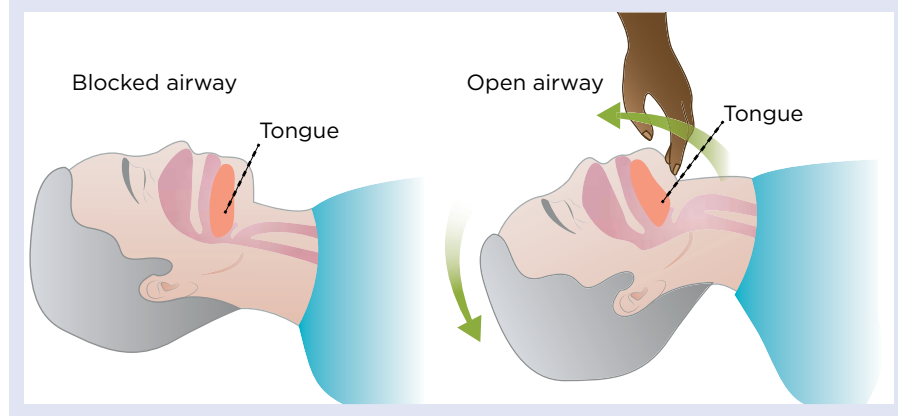
"There is no **legal duty** to volunteer help in an emergency situation. The legal duty of care generally only arises when a practitioner has assumed some responsibility for the care of the patient concerned [...]. Accordingly, if a nurse is at a road traffic accident they do not have a legal duty of care to offer aid to any person injured in the accident. Many people mistakenly assume that nurses have first aid training which would assist the injured person. This is not always the case.

"However, registered nurses, midwives and nursing associates should be aware that the NMC Code places a **professional duty** on them to provide appropriate assistance, within their sphere of knowledge and competence".

Clinical Practice

Practical procedures

Fig 1. Opening the airway



defibrillator (AED), in combination with CPR, dramatically increases chances of survival; the probability of survival decreases by 10–12% for every minute that defibrillation is delayed (Delhomme et al, 2019).

It is not necessary to start CPR if the casualty has a do not resuscitate (DNR) medic alert band or if they have injuries totally incompatible with life. In this situation you should ensure the individual and any friends or family are given privacy and their dignity is protected.

Infection prevention

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

Primary survey of the patient

A primary survey of the patient is a quick and systematic way to find and treat any life-threatening conditions in order of priority (Wardrope and MacKenzie, 2004). You should:

1. Remove danger – your safety and that of the casualty and people around you is paramount.
2. Check for response to speech and touch, and whether the person is unresponsive.
3. Open the airway – tilt the head by placing your hand on their forehead and your fingertips under the point of the casualty's chin (Fig 1).
4. Check for breathing for 10 seconds; you can do this by placing your ear and cheek close to the patient's mouth (see Box 3 for temporary changes in advice during the coronavirus pandemic). Be aware that slow, laboured breathing – described as agonal

gasps (Box 2) – is a sign of cardiac arrest. A short period of seizure-like movements can occur at the start of cardiac arrest but if the individual remains unresponsive and has abnormal breathing, start CPR (Perkins et al, 2021); If the person is unconscious and breathing – at least two normal breaths in a 10 second period – put them in the recovery position (Fig 2).

5. RCUK recommends that if the individual is not breathing normally, or you are unsure, start CPR (Fig 3) (Perkins et al, 2021).

Box 2. Agonal gasps

Just after the heart stops, a casualty may appear to be breathing when they are not. These breaths are called agonal gasps and are a reflex action. If there are less than two breaths in a 10-second period, or the person is breathing in a strange way, you should start cardiopulmonary resuscitation (CPR) (Rea, 2005). If you are unsure whether the casualty is exhibiting 'normal' breathing, always start CPR (Perkins et al, 2021).

Calling for assistance

Phone for an ambulance as soon as you realise that the person is unresponsive and not breathing. If you are using a mobile phone, put it on speaker so the emergency operator can give you advice and instruction. If there is someone else available, they should call for an ambulance while you start CPR. Ask someone to locate the nearest AED and send someone to collect it.

