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# Overview of the Treatment of Medical Emergencies

# 1

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## INTRODUCTION

Medical emergencies can be life-threatening. Prompt recognition and effective early treatment of a patient with a medical emergency is paramount if deterioration of the patient is to be prevented and the chances of recovery are to be maximised. The aim of this book is to understand the treatment of medical emergencies.

The assessment and treatment of any patient with a medical emergency should follow the ABCDE approach advocated by the Resuscitation Council UK (Resuscitation Council UK, 2006). In this chapter a brief overview to this generic approach will be provided (a more detailed and comprehensive guide can be found in *Treating the Critically Ill Patient*, Jevon, 2007) and throughout the book its importance will be continually emphasised.

The aim of this chapter is to provide an overview to the treatment of medical emergencies.

## LEARNING OUTCOMES

At the end of the chapter the reader will be able to:

- list what emergency equipment should be available,
- describe the assessment of a patient with a medical emergency,
- state the aim of treating a patient with a medical emergency.

This chapter is based on the chapter 'Overview of Treating the Critically Ill Patient' which first appeared in *Treating the Critically Ill Patient* by Jevon (2007). It has been revised and updated.

## EMERGENCY EQUIPMENT

Wherever patients with medical emergencies are treated, procedures should be in place to ensure that all the essential monitoring and emergency equipment and emergency drugs/fluids are immediately available, accessible and in good working order (Jevon, 2001).

### Oxygen

Facilities should be available for the delivery of high concentrations of oxygen: either piped oxygen to a wall-outlet behind the patient's bed (preferable), or a portable oxygen cylinder, fitted with a variable oxygen-flow-rate meter capable of delivering up to 15 litres/min (Figure 1.1). There should also be adequate stocks of various oxygen-delivery devices, particularly non-rebreathe masks (see Figure 1.4, below).



**Figure 1.1** A wall mounted oxygen cylinder, fitted with a variable oxygen-flow-rate meter capable of delivering up to 15 litres/min

## Suction

Every clinical area should have access to a portable suction device. In addition, it is preferable if a wall-mounted suction device is available behind each patient's bed (Figure 1.2). As suction is sometimes required immediately in a life-threatening situation, it is standard practice to store appropriate suction connection tubing, together with suction catheters (rigid and flexible), with the suction source; that is, suction can be quickly administered.

## Monitoring devices

At the very least, an ECG monitor and a pulse oximeter should be available. Other monitoring facilities, for example capnography, may also be required in some clinical areas.



**Figure 1.2** A wall-mounted suction device

### **Cardiopulmonary resuscitation trolley**

A carefully set out and fully stocked cardiac arrest trolley is paramount, following Resuscitation Council guidelines (Box 1.1) (Resuscitation Council UK, 2004). The trolley should be spacious, sturdy, easily accessible and mobile; ideally each trolley in a healthcare establishment should be identically stocked to avoid confusion. A defibrillator should be immediately available and, where

#### **Box 1.1 Cardiopulmonary resuscitation equipment that should be available**

##### **Airway equipment**

- Pocket mask with oxygen port (should be widely available in all clinical areas)
- Self-inflating resuscitation bag with oxygen reservoir and tubing (ideally, the resuscitation bag should be single-use; if not, it should be equipped with a suitable filter)
- Clear face masks, sizes 3, 4 and 5
- Oropharyngeal airways, sizes 2, 3 and 4
- Nasopharyngeal airways, sizes 6 and 7
- Portable suction equipment
- Yankauer suckers
- Tracheal suction catheters, sizes 12 and 14
- Laryngeal mask airways (LMAs; sizes 4 and 5), or ProSeal LMAs (sizes 4 and 5), or Combitube (small)
- Magill forceps
- Tracheal tubes, oral, cuffed, sizes 6, 7 and 8
- Gum elastic bougie or equivalent device
- Lubricating jelly
- Laryngoscope handles (×2) and blades (standard and long blade)
- Spare batteries for laryngoscope and spare bulbs (if applicable)
- Fixation for tracheal tube (e.g. ribbon gauze/tape)
- Scissors
- Selection of syringes
- Oxygen mask with reservoir (non-rebreathing) bag
- Oxygen cylinders
- Cylinder key

