ABC of Resuscitation

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RESUSCITATION IN THE ACCIDENT AND EMERGENCY DEPARTMENT

The success of resuscitative efforts in the emergency room depends on an organised, well practised team working in familiar surroundings. The resuscitation area should be a private room close to the emergency entrance at least 23.5 m² (250 ft²) with piped gases, wash hand basins, good lighting, and x ray power points as essential fittings; operative surgical facilities should be close by.

General equipment

- (1) Patient trolley, variable height and tilt; rigid mattress; oxygen, suction, drip poles, etc
- (2) Work unit with disposables storage under
- (3) Procedures trolley
- (4) X ray viewer
- (5) High intensity spotlamp
- (6) Stop clock
- (Not shown: scrub basin, refuse bin)

Airway and breathing equipment

- (7) Storage for tubes, airways, masks, etc
- (8) Bag-valve-mask unit
- (9) Oxygen therapy equipment
- (10) Suction unit
- (11) Intubation equipment
- (12) Automatic ventilator

Circulation equipment

- (13) Pneumatic chest compressor
- (14) External defibrillator-pacemaker
- (15) Drip stand with pressure infuser
- (16) Blood warmer
- (17) Resuscitation drugs
- (Not shown: antishock trousers)

Diagnostic and monitoring equipment

- (18) Socket for portable X ray or image intensifier
- (19) Sphygmomanometer
- (20) ECG Monitor
- (21) Automatic blood pressure and temperature monitor
- (22) Central venous pressure monitor
- (23) Otoscope and ophthalmoscope

Forewarning will usually be from the ambulance service by telephone or, increasingly, via a two way radio call.

Medical and nursing staff take up their positions around the patient according to a preagreed scheme. All staff help to undress the patient. There should be a readily apparent leader from among the senior medical staff who will direct the team, prescribe treatments, and decide aftercare. One doctor will stay with the patient and be responsible for the medical care, assessment, and records of the patient.

The division of duties will vary according to whether the episode is medical, surgical, or traumatic. The Megacode approach, using an ordered team of four, is recommended in cardiorespiratory arrest.

The following scheme relates to the resuscitation of an unconscious casualty with multiple injuries. The principles are, however, fundamental to any type of emergency.

(1) Assume a spinal cord lesion until proved otherwise. The neck should be protected by a firm collar or sandbags and all neck movements kept to a minimum until the integrity of the cervical spine has been shown radiographically.

(2) Staunch obvious, gross external haemorrhage by direct pressure over the bleeding point and raising of the affected part.

(3) Cover and seal any open (sucking) chest wounds.

(4) **Airway**
Establish and maintain a clear airway. This will include postural methods; aspiration of blood, mucus, vomit, etc, with a sucker; and, definitively, the passage of a cuffed endotracheal tube. A tongue support such as the oropharyngeal or nasopharyngeal tube airway may be useful. When the airway is distorted because of an unstable mandibular fracture the tongue may be grasped and pulled forwards with tongue forceps or a suture. When there is total obstruction of the upper airway—for example, from oedema or inflammation at the vocal cords—a laryngotomy through the cricothyroid membrane may be necessary, this technique being safer in inexperienced hands in an emergency than the more elective procedure of tracheostomy.

(5) **Breathing**
A chest radiograph and blood gas analysis will be required early in the assessment of all chest emergencies. Ventilate for apnoea or respiratory inadequacy: aim to keep the arterial oxygen pressure above 10 kPa and the carbon dioxide below 5.5 kPa. This may be achieved by a bag-valve-mask device with added oxygen. With such a device the “feel” of the compliance may give clues about the presence of remediable problems within the chest, such as a tension pneumothorax (an important cause of cardiorespiratory collapse in acute asthma), flail segment, or lung contusion.