Start chest compressions

1. Perform chest compressions on a firm surface if possible (Perkins et al, 2021).
2. Kneeling by the side of the casualty, place the heel of one hand in the centre of the person's chest – the lower half of the sternum (Perkins et al, 2021) – and the heel of the other hand on top, interlocking the fingers (Fig 4a). It is important not to apply pressure on the ribs or upper abdomen.
3. With straight arms and your shoulders above the casualty's chest, push down at least 5cm, but no more than 6cm (Perkins et al, 2021) (Fig 4b).
4. Continue with compressions at a rate of 100–120 per minute (roughly two per second), allowing the chest to recoil completely between each compression.
5. Complete 30 compressions.

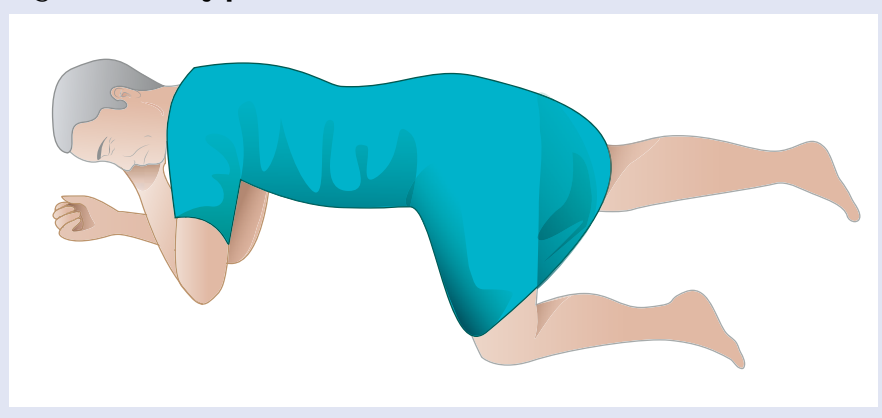
Breathing

Unless you are unwilling or unable to do so, you should combine effective CPR with breaths (Perkins et al, 2021). Temporary changes to adult resuscitation advice during the Covid-19 pandemic are outlined in Box 3.

To perform rescue breaths, you should:

1. Tilt the head and lift the chin to move the tongue away from the back of the airway, and hold the casualty's nose.

Fig 2. Recovery position



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Fig 3 **Algorithm for basic life support**

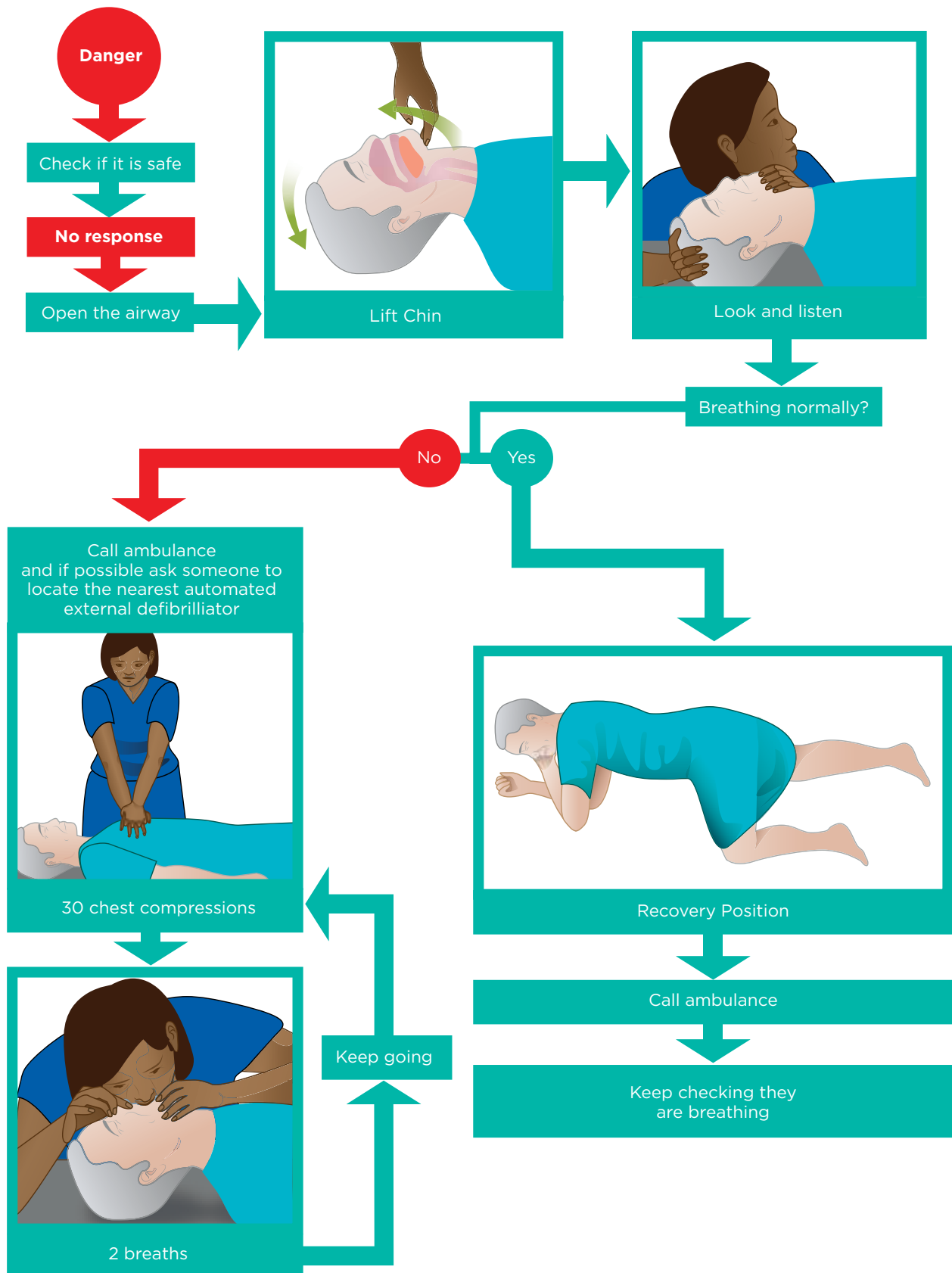
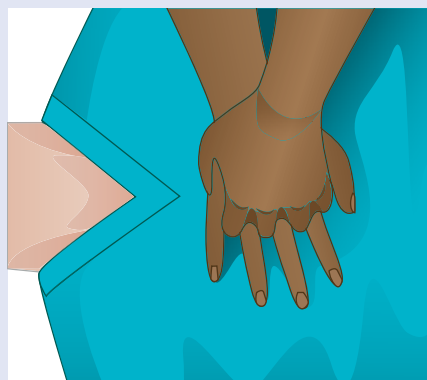


