

Management of Resuscitation & transport of the critically ill adult patient

Contents

List of Contributors	44
Adult life support guidelines	45
Adult Basic life support	45
Adult Advanced life support	49
Guidelines for the management of anaphylaxis and anaphyloid reactios	54
Transport of the critically ill patient	58

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2. Adult life support guidelines

2.1 Introduction

Management of a cardiac arrest is an essential skill of a medical practitioner . prompt diagnosis and immediate intervention improve outcome .

Following these guidelines is recommended to provide optimum care.

The guidelines have been divided into basic and advanced life support and the advanced life support is divided into shockable and nonshockable rhythms.

Early recognition of the critically ill patient, prompt commencement of basic life support, early defibrillation and transfer to specialized unit improves survival.

These guidelines follow the recommendation of the Resuscitation council of UK.

3. Adult Basic Life Support Guidelines

3.1 Make sure that the victim, any bystanders and you are safe.

3.2 Check the victim for a response – shake gently by the shoulder and ask if he/she is okay.

3.3 If he responds

- Leave him in the position that you found him if there is no danger.
- Try to find out what is wrong with him and get help if needed.
- Reassess him regularly

If he does not respond

- Shout for help
- Turn the patient on his back and open the airway with a head tilt and chin lift.
- Place your hand on his forehead and gently tilt his head back.
- With your fingertips under the point of the chin, lift the chin to open the airway.

3.4 Keep the airway open and look, listen and feel for breathing.

- Look for chest movements.
- Listen at the victim's mouth for breathsounds.
- Feel for air on your cheek.

In the first few minutes after a cardiac arrest the patient may be taking infrequent gasps of breath which should not be confused with normal breathing.

Look, listen and feel for **no more** than **10 sec** to determine if the victim is

Breathing normally. If you have any doubt whether breathing is normal act as if it

Is **not** normal.

3.5 If he is breathing normally:

- Turn him into the recovery position.
- Send or go for help, or call for an ambulance
- Check for continued breathing.

If he is not breathing normally:

- Ask someone to call for an ambulance or, if you are on your own, do this yourself; you may need to leave the victim. Start chest compressions as follows:
- Kneel by the side of the victim.
- Place the heel of one hand in the centre of the victim's chest.
- Place the heel of your other hand on top of the first hand.
- Interlock the fingers of your hands and ensure that pressure is not applied over the victim's ribs. Do not apply any pressure over the upper abdomen or the bottom end of the bony sternum (breastbone).
- Position yourself vertically above the victim's chest and, with your arms straight, press down on the sternum 4-5cm.
- After each compression, release all the pressure on the chest without losing contact between your hands and the sternum. Repeat at a rate of about 100 times a minute (a little less than 2 compressions a second).
- Compression and release should take an equal amount of time.

3.6 Combine chest compressions with rescue breaths.

- After 30 compressions open the airway again using head tilt and chin lift.
- Pinch the soft part of the victim's nose closed, using the index finger and thumb of your hand on his forehead.
- Allow his mouth to open, but maintain chin lift.
- Take a normal breath and place your lips around his mouth, making sure that you have a good seal.
- Blow steadily into his mouth whilst watching for his chest to rise; take about one second to make his chest rise as in normal breathing; this is an effective rescue breath.
- Maintaining head tilt and chin lift, take your mouth away from the victim and watch for his chest to fall as air comes out.

- Take another normal breath and blow into the victim's mouth once more to give a total of two effective rescue breaths. Then return your hands without delay to the correct position on the sternum and give a further 30 chest compressions.
- Continue with chest compressions and rescue breaths in a ratio of 30:2.
- Stop to recheck the victim only if he starts breathing normally; otherwise do not interrupt resuscitation.

If your rescue breaths do not make the chest rise as in normal breathing, then

Before your next attempt:

- Check the victim's mouth and remove any visible obstruction.
- Recheck that there is adequate head tilt and chin lift.
- Do not attempt more than two breaths each time before returning to chest compressions.

If there is more than one rescuer present, another should take over CPR about

Every two minutes to prevent fatigue. Ensure minimum delay during the changeover of rescuers.