### Circulation equipment

- Defibrillator (shock advisory module and or external pacing facility to be decided by local policy)
- ECG electrodes
- Defibrillation gel pads or self-adhesive defibrillator pads (preferred)
- Selection of intravenous cannulae
- Selection of syringes and needles
- Cannula fixing dressings and tapes
- Seldinger central venous catheter kit
- Intravenous infusion sets
- 0.9% sodium chloride, 1000 ml  $\times$  2
- Arterial blood gas syringes
- Tourniquet

### Drugs

- (a) Immediately available prefilled syringes
- Adrenaline (epinephrine) 1 mg (1:10,000)  $\times$  4
  - Atropine 3 mg  $\times$  1
  - Amiodarone 300 mg  $\times$  1
- (b) Other readily available drugs

### *IV injections*

- Adenosine 6 mg  $\times$  10
- Adrenaline 1 mg (1:10,000)  $\times$  4
- Adrenaline 1 mg (1:1000)  $\times$  2
- Amiodarone 300 mg  $\times$  1
- Calcium chloride 10 ml of 100 mg/ml  $\times$  1
- Chlorphaniramine 10 mg  $\times$  2
- Furosemide 50 mg  $\times$  2
- Glucose 10% 500 ml  $\times$  1
- Hydrocortisone 100 mg  $\times$  2
- Lignocaine 100 mg
- Magnesium sulphate 50% solution 2 g (4 ml)  $\times$  1
- Midazolam 10 mg  $\times$  1
- Naloxone 400  $\mu$ g  $\times$  5
- Normal saline, 10 ml ampoules
- Potassium chloride for injection (see National Patient Safety Agency Alert, [www.npsa.nhs.uk](http://www.npsa.nhs.uk))

*Continued*

- Sodium bicarbonate 8.4%, 50 ml × 1

*Other medications/equipment*

- Salbutamol (5 mg × 2) and ipratropium bromide (500 µg × 2) nebulas
- Nebulizer device and mask
- Glyceryl trinitrate spray
- Aspirin 300 mg

**Additional items**

- Clock
- Gloves/goggles/aprons
- Audit forms
- Sharps container and clinical waste bag
- Large scissors
- Alcohol wipes
- Blood sample bottles
- A sliding sheet or similar device should be available for safer handling

Source: Resuscitation Council UK (2004).

appropriate, for example on general wards, it should have an automatic or advisory facility (Jevon, 2001). Defibrillators with external pacing should be strategically located, for example in emergency departments, intensive care units (ICUs) and coronary care units (CCUs).

**Routine checking of emergency equipment**

All emergency equipment should be checked routinely following local protocols. It is recommended that cardiopulmonary resuscitation equipment should be checked on a daily basis by each ward or department responsible for it (Resuscitation Council UK, 2000). A system for daily documented checks of the equipment inventory should be in place (Jevon, 2001). The electronic equipment should be stored, maintained and checked following the manufacturer's recommendations and those of the local electrobiomedical engineers' department (EBME).

## ASSESSMENT OF A PATIENT WITH A MEDICAL EMERGENCY

### **ABCDE assessment**

A patient with a medical emergency will be critically ill. The Resuscitation Council UK (2006) has issued guidelines on the recognition and treatment of the critically ill patient. Adapted from the ALERT course (Smith, 2003), these guidelines follow the logical and systematic ABCDE approach to patient assessment and treatment:

- Airway,
- Breathing,
- Circulation,
- Disability,
- Exposure.

When assessing the patient, a complete initial assessment should be undertaken, identifying and treating life-threatening problems first, before moving on to the next part of assessment. The effectiveness of treatment/intervention should be evaluated, and regular re-assessment undertaken. The need to alert more senior help should be recognised and other members of the multi-disciplinary team should be utilised as appropriate so that patient assessment, instigation of appropriate monitoring and interventions can be undertaken simultaneously.

Irrespective of their training, experience and expertise in clinical assessment and treatment, all nurses can follow the ABCDE approach; clinical skills, knowledge, expertise and local circumstances will determine what aspects of the assessment and treatment are undertaken. Throughout this book, the ABCDE approach will be reinforced.

