

ADD ON...PRE-HOSPITAL CARE

Immediate Assessment And Management Of Acute Medical Emergencies

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Introduction

Pre-hospital immediate care is 'the provision of skilled medical help at the scene of an accident or medical emergency and during transportation to hospital' (1). Although this widely accepted definition places equal emphasis on both traumatic injury and medical emergencies, trauma tends to dominate training courses and discussions (2). Medical emergencies generally only feature in the context of cardio-pulmonary resuscitation (3). While this may seem appropriate when working with pre-dominantly young and healthy individuals (such as soldiers on operational deployment), knowledge of the immediate care of medical emergencies is an essential component of immediate care practice. Acute medical emergencies are far more common than major trauma. Given this, it might be assumed that doctors, paramedics and nurses will be confident in the immediate management of the full range of acute medical emergencies simply by virtue of their training and practice. However, there is evidence that clinical signs of life threatening dysfunction of the airway, breathing, circulation or consciousness may be easily missed, misinterpreted, or mis-managed in the emergency setting (4,5) and specific life-threatening medical emergencies may only occur a few times in a career (6,7). Even experienced doctors require training and revision to maintain confidence and skills in recognising and treating the full range of emergencies quickly and correctly. In addition, General Practitioners (GPs) provide much of the pre-hospital care in this context and there is often little opportunity for other immediate care practitioners to develop experience in the pre-hospital assessment and management of these patients.

When considering the immediate care for a medical emergency, it is useful to think in terms of common presentations and common underlying conditions or diagnoses. Shortness of breath, chest pain, abdominal pain, collapse, coma and seizures are typical examples of common emergency presentations (Box 1). They are not diagnoses. In contrast, acute coronary syndromes, pulmonary embolism, pneumonia, pneumothorax, appendicitis and sub-arachnoid haemorrhage are typical examples of conditions or diagnoses that lead to acute presentations. Although knowledge of the

underlying medical condition or disease process will clearly influence management, this may not be known at the time of the emergency. The essence of immediate care is the ability to manage such presentations without the certainty of a diagnosis. In this first of two articles on acute medical emergencies, the emphasis is placed on a safe and effective systematic approach to the assessment and immediate management of the common acute medical presentations. The detailed management of specific disease processes will be discussed in the second article.

Box 1. Common emergency presentations.

Coma
Difficulty in breathing
Chest pain
Collapse with hypotension
Gastrointestinal bleeding
Abdominal pain
Headache
Seizures
Collapse with altered consciousness

Preparation

When considering how best to prepare for pre-hospital medical emergencies, many of the principles surrounding equipment selection apply (8). With the development of automatic external defibrillators and an international consensus on the immediate management of cardiac arrest, it is clear that all those involved in pre-hospital emergency care should be capable of effective basic life support and defibrillation (3,9). With respect to other medical emergencies, a civilian GP based immediate care system working within a typical practice population will require more medical expertise and equipment than the forward echelons of a close support medical unit or mountain rescue team for example. Nevertheless, practitioners in these circumstances may still be faced with medical emergencies. Although the occupational medicine function of the Army Medical Services ensures that personnel on active duty are generally of good health and physically fit (10), experience has shown that it is still possible to be faced with acute medical conditions in the operational setting (11-13). Acute medical emergencies also constituted 7.5% of incidents attended by Mountain Rescue Teams in England and Wales between 1999 and 2001 (annual mountain rescue team incident statistics are available at <http://www.mountain.rescue>).