Chest compression only CPR

- If you are not able, or are unwilling, to give rescue breaths, give chest compressions only.
- If chest compressions only are given, these should be continuous at a rate of 100 a minute.
- Stop to recheck the victim only if he starts breathing normally or shows signs of life – coughing, movement; otherwise do not interrupt resuscitation.

3.7 Continue resuscitation until:

- Qualified help arrives and takes over/ transferred to a hospital.
- The victim starts breathing normally, or
- You become exhausted.

Summarized from the Resuscitation Guidelines 2005 of the Resuscitation Council (UK).

4. Adult Advanced Life Support Guidelines

Arrhythmias associated with cardiac arrest are divided into two groups: shockable rhythms (VT/VF) and non-shockable rhythms (asystole and pulseless electrical activity (PEA)).

4.1 Sequence of actions –

Is patient unconscious and unresponsive?

Open airway and look for signs of life i.e. evidence of breathing, carotid pulse.

If no signs of life are found immediately call resuscitation team and start CPR at a rate of 30 cardiac compressions to 2 artificial breaths with an ambu bag and mask until a defibrillator and monitor is available.

Attempt intubation until monitor and defibrillator is available and continue CPR. Following intubation chest compressions can continue without pausing for ventilation.

Attach the monitor and assess the rhythm.

4.2 Shockable Rhythm (VT/VF)

- Attempt defibrillation with one shock of 360J from a monophasic defibrillator (150-200J from a biphasic defibrillator).
- In the case of a witnessed arrest with a defibrillator at hand, proceed immediately to defibrillate a shockable rhythm.
- In the case of a non-witnessed arrest give 5 cycles of CPR (about 2 minutes) before defibrillation.
- Apply defibrillator paddles firmly over the chest and make sure that paddles are coated well with electrolyte jelly. “Sternum” paddle over the right infraclavicular area and the “apex” paddle over the apex of the heart.
- Following defibrillation resume CPR immediately at a rate of 30:2.
- Do not assess rhythm or feel for a pulse.
- After a period of 2 minutes stop CPR and check the monitor for a change in rhythm and feel for a pulse if rhythm is anything other than VF or asystole
- If VT/VF persists give a second shock of 360J (monophasic) or 150 – 360J (biphasic) and resume CPR again and continue for 2 minutes, pause briefly to check monitor and assess pulse.
- After intubation chest compressions can continue without pausing for ventilation.
- Following 2 shocks give 10ml of 1:10,000 adrenaline followed immediately by the 3rd shock. Resume CPR immediately and continue for 2 minutes.
- Pause briefly to check monitor and pulse.

- If VT/VF persists give amiodarone 300mg IV followed by the 4th shock.
- Resume CPR and continue for 2 minutes.
- Give adrenaline 10ml of 1:10,000 before alternate shocks at approximately 3 – 5 minutes.
- Give further shocks after every 2 minute period of CPR following assessment of the rhythm.
- If organized electrical activity is seen during the brief pause in compressions, check for a palpable pulse.
- If the pulse is present start post resuscitation care.
- If no pulse is present continue CPR and switch to the non shockable rhythm algorithm.
- If asystole is seen continue CPR and switch to the non shockable rhythm algorithm.
- A single precordial thump is useful when given rapidly after a witnessed sudden collapse which is confirmed as a cardiac arrest.

4.3 Non-shockable rhythms

4.3.1 If pulseless electrical activity (PEA) is seen on the monitor

- Start CPR at a rate of 30:2.
- Give adrenaline 10ml of 1:10,000 adrenaline IV immediately intravenous access is achieved.
- Continue CPR at 30:2 until the airway is secured (intubated) and then continue chest compressions without pausing during ventilation.
- Recheck rhythm after 2 minutes
- If PEA persists restart CPR and keep checking the rhythm after every 2 minutes.
- Give adrenaline 10ml of 1:10,000 IV every 3 – 5 minutes (approximately every other two minute loop).
- If the ECG changes and organized electrical activity is seen, check for a pulse.
- If a pulse is present start post-resuscitation care.
- If no pulse is present continue as for PEA.