Full thickness circumferential burns of neck and chest require escharotomy to release restriction of chest wall movement. Inequality of ventilation may indicate inadvertent intubation of the right main bronchus or a major air leak within the tracheobronchial tree. Chest drainage is indicated on the side of a flail segment, in the presence of surgical emphysema, or if there is a traumatic pneumothorax however small. All pneumothoraces must be drained before ventilation. If given early high dose corticosteroids—for example, methylprednisolone 30 mg/kg intravenously—may be of advantage in blast lung injury, lung contusion, near drowning, and smoke inhalation.

(6) Circulation

Support the circulation by ensuring secure venous access with the largest cannula size achievable in a reliable vein. The antecubital fossae are, perhaps, the best sites for intravenous infusion in major trauma, but a central vein, such as the internal jugular, may need to be catheterised for fluid push or central venous pressure monitoring. In profound shock consider the use of the saphenous vein in the groin accessed by cutting down at the saphenofemoral junction.

Blood samples will be withdrawn for grouping and cross matching, haemoglobin and packed cell volume estimations, and analysis of electrolyte, urea, and glucose concentrations. The choice of intravenous fluid (crystalloids, polygelatins, dextrans, starches, human plasma protein fraction) in shock is controversial. Volume is more important than content. As a general principle in severe traumatic shock type specific whole blood is indicated, with attention given to the multiplicity of problems of blood transfusion. Traumatic shock cannot be successfully managed unless the bleeding is brought under control and blood loss replaced—and this may require immediate surgery. The application of antishock trousers will tamponade haemorrhage from abdomen, pelvis, and leg injuries and may be supportive (release should be under strict surgical control in the operating theatre).

In cardiac arrest due to hypovolaemia the treatment is immediate thoracotomy (to allow internal cardiac massage and cross clamping of the aorta) and blood replacement. If more than eight units of blood need to be given there may be a requirement for fresh frozen plasma, platelets, calcium gluconate, and clotting screen.

(7) Establish baseline monitoring and start observations of pulse, blood pressure, and central venous pressure when appropriate. Monitor the electrocardiogram. Except when there is blood at the urethral meatus, a urinary catheter should be inserted and the urine output measured. Observations of the level of consciousness, using an approved coma scale, pupillary responses, and limb movements should be charted every 15 minutes. A breath or blood alcohol assessment may be valuable.

(8) The victim should be examined fully, front and back and from head to toe. Up to 30% of fractures are not recognised in the resuscitation room. Radiographs of skull, cervical spine, chest, and pelvis should be routinely obtained in the multiply injured patient. Peritoneal lavage should be considered in the diagnosis of intra-abdominal haemorrhage in casualties who are comatose or paralysed or who have injury to both chest and pelvis. Computerised diagnostic ultrasound (the "midliner") is a valuable and inexpensive bedside screening test for intracranial haematoma.

(9) If the level of consciousness is deteriorating obtain immediate neurosurgical advice. Mannitol 1 g/kg effectively lowers intracranial pressure in the short term. Its use, together with paralysis and hyperventilation, is best confined to patients who have been accepted for neurosurgery. Convulsions should be brought under control with titrations of intravenous diazepam. Check for hypoglycaemia as a contributory factor.

(10) Administer human antitetanus immunoglobulin unless tetanus prophylaxis is known to be up to date.

(11) Organise a diagnosis list and scale of priorities for subsequent care. Arrange referral to the specialty or specialties most urgently concerned and ensure that responsibility for the care of the whole patient is undertaken by an identifiable consultant whose firm will organise the involvement of other specialties as needed. Organise safe, controlled transit of the patient to theatre, computed tomography, or ward and transfer of responsibility thereafter.

At the conclusion of resuscitation each member of the team should take part in the cleaning up that invariably takes place. Records should be completed, equipment and drugs should be rechecked and replaced, and, some time later, a private, informal "debriefing" is valuable in assessing the procedures and identifying any errors and scope for improvement.

Emergency department resuscitation, though infrequent, is demanding and exciting. Perhaps only 1% of cases presenting to the accident and emergency department (one to two a day) require the use of the resuscitation room. Thorough preplanning, organisation, and team effort make such cases particularly rewarding.

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