In-hospital Resuscitation

Introduction

This new section in the guidelines describes the sequence of actions for starting in-hospital resuscitation. Hospital staff are often trained in basic life support (BLS) techniques that are more appropriate for the single lay rescuer in an out-of-hospital environment. These new guidelines are aimed primarily at healthcare professionals who are first to respond to an in-hospital cardiac arrest. Some of the guidelines are also applicable to healthcare professionals in other clinical settings.

The Royal College of Anaesthetists, the Royal College of Physicians of London, the Intensive Care Society, and the Resuscitation Council (UK) published a joint statement in 2004, *Cardiopulmonary resuscitation - standards for clinical practice and training*.[1] This document provides healthcare institutions with guidance on delivering an effective resuscitation service.

After in-hospital cardiac arrest the division between basic life support and advanced life support is arbitrary; in practice, the resuscitation process is a continuum and is based on common sense. The public expect that clinical staff should be able to undertake cardiopulmonary resuscitation (CPR). For all in-hospital cardiac arrests, ensure that:

- cardiorespiratory arrest is recognised immediately;
- help is summoned using a standard telephone number (e.g. 2222);
- CPR is started immediately using airway adjuncts, for example a pocket mask, and, if indicated, defibrillation attempted as soon as possible (within 3 min at the most).

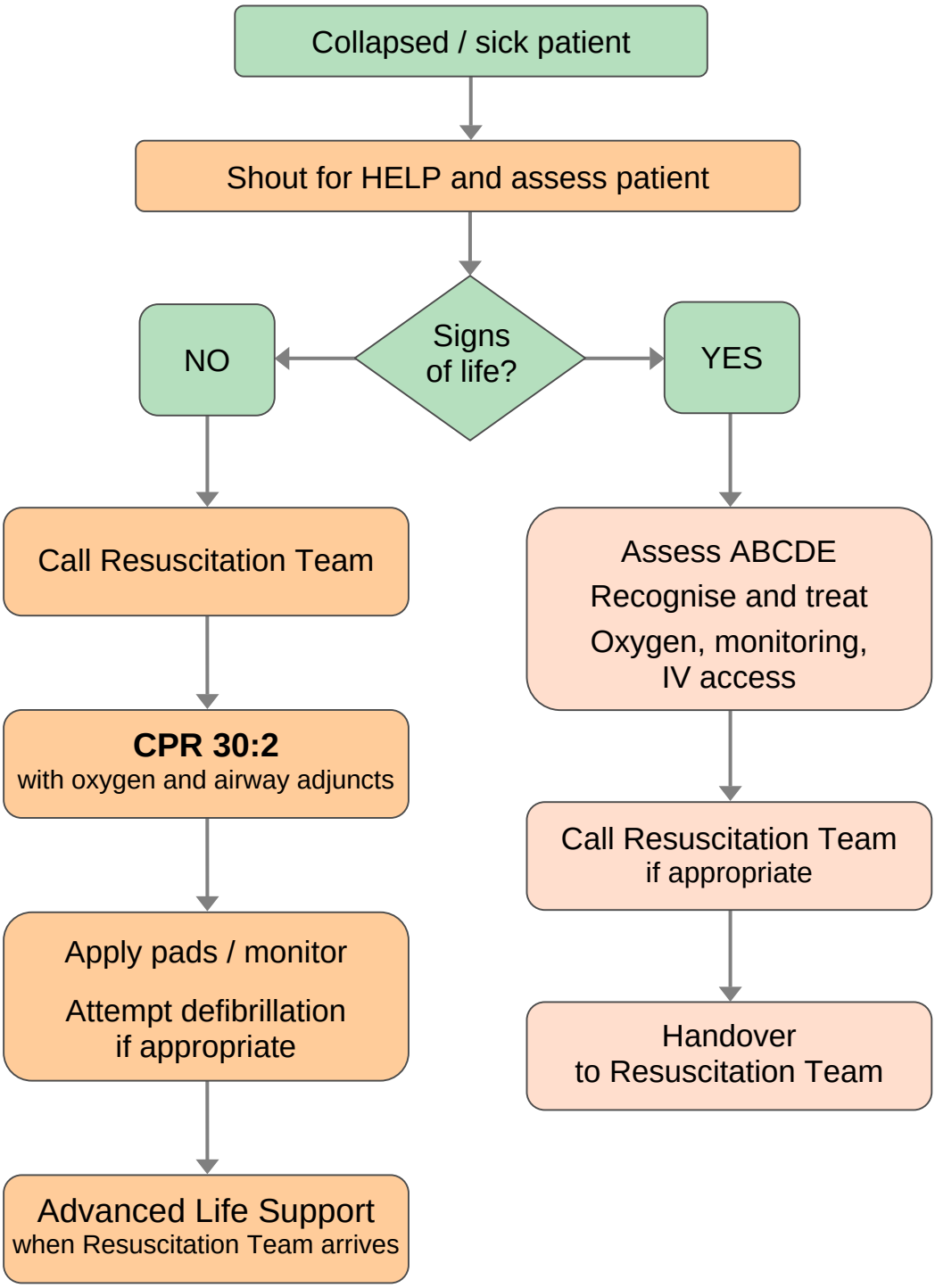
Sequence for 'collapsed' patient in a hospital