4.3.2 If asystole or slow PEA (rate <60/min) is seen on the monitor

- Start CPR at 30:2
- Without stopping CPR check if leads are attached correctly

- Give adrenaline 10ml of 1:10,000 IV as soon as intravascular access is achieved.
- Give atropine 3mg IV (once only).
- Continue CPR 30:2 until the airway is secured, then continue chest compressions without pausing for ventilation.
- Check rhythm after 2 minutes and proceed accordingly
- Give adrenaline 10ml of 1:10,000 IV every 3 – 5 minutes (every other 2 minute cycle).
- If a shockable rhythm recurs follow the relevant algorithm.
- During CPR
- Attempts must be made to secure the airway by intubating the trachea and reversible causes of cardiac arrest must be recognized and treated.
- The reversible causes are 4T's and 4H's

Thromboembolism	Hypotension
Tamponade (cardiac)	Hypoxia
Tension pneumothorax	Hyper/hypokalaemia, hypocalcaemia acidaemia
Toxins and other metabolic causes	Hypothermia

Summarized from the Resuscitation Guidelines 2005 of the Resuscitation Council (UK)

5. Guidelines for the Management of Anaphylaxis and Anaphylactoid Reactions

5.1 Introduction

Anaphylactic reactions can vary in severity and progress may be rapid, slow or biphasic. Reactions may be delayed or even last for > 24 hours.

Death could result in minutes from acute irreversible asthma or laryngeal oedema with few generalized manifestations.

Cardiovascular collapse is common with intravenous drugs and stings. Usually all cardiac manifestations are primarily due to hypotension or the effects of adrenaline given intravenously.

In all cases a full history and examination should be undertaken as soon as possible.

Following the reaction 10ml of clotted blood must be taken within 45 – 60 minutes (not later than 6 hours) for IgE antibody and mast cell tryptase levels.

5.2 Diagnosis

Consider the diagnosis when the history is compatible with a severe allergic type reaction with respiratory difficulty and / or hypotension especially with skin changes.

5.2.1 Symptoms and signs –

1. angio-oedema
2. urticaria
3. dyspnoea
4. hypotension

5. rhinitis
6. conjunctivitis
7. abdominal pain
8. vomiting
9. diarrhea
10. sense of impending doom

5.3 Treatment

Recline patient in a comfortable position, lying flat with or without leg elevation.

Oxygen should be administered via a MC mask at a high flow rate (10 – 15 l/min).

In the instance of cardiac arrest proceed with the CPR algorithm.

If any of the following are present give adrenaline intramuscularly.

- 1) Stridor,
- 2) Wheeze,
- 3) Respiratory distress
- 4) Clinical signs of shock

Adrenaline-

Adults - 0.5ml of 1:1000 solution of adrenaline given IM

>12 years – 0.5ml of 1:1000 solution of adrenaline given IM
in a small or prepubertal child 0.25ml of
1:1000 solution of adrenaline.

6 – 12 years – 0.25ml of 1:1000 solution of adrenaline given
IM

>6 months – 6 years – 0.12ml of 1:1000 solution of adrenaline given IM

<6 months – 0.05ml of 1:1000 solution of adrenaline given IM

Repeat the injection in 5 minutes in the absence of clinical improvement or if the patient deteriorates. Several doses may also be needed if the improvement is transient.

Intravenous adrenaline is hazardous and should only be given in dilutions of 1:10,000 and should never be given in 1:1000 dilutions.

Intravenous adrenaline must be reserved for those in profound shock and during anaesthesia. The injection must be slow while monitoring heart rate and ECG.

Assist ventilation with bag and mask or intubation if response to adrenaline is slow.

Monitor SpO₂ and maintain >90%.

Monitor BP and maintain systolic BP >90mmHg

When hypotension does not respond to adrenaline rapidly;

Give crystalloid (safer than colloid) as a rapid infusion of 1000 – 2000 ml in adults and 20ml /Kg in children. In the absence of a response follow with a similar dose.

Antihistamines

Chlophenamine is administered IM or as a slow IV injection.