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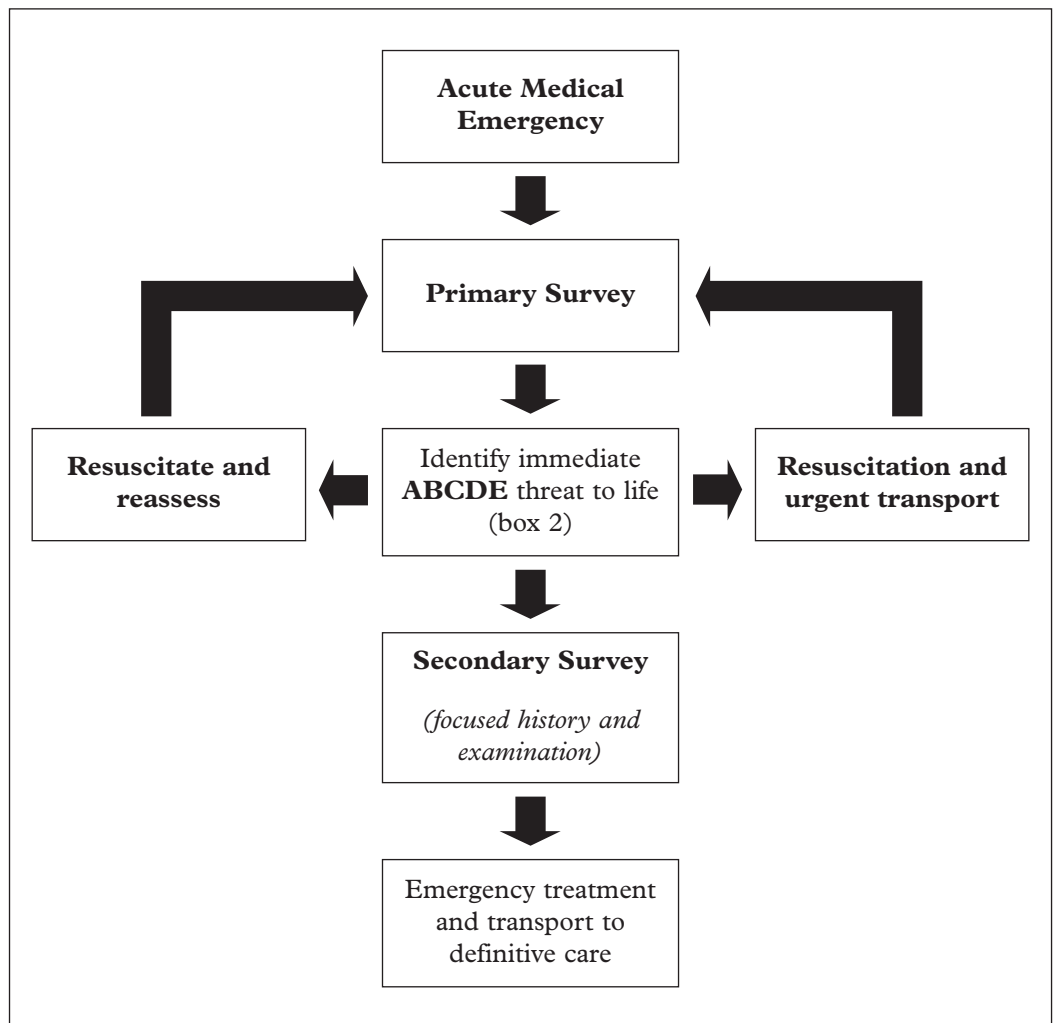


Fig 1. The structured approach to pre-hospital assessment of acute medical emergencies.

org.uk). In road accidents, the commonest associated medical emergency is chest pain (ranging from an episode of angina to myocardial infarction) (14). Altered consciousness (secondary to hypoglycaemia in diabetics), seizures and acute asthma are also relatively common. Thus the population base, the availability of other health care resources and the type of immediate care activity should all be taken into account when planning for the provision of acute medical care.

The systematic approach

There are a number of excellent reference texts and resources that describe the priorities and immediate actions in assessing acutely unwell patients in the hospital and general practice setting (15-19). The approach and techniques advocated are often equally applicable in the resource limited pre-hospital environment and during transition to hospital (1,20-23). Similarly, the ABCDE approach taught on standard life support courses is as applicable to acute medical emergencies as it is to resuscitation from cardiac arrest and the management of major trauma (3,24-27). Thus the structured approach illustrated in Figure 1 is recommended. This approach reflects the central

doctrine of advanced trauma, cardiac and paediatric life support courses: immediate assessment and management of a life-threatening emergency does not require a precise diagnosis of the underlying condition. It also illustrates the importance of considering early transport to emergency treatment with resuscitation en-route.

Primary Survey

After ensuring the scene is safe, the practitioner should aim to undertake a rapid primary survey. The common pathways to cardiac arrest in acute medical emergencies are airway obstruction, respiratory failure, circulatory failure and neurological failure. The aim of the primary survey is to seek out evidence of these in order to target specific resuscitative interventions. The fact that most acute medical patients in hospital practice do not have an immediately life-threatening problem does not diminish the importance of this initial approach. It is only once life-threatening problems have been excluded or identified and treated that a conventional history and examination can be conducted. In many patients, the primary survey may be completed very quickly. The ABCDE sequence illustrated in Figure 1 and Box 2 should be followed.

Box 2. The primary survey.

Airway assessment

Is there evidence of airway obstruction (noisy breathing, stridor, obstructive respiratory pattern)?

Is there failure of airway protection (pooling of secretions, absence of spontaneous swallowing)?