1 Ensure personal safety.

2 Check the patient for a response.

- When a healthcare professional sees a patient collapse, or finds a patient apparently unconscious in a clinical area, he should first shout for help, then assess if the patient is responsive by gently shaking his shoulders and asking loudly, 'Are you all right?'
- If other members of staff are nearby it will be possible to undertake actions simultaneously.

In-hospital resuscitation



3 A If the patient responds:

- Urgent medical assessment is required. Depending on the local protocols this may be by a resuscitation team (e.g. medical emergency team (MET)).
- While awaiting this team, assess the patient using the ABCDE approach.
- Give the patient oxygen.
- Attach monitoring leads.
- Obtain venous access.

3 B If the patient does not respond:

- Shout for help (if this has not already been done).
- Turn the patient onto his back.
- Open the airway using head tilt and chin lift.
- Look in the mouth. If a foreign body or debris is visible, attempt to remove it, using suction or forceps as appropriate.
- If there is a risk of cervical spine injury, establish a clear upper airway by using jaw thrust or chin lift in combination with manual in-line stabilisation (MILS) of the head and neck by an assistant (if sufficient staff are available). If life-threatening airway obstruction persists despite effective application of jaw thrust or chin lift, add head tilt a small amount at a time until the airway is open; establishing a patent airway takes priority over concerns about a potential cervical spine injury.
- Keeping the airway open, look, listen, and feel for no more than **10 sec** to determine if the victim is breathing normally:
  - Listen at the victim's mouth for breath sounds.
  - Look for chest movement.
  - Feel for air on your cheek.
- Those experienced in clinical assessment may wish to assess the carotid pulse for not more than 10 sec. This may be performed simultaneously with checking for breathing or after the breathing check.

The exact sequence will depend on the training of staff and their experience in assessment of breathing and circulation. Agonal breathing (occasional gasps, slow, laboured, or noisy breathing) is common in the early stages of cardiac arrest - it is a sign of cardiac arrest and should not be mistaken for a sign of life.

4 A If the patient has a pulse or other signs of life:

- Urgent medical assessment is required. Depending on the local protocols this may take the form of a resuscitation team.
- While awaiting this team, assess the patient using the ABCDE approach.
- Give the patient oxygen.
- Attach monitoring.
- Insert an intravenous cannula.