>12 years	10 - 20mg
6 – 12 years	5 – 10 mg
1 – 6 years	2.5 – 5 mg

Hydrocortisone (as sodium succinate)

Must be administered to prevent late sequelae; especially important for asthmatics with increased risk of severe or fatal anaphylaxis.

Hydrocortisone is given slow IV or IM.

>12 years	100 – 500 mg
6 – 12 years	100mg
1 – 6 years	50mg

Beta agonists

Inhaled beta agonists (salbutamol) are useful in the presence of bronchospasm.

Patients should be warned of a recurrence of symptoms and may need to be kept under observation for 8 – 24 hours especially in the following situations.

1. Severe reactions with slow onset due to idiopathic anaphylaxis.
2. Reactions in individuals with severe asthma or with a severe asthmatic component
3. Reactions with the possibility of continuing absorption of allergens.
4. Patients with a history of biphasic reactions.

A bracelet or card should be given to a patient indicating that the patient has a risk of anaphylaxis.

The patient needs to be investigated at a specialist allergy clinic following recovery.

5.4 Cautions

Patients on beta blockers may respond slowly to treatment.

Patients on tricyclic antidepressants and MAOI should receive only half the dose of adrenaline.

Beware of panic attacks which may mimic anaphylaxis, especially in those who have suffered a severe anaphylaxis reaction previously.

6. Transport of the critically ill patient

6.1 Introduction

The transfer of a critically ill patient is a serious undertaking. To make the transfer worthwhile, the patient must arrive at his destination safe and in the best possible physiological state. The following guidelines are to be used as a check list to make this possible.

6.2 Communication –

The decision to transfer must be taken by the senior medical practitioner who is currently caring for the patient.

Communication should always be from consultant to consultant where applicable or medical officer in charge to the consultant in charge of the receiving hospital.

The transfer must take place to the closest available specialized unit able to handle the patient.

6.3 Patient stability –

Assessment of patient stability and interventions needed prior to transfer

6.3.1 Airway- assess with regards to

- Patency of airway -
 - a) Immediate obstruction
 - b) Anticipated delayed obstruction eg: facial trauma, inhalational injury.
- Ability to protect airway – eg: GCS < 8, absent cough reflex.

Intubate if one of the above are applicable.
(intubation to be performed by the most skilled person available)

Once intubated sedate, paralyze and ventilate with either a portable ventilator or an ambu bag.

6.3.2 Breathing – consider breathing compromised if

- SpO₂ < 90% on maximal available O₂ therapy
- Respiratory rate < 8/min or > 40/min
- Signs of exhaustion – unlikely to last the journey breathing spontaneously
- Abnormal respiratory pattern – paradoxical breathing, Cheyenne Stokes breathing.
- Head injuries with a PaCO₂/ Et CO₂ of <30 mmHg or > 45mmHg.
- Haemodynamic instability.
- Multiple major trauma.

Intubate and ventilate patients with **one** of the above

- rapid sequence induction.
- use sedation and paralysis.

Insert chest drains if haemothorax or pneumothorax suspected.
(Confirmation is not necessary)

In the instance of an open pneumothorax – apply a dressing sealed on three sides.

Oxygen via face mask/ nasal catheters for all other patients.

Nasogastric tube – avoid in suspected base of skull fractures.

6.3.3 Circulation –

Achieve cardiovascular stability prior to transfer with either fluid resuscitation +/- inotropes.

- Two large bore intravenous catheters (preferably > 17G) into large upper limb veins.
- Crystalloid or colloid infusions as required.
- Inotropes via a central/large vein and using a syringe pump with a labeled syringe with name and concentration of drug.
- Immobilize major fractures.
- Compression bandages or suturing of bleeding open injuries to minimize blood loss.

6.3.4 Disability –

Minimize further damage to CNS with a spinal board and neck stabilization with a collar and sandbags in all trauma victims.

Minimize secondary damage to brain and spinal cord by maintaining

- Oxygenation (>92%)
- Perfusion pressures (mean arterial pressure >90mmHg)
- Normocarbida (ventilate if necessary)
- Normoglycaemia
- Prevent seizures
- Normothermia

6.4 Monitoring, equipment and drugs –

Adequate oxygen stores for the journey (calculate the requirement) or 2 full cylinders (full cylinder – pressure 137 bar)

Oxygen key.