### **Prevention of cross-infection**

When assessing and treating the critically ill patient, it is important to ensure that effective measures are taken to minimise the



**Figure 1.3** Hygienic hand-rub

risk of cross-infection. Wash hands or use alcohol gel following local policy (Figure 1.3).

### **Communication with the patient**

Talk to the patient and evaluate the response: a normal response indicates that they have a clear airway, are breathing and have adequate cerebral perfusion; if they are unable to complete sentences in one breath, this may be an indication of extreme respiratory distress. An inappropriate response or no response could indicate an acute life-threatening physiological disturbance (Gwinnutt, 2006).

### **General appearance of the patient**

Note the patient's general appearance, their colour and whether they appear content and relaxed or distressed and anxious.

## Senior help

During the assessment process, consider whether senior help should be requested. Evaluate MEWS score and alert medics/outreach if necessary (see p. 298).

## Oxygen

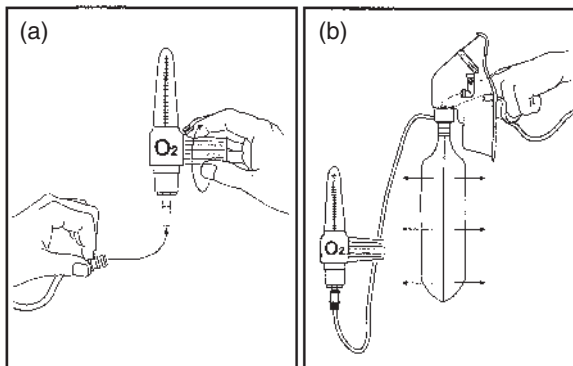
Administer high concentrations of oxygen: use a non-rebreathe mask (Figure 1.4) connected to an oxygen flow rate of 15 litres/min (Smith, 2003). This will enable the delivery of an inspired oxygen concentration of approximately 95% (Jevon, 2007). Prior to application, carry out checks to ensure correct functioning as recommended by the manufacturer (Figure 1.5).

## Patient-monitoring devices

Attach appropriate monitoring devices, for example pulse oximetry, ECG monitor and non-invasive blood-pressure



**Figure 1.4** A non-rebreathe mask. Taken from Jevon, P (2007) *Treating the Critically Ill Patient*. Blackwell Publishing, Oxford, with permission



**Figure 1.5** Ensure correct functioning as recommended by the manufacturer. (a) Attach the tubing to the oxygen source and set the oxygen flow rate. (b) Occlude the valve between the mask and the oxygen reservoir bag to check that the bag fills up with oxygen. Taken from Jevon, P (2007) *Treating the Critically Ill Patient*. Blackwell Publishing, Oxford, with permission.

monitoring, as soon as it is safe to do so (Resuscitation Council UK, 2006).

### Assessment of airway

Look, listen and feel for the signs of airway obstruction. Partial airway obstruction will result in noisy breathing:

- *gurgling*: indicates the presence of fluid, for example secretions or vomit, in the mouth or upper airway; usually seen in a patient with altered conscious level who is having difficulty or is unable to clear their own airway;
- *snoring*: indicates that the pharynx is being partially obstructed by the tongue; usually seen in a patient with altered conscious level lying in a supine position;
- *stridor*: high-pitched sound during inspiration, indicating partial upper-airway obstruction; usually due to either a foreign body or laryngeal oedema;
- *wheeze*: noisy musical whistling type sound due to the turbulent flow of air through narrowed bronchi and bronchioles,

more pronounced on expiration; causes include asthma and chronic obstructive pulmonary disease (COPD).

Complete airway obstruction can be detected by no air movement at the patient's mouth and nose. Paradoxical chest and abdominal movements ('see-saw' movement of the chest) may be observed; central cyanosis (a late sign of airway obstruction) will develop if not treated rapidly.