4 B If there is no pulse or other signs of life:

- One person should start CPR as others call the resuscitation team and collect the resuscitation equipment and a defibrillator. If only one member of staff is present, this will mean leaving the patient.
- Give 30 chest compressions followed by 2 ventilations.
- The correct hand position for chest compression is the middle of the lower half of the sternum. The recommended depth of compression is 4 to 5 cm and the rate is 100 compressions min^{-1}.
- Maintain the airway and ventilate the lungs with the most appropriate equipment immediately at hand. A pocket mask, which may be supplemented with an oral airway, is usually readily available. Alternatively, use a laryngeal mask airway (LMA) and self-inflating bag, or bag-mask, according to local policy. Tracheal intubation should be attempted only by those who are trained and experienced in this skill.
- Use an inspiratory time of 1 sec and give enough volume to produce chest rise as in normal breathing. Add supplemental oxygen as soon as possible.
- Once the patient's airway has been secured, continue chest compression uninterrupted (except for defibrillation or pulse checks when indicated) at a rate of 100 min^{-1}, and ventilate the lungs at approximately 10 breaths min^{-1}. Avoid hyperventilation.
- If there is no airway and ventilation equipment available, give mouth-to-mouth ventilation. If there are clinical reasons to avoid mouth-to-mouth contact, or you are unwilling or unable to do this, give chest compressions alone until help or airway equipment arrives. A pocket mask should be rapidly available in all clinical areas.
- When the defibrillator arrives, apply the electrodes to the patient and analyse the rhythm. The use of adhesive electrode pads or the 'quick-look' paddles technique will enable rapid assessment of heart rhythm compared with attaching ECG electrodes.
- If self-adhesive defibrillation pads are available, and there is more than one rescuer, apply the pads without interrupting chest compression. Pause briefly to assess the heart rhythm. If indicated, attempt either manual or automated external defibrillation.

- Recommence chest compressions immediately after the defibrillation attempt. Do not pause to assess the pulse or heart rhythm. Minimise interruptions to chest compression.
- Continue resuscitation until the resuscitation team arrives or the patient shows signs of life. If using an automated external defibrillator (AED), follow the voice prompts; if using a manual defibrillator follow the algorithm for advanced life support (ALS) (see adult ALS section).
- Once resuscitation is underway, and if there are sufficient people available, prepare intravenous cannulae and drugs likely to be used by the resuscitation team (e.g. adrenaline).
- Identify one person to be responsible for handover to the resuscitation team leader. Locate the patient's records.
- Change the person providing chest compression about every 2 min to prevent fatigue.

4 C If the patient is <u>not</u> breathing but <u>has a pulse</u> (respiratory arrest):

- Ventilate the patient's lungs (as described above) and check for a pulse every 10 breaths (about every minute).

Only those confident in assessing breathing and a pulse will be able to make this diagnosis. If there are any doubts about the presence of a pulse, start chest compression and continue until more experienced help arrives.

5 If the patient has a monitored and witnessed cardiac arrest:

- Confirm cardiac arrest and shout for help.
- If a defibrillator is not immediately to hand consider giving a single precordial thump immediately after confirmation of VF/VT cardiac arrest. The precordial thump should be given only by healthcare professionals trained in the technique.
- If the initial rhythm is VF/VT and a defibrillator is immediately available, give a shock first.
- Start CPR immediately after the shock is delivered as described above.
- Continue resuscitation in accordance with the ALS algorithm (see adult ALS section).

Background notes

Sequence of actions

The exact sequence of actions after in-hospital cardiac arrest depends on several factors including:

- location (clinical or non-clinical area; monitored or unmonitored patients);
- skills of staff who respond;

- number of responders;
- equipment available;
- hospital system for response to cardiac arrest and medical emergencies (e.g. MET, cardiac arrest team).

Location

Patients who have monitored arrests are usually diagnosed rapidly. Ward patients may have had a period of deterioration and an unwitnessed arrest. Ideally, all patients who are at high risk of cardiac arrest should be cared for in a monitored area where facilities for immediate resuscitation are available. Patients, visitors, or staff may also have a cardiac arrest in non-clinical areas (e.g. car parks, corridors).

Training

All healthcare professionals should be able to recognise cardiac arrest, call for help, and start resuscitation. Staff should do what they have been trained to do. For example, staff in critical care and emergency medicine may have more advanced resuscitation skills than staff who are not involved regularly in resuscitation in their normal clinical role. Hospital staff who attend a cardiac arrest may have different competencies in managing the airway, breathing, and circulation. Rescuers must undertake only the skills in which they are competent.