Is there evidence of mucosal oedema (anaphylaxis) or foreign body aspiration?

Breathing assessment

Is there evidence of an increased work of breathing (tachypnoea, accessory muscle use, recession)?

Is there evidence of hypoxia or fatigue (cyanosis, feeble respiratory effort)?

Is there evidence of pneumothorax, asthma, anaphylaxis, heart failure, pneumonia or chronic obstructive pulmonary disease?

Circulation assessment

Is there evidence of bleeding (haematemesis, melaena, concealed bleeding)?

Is there evidence of shock (heart rate, capillary refill time, respiratory rate, blood pressure)?

Does the patient have evidence of sepsis (any two of heart rate > 90, respiratory rate > 20 and temperature > 38°C or < 36°C)?

Is there evidence of acute coronary syndrome, heart failure or arrhythmias?

Disability Assessment

Is the patient fitting?

Is the patient hypoglycaemic?

Is there any evidence of meningism (neck stiffness, photophobia)?

Are there any localising signs (pupils, cranial nerves, limbs)?

Exposure Assessment

Is there a rash (urticaria, purpura)?

Is the patient hypothermic or pyrexial?

Are there any obvious physical stigmata of chronic disease?

The first priority is to assess the airway. This is no different to the approach used in trauma patients although it is usually unnecessary to maintain cervical spine immobilisation in the absence of a history of trauma. The aim of the assessment is to decide whether there is evidence of airway obstruction and whether the patient is maintaining and protecting the airway. It is important to appreciate that the unconscious patient is at significant risk of passive regurgitation and pulmonary aspiration even if the airway is maintained with simple techniques and positioning. Failure to clear blood, saliva or mucus from the oropharynx and absence of spontaneous swallowing indicate a failure of airway protection. The full range of basic and advanced airway management interventions should therefore be available to manage such patients (28-30). In the resource limited pre-hospital environment, simple adjuncts (especially nasopharyngeal airways), postural drainage and head and neck positioning may be sufficient during the remainder of the primary survey and immediate transportation. Stridor and oedema of the oropharynx as may occur with

infection, anaphylaxis and foreign body aspiration should be specifically excluded in the conscious spontaneously breathing patient.

Assessment of breathing should focus on signs of increased respiratory effort, inadequate ventilation and common physical signs associated with respiratory and cardiovascular disease. An increased respiratory rate, use of accessory muscles, splinting of the diaphragm and recession of the chest wall are sensitive indicators of an increased work of breathing. Tachypnoea alone may reflect a very wide range of disease processes and it should not be assumed to reflect a breathing problem in the absence of other signs of respiratory distress. It is important to look for inspiratory stridor and expiratory wheeze when assessing breathing.

Assessment of the circulation should identify the presence of shock and a systemic inflammatory response to infection. Shock is a failure of tissue oxygenation which is manifest by prolonged capillary refill, tachycardia, tachypnoea and sympathetic nervous system stimulation (pallor, sweating, peripheral vasoconstriction). Sepsis refers to evidence of infection (e.g. pneumonia, meningococcal disease) accompanied by systemic inflammatory responses. These include a pulse rate greater than 90, a respiratory rate greater than 20 and a temperature above 38°C or below 36°C (31). Acute gastrointestinal haemorrhage may be missed if evidence of bleeding is not identified. Finally, assessment of the circulation in medical emergencies includes an assessment of heart rhythm and a search for evidence of heart failure and myocardial dysfunction (tachycardia, 3rd or 4th heart sounds, systolic murmur, friction rub etc.).

Assessment of disability involves a mini neurological examination commencing with level of consciousness, mental state, pupil signs, localizing signs and limb function. Neck stiffness should be checked along with photophobia and Kernig's sign (neck pain on extension of the knee with the hip flexed). The patient should then be exposed to look for evidence of a rash (urticaria or purpura), jaundice, anaemia, pitting oedema and physical manifestations of chronic disease. An accurate assessment of temperature is essential in assessing whether the patient is pyrexial or hypothermic.

Resuscitation

Resuscitation involves physical interventions and the use of equipment and drugs. A further doctrinal principle of advanced life support is that treatment of life-threatening airway, breathing, circulation and neurological problems should take place in parallel with the primary survey (3, 24-27). In other words: treat immediately life-threatening problems as they are identified. The range of equipment and drugs available to the

practitioner will clearly influence how much can be done in the pre-hospital environment (8). In many cases, simple measures to support the airway, breathing and circulation whilst en-route to the emergency department or receiving facility are sufficient. In some cases however, immediate on-scene treatment is essential if life is to be saved. Patients with anaphylaxis, inhaled foreign body, cardiac arrest, myocardial infarction, asthma, continuous seizures and sepsis for example will usually benefit from immediate intervention at the scene if appropriate equipment and drugs are available. The specific resuscitative interventions for common presentations are discussed below.