If the patient's airway is compromised, or is at risk of being compromised, take immediate action. Treat the underlying cause (Resuscitation Council UK, 2006); for example:

- apply head tilt/chin lift to open the airway;
- suction the airway if secretions, blood or gastric contents are present;
- place the patient in the lateral position if breathing, but has altered conscious level;
- if the patient is unconscious, insert an oropharyngeal airway to help maintain an oral airway (a nasopharyngeal airway may be helpful in a patient who is semi-conscious);
- advanced airway intervention, for example tracheal intubation or tracheostomy, may be required in some situations;
- administer high-concentration oxygen.

### **Assessment of breathing**

Look, listen and feel to assess breathing.

*Count the respiratory rate:* normal respiratory rate is 12–20 breaths/min (Resuscitation Council UK, 2006). Tachypnoea is usually the first sign that the patient has a physiological upset, the cause of which may be respiratory (NCEPOD, 2005). Bradypnoea is an ominous sign and could indicate imminent respiratory arrest; causes include drugs such as opiates, fatigue, hypothermia, head injury and central nervous system depression.

*Evaluate chest movement:* chest movement should be symmetrical; unilateral chest movement suggests unilateral pathology, such as pneumothorax, pneumonia or pleural effusion (Smith, 2003).

*Evaluate depth of breathing:* only marked degrees of hyperventilation and hypoventilation can be detected; hyperventilation may be seen in metabolic acidosis or anxiety and hypoventilation may be seen in opiate toxicity (Ford et al., 2005).

*Evaluate respiratory pattern:* a Cheyne–Stokes breathing pattern (periods of apnoea alternating with periods of hyperpnoea) can be associated with brain-stem ischaemia, cerebral injury and severe left-ventricular failure (altered carbon dioxide sensitivity of the respiratory centre) (Ford et al., 2005).

*Note the oxygen saturation (SpO<sub>2</sub>) reading:* 97–100% is normal. A low SpO<sub>2</sub> could indicate respiratory distress or compromise. Note that the pulse oximeter does not detect hypercapnia and that the SpO<sub>2</sub> can be normal in the presence of a very high PaCO<sub>2</sub> (Resuscitation Council UK, 2006).

*Listen to the breathing:* normal breathing is quiet. Rattling airway noises indicate the presence of airway secretions, usually due to the patient being unable to cough sufficiently or unable to take a deep breath in (Smith, 2003). The presence of stridor or wheeze indicates partial, but significant, airway obstruction (see above).

*Check the position of the trachea:* place the tip of the index finger into the suprasternal notch, let it slip either side of the trachea and determine whether it fits more easily into one or other side of the trachea (Ford et al., 2005). Deviation of the trachea to one side indicates mediastinal shift (e.g. lung collapse, pneumothorax, lung fibrosis or pleural fluid).

*Palpate the chest wall:* to detect surgical emphysema or crepitus (suggesting a pneumothorax *until* proven otherwise) (Smith, 2003).

*Perform chest percussion:* this is done as follows.

- Place the left hand on the patient's chest wall. Ensure that the fingers are separated slightly, with the middle finger pressed firmly into the intercostal space to be percussed (Ford et al., 2005).

- Strike the centre of the middle phalanx of the middle finger sharply using the tip of the middle finger of the right hand (Ford et al., 2005). Deliver the stroke using a quick flick of the wrist and finger joints not from the arm or shoulder. The percussing finger should be bent so that its terminal phalanx is at right angles to the metacarpal bones when the blow is delivered, and it strikes the percussed finger in a perpendicular way. The percussing finger should then be removed immediately, like a clapper inside a bell, otherwise the resultant sound will be dampened (Epstein et al., 2003).
- Percuss the anterior and lateral chest wall. Percuss from side to side, top to bottom, comparing both sides and looking for asymmetry.
- Categorise the percussion sounds (see below).
- If an area of altered resonance is located, map out its boundaries by percussing from areas of normal to altered resonance (Ford et al., 2005).
- Sit the patient forward and then percuss the posterior chest wall, omitting the areas covered by the scapulae. Ask the patient to move their elbows forward across the front of the chest: this will rotate the scapulae anteriorly and out of the way (Talley & O'Connor, 2001). It may be helpful to offer the patient a pillow to lean on.
- Again percuss from side to side, top to bottom, comparing both sides and looking for asymmetry. Don't forget that the lung extends much further down posteriorly than anteriorly (Epstein et al., 2003).
- Categorise the percussion sounds (see below).