Trained healthcare staff cannot reliably assess breathing and pulse to confirm cardiac arrest.[2,3] Only those who are trained and experienced in pulse assessment should use pulse checks in addition to assessment of signs of life for confirmation of cardiac arrest. If the patient has no signs of life (based on lack of movement, breathing, or coughing), start CPR and continue until more experienced help arrives or the patient shows signs of life.

In Guidelines 2000 a method was recommended for finding the correct hand position for chest compression by placing one finger on the lower end of the sternum and sliding the other hand down to it. It has been shown that the same hand position can be found more quickly if rescuers are taught to 'place the heel of your hand in the centre of the chest with the other hand on top', provided the teaching includes a demonstration of placing the hands in the middle of the lower half of the sternum.[4]

The quality of chest compression during in-hospital CPR is frequently sub-optimal.[5] The team leader should monitor the quality of CPR and change rescuers if it is poor. The person doing chest compression will get tired. If there are enough rescuers this person should change about every 2 min.

The Resuscitation Council (UK) Immediate Life Support Course trains healthcare professionals in the skills required to start resuscitation, including defibrillation, and to be members of a cardiac arrest team.[6] The ALS Course teaches the skills required for leading a resuscitation team.[7,8]

Number of responders

The single responder must ensure that help is on its way. If other staff are nearby, several actions can be undertaken simultaneously.

Equipment available

All clinical areas should have immediate access to resuscitation equipment and drugs to facilitate rapid resuscitation of the patient in cardiopulmonary arrest. Ideally, the equipment used for resuscitation (including defibrillators) and the layout of equipment and drugs should be standardised throughout the hospital.[1]

Resuscitation team

The resuscitation team may take the form of a traditional cardiac arrest team, which is called only when cardiac arrest is recognised. Alternatively, hospitals may have strategies to recognise patients at risk of cardiac arrest and summon a team (e.g. MET) before cardiac arrest occurs.[9-11] The term 'resuscitation team' reflects the range of response teams. In-hospital cardiac arrests are rarely sudden or unexpected. A strategy of recognising patients at risk of cardiac arrest may enable some of these arrests to be prevented, or may prevent futile resuscitation attempts in those patients who are unlikely to benefit from CPR (See prevention of in-hospital cardiac arrest and decisions about cardiopulmonary resuscitation section).

References

1. Gabbott D, Smith G, Mitchell S, et al. Cardiopulmonary resuscitation standards for clinical practice and training in the UK. Resuscitation 2005;64:13-9.

2. Ruppert M, Reith MW, Widmann JH, et al. Checking for breathing: evaluation of the diagnostic capability of emergency medical services personnel, physicians, medical students, and medical laypersons. Ann Emerg Med 1999;34:720-9.

3. Perkins GD, Stephenson B, Hulme J, Monsieurs KG. Birmingham assessment of breathing study (BABS). Resuscitation 2005;64:109-13.

4. Handley AJ. Teaching hand placement for chest compression - a simpler technique. Resuscitation 2002; 53:29-36.

5. Abella BS, Alvarado JP, Myklebust H, et al. Quality of cardiopulmonary resuscitation during in-hospital cardiac arrest. JAMA 2005;293:305-10.

6. Soar J, Perkins GD, Harris S, Nolan JP. The immediate life support course. Resuscitation 2003;57:21-6.

7. Nolan J. Advanced life support training. Resuscitation 2001;50:9-11.

8. Perkins G, Lockey A. The advanced life support provider course. BMJ 2002;325:S81.

9. Bellomo R, Goldsmith D, Uchino S, et al. A prospective before-and-after trial of a medical emergency team. Med J Aust 2003;179:283-7.

10. The MERIT study investigators. Introduction of the medical emergency team (MET) system: a cluster-randomised controlled trial. Lancet 2005;365:2091-7.

11. Kenward G, Castle N, Hodgetts T, Shaikh L. Evaluation of a medical emergency team one year after implementation. Resuscitation 2004;61:257-63.