Secondary Assessment

All acutely unwell patients should undergo a primary survey to identify their immediate resuscitation needs followed by a more detailed secondary survey. The secondary survey follows the more traditional medical model of history and examination. The mnemonics AMPLE and 'well PHRASED' history are often used as a reminder of the key elements of the history in trauma and medical emergencies respectively (Box 3) (16). Clinical examination should then be dictated by history and clinical suspicion. A differential diagnosis can then be reached and further decisions regarding resuscitation, transportation and definitive care can then be made.

Box 3. A well 'PHRASED' or 'AMPLE' history.

P	Problem	A	Allergies
H	History of problem	M	Medication
R	Relevant medical history	P	Past and present illnesses
A	Allergies	L	Last food and drink
S	Systems review	E	Events
E	Essential family / social history		
D	Drugs		

Emergency Presentations

The following notes provide guidance on the immediate assessment and management of a range of potentially life threatening emergencies during the primary survey and resuscitation phase.

Difficulty in breathing

Difficulty in breathing may be manifest as a conscious awareness of respiratory effort (dyspnoea) or an actual physical increase in rate and depth (work) of breathing (32). Difficulty in breathing is the principal presenting feature of a wide range of acute medical emergencies. Nonetheless, the initial approach is to complete a primary survey, identify and treat immediately life-threatening problems and make a working diagnosis of the underlying cause on the basis of the history and a physical examination. Sudden shortness of breath is extremely frightening for patients. A calm approach and environment should be

maintained as far as possible. Figure 2 gives an algorithm for the initial approach to these patients. Airway obstruction, tension pneumothorax, acute severe asthma, acute exacerbation of chronic pulmonary obstructive disease (COPD), left ventricular failure with pulmonary oedema, pulmonary embolus and arrhythmias are the immediately life threatening problems that commonly present as acute shortness of breath. Although there may be a number of clinical clues that point to one specific cause (Table 1) it should be remembered that a number of pathologies may contribute to dyspnoea or respiratory distress. Partial airway obstruction with a foreign body may present as a very agitated and distressed patient with what appears to be severe difficulty in breathing. If there is a history of choking or obvious features of partial upper airway obstruction then this must be managed immediately (3). Pneumothorax is associated with both asthma and chronic obstructive pulmonary disease and the features of tension should be actively excluded and urgently treated (respiratory distress, decreased movement on the affected side with decreased air entry and tympanic percussion note – tracheal deviation is a late sign) (33,34). Oxygen via a non-rebreathing mask at a high flow rate together with bronchodilators (either via a spacer or a nebuliser) can be administered while the remainder of the primary survey is completed. Hypoxia is a precursor to cardiac arrest and all patients with acute shortness of breath should have as high a percentage of oxygen as possible administered during the primary survey and resuscitation phases (35,36). Asthma continues to cause deaths in young people; recognition and emergency management in the pre-hospital phase may save life (37,38). There is a continuum between uncontrolled asthma, acute severe asthma and life threatening asthma. Patients who present with uncontrolled asthma may progress to life threatening asthma rapidly and high risk factors such as night time waking or morning exacerbations, afternoon or early evening attendance and a past history of severe attacks should be considered. Salbutamol 5 mg via a nebuliser (preferably oxygen driven or with oxygen supplementation) or 10-40 puffs from a metered dose inhaler via a spacer (1 puff at a time) should be given immediately and regardless of previous salbutamol use. A large plastic drinks bottle makes an excellent improvised spacer. If life threatening features are present, iprotropium bromide 0.5 mg can be added to the salbutamol. Intravenous aminophylline (250 mg over 20 minutes) or terbutaline 250 micrograms over 10 minutes may be required in those with life-threatening features (39). If rapid sequence induction of anaesthesia with tracheal intubation is required, the risk of