Ambu bag.

A monitoring chart needs to be maintained throughout the journey

Non Invasive Blood Pressure – manual or automated

ECG with heart rate

SpO₂

EtCO₂ for all intubated patients

Defibrillator

If a portable ventilator is used it must have functioning alarms i.e. high airway pressure, disconnection

- Urine output measurement- after catheterization
- Endotracheal tubes, laryngoscopes, stillets and oropharyngeal airways.
- Intravenous cannulars, syringes, needles, iv fluids and drip sets.
- Suction apparatus with catheters.
- Stethoscope
- Dressings, scissors, plasters, bandages, antiseptic solutions.
- Disposable gloves.

- Drugs – Atropine
 - Adrenaline
 - Atracurium
 - Ca gluconate
 - 50% Dextrose
 - Frusemide
 - Hydrocortisone
 - Morphine
 - Midazolam
 - Oxygen
 - Suxamethonium

Any additional drugs the patient may require including regular drugs that need to be given.

6.5 Personnel –

The patient must be accompanied by

- One doctor who has competency in critical care management & intubation skills.
- One nurse with critical care experience.
- One labourer with ability to change oxygen cylinders.
The transport team must have a mode of communication i.e. mobile phone/ money.

6.6 Properties –

The following documents must accompany the patient.

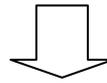
- A written summary of the patient's condition and state at transfer.
- A photocopy of the bed head ticket.
- All relevant investigations and originals of radiological investigations.
- Drug chart with time of last dose.
- Temperature chart
- Fluid balance chart
- All relevant microbiological reports
- Consent for transfer either from the patient or the family and details of the family (contact numbers and address)

Anaphylaxis treatment algorithm for adults and children by first medical responders.

Consider when compatible history of severe allergic-type reaction

With respiratory difficulty and / or hypotension especially if skin changes present.

Oxygen treatment when available



Stridor, wheeze, respiratory difficulty or clinical signs of shock

Adrenaline (epinephrine) 1:1000 solution

Adult 0.5ml IM

>12 years 0.5ml IM

6-12 years 0.25ml IM

>6 months to 6 years 0.12ml IM

<6 months 0.05ml IM

Repeat in 5 minutes if no clinical improvement

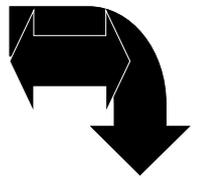
Antihistamine (chlorphenamine)

Adult 10 – 20 mg IM or slow IV

>12 years 10 – 20 mg IM

6 – 12 years 5 – 10 mg IM

1 – 6 years 2.5 -5 mg IM



For all severe or recurrent reactions If clinical manifestations of shock
And patients with asthma give do not respond to drug treatment hy-
drocortisone give

1-2 liters of fluid in adults

Adult 100 – 500 mg IM or slow IV or 20ml/kg body weight IV fluids
>12 years 100 – 500 mg IM or slow IV in children.

6-12 years 100 mg IM or slow IV

1-6 years 50 mg IM or slow IV rapid infusion or one repeat dose
may be necessary.

1. An inhaled beta 2 agonist such as salbutamol may be used as an adjunctive measure if bronchospasm is severe and does not respond rapidly to other treatment.
2. If profound shock judged **immediately** life threatening give CPR/ ALS if necessary. Consider **slow** intravenous (IV) adrenaline (epinephrine) 1:10,000 solution. This is **hazardous** and is recommended only for an experienced practitioner who can also obtain IV access without delay. Note the different strength of adrenaline (epinephrine) that may be required for IV use.
3. For children who have been prescribed an adrenaline auto-injector, 150micrograms can be given instead of 120 micrograms, and 300 micrograms can be given instead of 250 micrograms or 500micrograms.
4. Absolute accuracy of the small dose is not essential.
5. A crystalloid may be safer than a colloid.

Summarized from the guidelines of the Resuscitation Council (UK)