Fig 4. **Hand position on the sternum**



4a. Place the heel of one hand in the lower half of the sternum and the heel of the other on top, interlocking the fingers



4b. With straight arms and shoulder above the casualty's chest, push down at least 5cm but no more than 6cm.

Fig 5. **Rescue breaths**



Put your mouth around the casualty's to create a seal; deliver two rescue breaths

2. Take a normal breath in and place your mouth around their mouth, creating a seal (Fig 5).

3. Blow into the casualty's mouth, check their chest rises and give two rescue breaths.

4. Continue compressions and breaths at a rate of 30:2.

5. Do not stop to check for signs of life.

6. If the chest does not rise, try tilting the head back a bit more; if this is not effective, go straight back to compressions.

7. Use an AED as soon as it is available (see part 2).

If you cannot give rescue breaths, continue with compressions until help arrives.

Two-person CPR

If there is someone to help, one person should be responsible for the compressions

and the other should deliver breaths. Giving compressions can be tiring so swap over, but aim to minimise the time when no one is pressing on the chest. When 30 compressions have been given, the person swapping out should complete their two breaths while the person taking over the chest compressions gets into position. Swapping every two minutes will maximise the effectiveness of the chest compressions and give time for those giving the compressions to recover before recommencing.

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 AED is analysing the heart rhythm and if a shock is advised. Be ready to restart as soon as the shock has been given. **NT**

- Part 2 explains how to use an AED

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Box 3. **Adult resuscitation: temporary changes due to Covid-19**

- If the casualty is unconscious and not breathing normally, call an ambulance and notify them if you suspect the person may have Covid-19
 - If there is a perceived risk of infection, lightly place a cloth over the victim's mouth and nose, and give compression-only cardiopulmonary resuscitation (CPR) along with prompt use of an automated external defibrillator (if one is available) until the ambulance (or advanced care team) arrives
 - After performing compression-only CPR, wash your hands thoroughly with soap and water or an alcohol-based hand gel. Seek additional advice from the NHS 111 coronavirus advice service, your GP or your occupational health department
- These are temporary adjustments to resuscitation and the Resuscitation Council UK continues to recommend giving breaths once the Covid-19 threat is contained. It is vital that drowning victims, babies and children continue to receive rescue breaths as these are critical to their chances of survival.

Source: Resuscitation Council (2020)

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.

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