The causes of different percussion notes are listed below (source, Ford et al., 2005):

- *resonant*: air-filled lung;
- *dull*: liver, spleen, heart, lung consolidation/collapse;
- *stony dull*: pleural effusion/thickening;
- *hyper-resonant*: pneumothorax, emphysema;
- *tympanitic*: gas-filled viscus.

### *Auscultate the chest*

- Ask the patient to breathe in and out normally through their mouth.
- Auscultate the anterior chest from side to side, and top to bottom. Auscultate over equivalent areas and compare the volume and character of the sounds and note any additional sounds. Compare the sounds during inspiration and expiration.
- Note the location and quality of the sounds heard.
- Auscultate the posterior chest, from side to side, and top to bottom. Auscultate over equivalent areas and compare the volume and character of the sounds and note any additional sounds. Compare the sounds during inspiration and expiration (Jevon & Cunningham, 2006).

Evaluate air entry, the depth of breathing and the equality of breath sounds on both sides of the chest. Bronchial breathing indicates lung consolidation; absent or reduced sounds suggest a pneumothorax or pleural fluid (Smith, 2003). In particular, note any additional breath sounds:

- *Wheezes (rhonchi)*: these are high-pitched musical sounds associated with air being forced through narrowed airways, for example asthma (Ford et al., 2005). This is usually more pronounced on expiration. Inspiratory wheeze (stridor) is usually indicative of severe upper-airway obstruction, for example by a foreign body or laryngeal oedema. If both inspiratory and expiratory wheezes are heard, this is usually due to excessive airway secretions (Adam & Osborne, 2005).
- *Crackles (crepitations)*: these are non-musical sounds, associated with reopening of a collapsed airway, for example pulmonary oedema (Ford et al., 2005). Crackles are usually localised in pneumonia and mild cases of bronchiectasis; in pulmonary oedema and fibrosing alveolitis, both lung bases are affected equally (Epstein et al., 2003).
- *Pleural friction rub*: this can be heard as leathery/creaking sounds during inspiration and expiration, evident in areas

of inflammation when the normally smooth pleural surfaces are roughened and rub on each other (Adam & Osborne, 2005).

*Record peak expiratory flow rate:* this provides a useful estimate of the calibre of the airways, particularly in asthma and COPD (Ford et al., 2005).

### ***Evaluate the efficacy of breathing, work of breathing and adequacy of ventilation***

- *Efficacy of breathing:* air entry, chest movement, pulse oximetry, arterial blood gas analysis and capnography.
- *Work of breathing:* respiratory rate and use of accessory muscles, for example neck and abdominal muscles.
- *Adequacy of ventilation:* heart rate, skin colour and mental status.

If breathing is compromised, ensure a clear airway and administer a high concentration of oxygen. Positioning the patient in an upright position can be helpful in a patient who is breathing spontaneously. It is important to recognise and effectively treat immediately life-threatening conditions, such as acute severe asthma, pulmonary oedema, tension pneumothorax and massive haemothorax (Resuscitation Council UK, 2006). Patients with inadequate ventilation will need ventilatory support.

### **Assessment of circulation**

Look, listen and feel to assess circulation.

*Palpate peripheral and central pulses:* check for presence, rate, quality, regularity and equality (Smith, 2003). A weak, thready pulse suggests a poor cardiac output and a bounding pulse may indicate sepsis (Resuscitation Council UK, 2006).

*Check the colour and temperature of the hands and fingers:* signs of cardiovascular compromise include cool and pale peripheries.

*Measure the capillary refill time (CRT):* apply sufficient pressure to cause blanching to the skin, for example on the sternum, for 5 s and then release (Figure 1.6). Normal CRT is less than 2 s; a



**Figure 1.6** Measuring the central capillary refill time (CRT). Taken from Jevon, P (2007) *Treating the Critically Ill Patient*. Blackwell Publishing, Oxford, with permission

prolonged CRT could indicate poor peripheral perfusion, although other causes can include cool ambient temperature, poor lighting and old age (Resuscitation Council UK, 2006).

*Look for other signs of a poor cardiac output:* these include altered conscious level and, if the patient has a urinary catheter, oliguria (urine volume less than 0.5 ml/kg per h) (Smith, 2003).

*Look for signs of haemorrhage:* for example from wounds or drains, or evidence of internal haemorrhage, such as abdominal swelling; concealed blood loss can be significant, even if drains are empty (Smith, 2003).

*Measure blood pressure:* systolic blood pressure (BP) of less than 90 mmHg suggests shock. A normal BP does not exclude shock because compensatory mechanisms increase peripheral resistance in response to reduced cardiac output (Smith, 2003). A low diastolic BP suggests arterial vasodilatation, for example anaphylaxis or sepsis. A narrowed pulse pressure – that is, the difference between systolic and diastolic readings (normal is

35–45 mmHg), suggests arterial vasoconstriction, for example cardiogenic shock or hypovolaemia (Resuscitation Council UK, 2006).

*Assess the state of the veins:* if hypovolaemia is present the veins could be under-filled or collapsed (Smith, 2003).

*Interpret the ECG:* determine whether a cardiac arrhythmia is present. A 12-lead ECG should be recorded as a priority in some situations, for example chest pain.

If the patient has compromised circulation (Resuscitation Council UK, 2006);

- ensure the airway is clear and breathing is adequate;
- administer high-concentration oxygen;
- if shock present, insert one or more wide-bore cannulae (14–16-gauge), and start treatment directed at fluid replacement, haemorrhage control and restoration of tissue perfusion; administer a rapid fluid challenge, for example 500 ml normal saline (warmed) over 5–10-min;
- if the patient has chest pain and acute coronary syndrome is suspected, treat initially with oxygen, aspirin, nitroglycerine and morphine.

### **Assessment of disability**

Assess disability (central nervous system function) as follows.

*Evaluate the patient's level of consciousness:* use the AVPU scale (see Box 6.1) or the Glasgow Coma Scale (GCS) (see Box 6.2) if a more objective assessment of conscious level is required, for example head injury (see Chapter 6 in this volume).

*Examine the pupils:* compare size, equality and reaction to light of each pupil.

*Undertake bedside glucose measurement:* exclude hypoglycaemia as a cause of altered conscious level.

If the patient has altered conscious level (Resuscitation Council UK, 2006):

- review ABC: exclude or treat hypoxia and hypotension (both of which are possible causes of altered conscious level);
- nurse in a lateral position, with particular attention to the airway;
- review the patient's medication chart: check for reversible medication-induced causes of altered conscious level, for example administer naloxone (opioid antagonist) for opioid toxicity.

### **Exposure**

Expose the patient and undertake a thorough examination to ensure that important details are not over-looked (Smith, 2003). In particular, the examination should concentrate on the part of the body that is most probably contributing to the patient's ill status, for example in suspected anaphylaxis, examine the skin for urticaria. Respect the patient's dignity and minimise heat loss.

In addition (source, Resuscitation Council UK, 2006):

- take a full clinical history and review the patient's notes/charts;
- study the recorded vital signs: trends are more significant than one-off recordings;
- administer prescribed medications;
- review laboratory results and ECG and radiological investigations;
- ascertain what level of care the patient requires (e.g. ward, high-dependency unit, ICU);
- document in the patient's notes details of assessment, treatment and response to treatment.

### **THE AIM OF TREATING A PATIENT WITH A MEDICAL EMERGENCY**

The aim of treating a patient with a medical emergency is the early anticipation and detection of abnormal physiology at a

stage before organ failure is established and to initiate simple preventative therapies and interventions (Smith, 2003). The initial ABCDE assessment and treatment should be seen as a holding measure to keep the patient alive, and to produce some clinical improvement, so that definitive treatment may be initiated (Resuscitation Council UK, 2006). The aim of this book is to discuss the treatment of medical emergencies following the ABCDE approach.

## CONCLUSION

Recognition and the effective treatment of a patient with a medical emergency is paramount. In this chapter the importance of ensuring that the necessary emergency equipment is available and the systematic approach to assessment following the ABCDE method have been described. In the remaining chapters of the book the specific treatment for individual medical emergencies will be discussed.

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