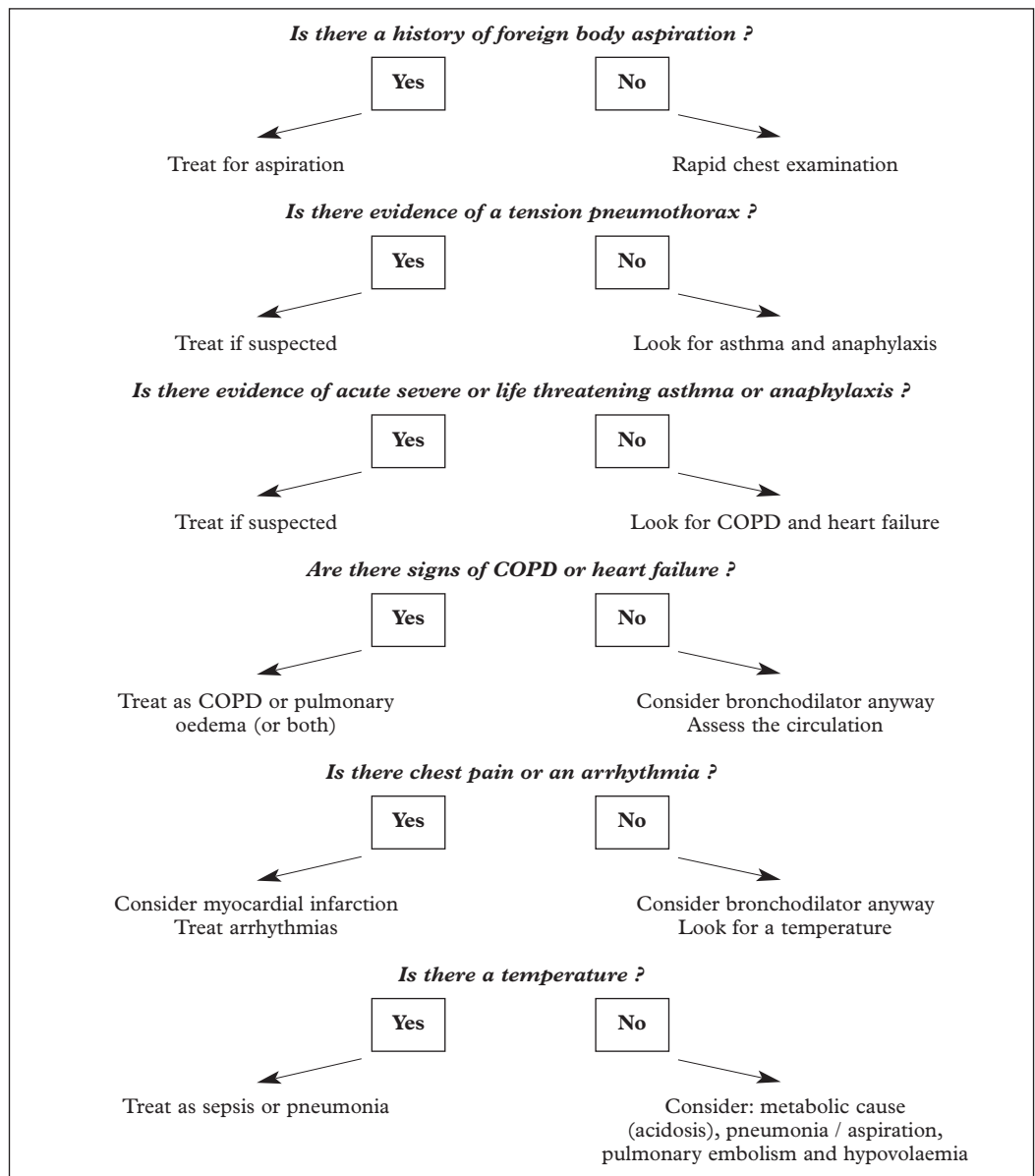


Fig 2. Immediate assessment of acute shortness of breath.

pneumothorax is much higher and practitioners must be aware of the need for sustained ventilations with a prolonged expiratory phase (40).

Acute pulmonary oedema should be treated by sitting the patient up and administering oxygen while intravenous access is obtained. Reduction in cardiac work can be achieved by administering diamorphine 2.5 to 5.0 mg (or morphine 5 to 10 mg), furosemide 50 to 100 mg, and

glyceryl trinitrate 5 mg buccal tablet (if systolic blood pressure is above 100 mmHg). Life threatening pneumonia can affect previously healthy individuals and is associated with a high risk of death if associated with a respiratory rate greater than 30 breaths / minute, confusion and atrial fibrillation (41,42). Intravenous antibiotics must be given immediately the diagnosis is considered. Chronic obstructive pulmonary disease (COPD) is a general term which

Table 1. Clinical clues to the cause of acute shortness of breath.

Problem	Suggestive features
Airway obstruction	Choking episode, stridorous breathing, features of anaphylaxis
Acute asthma	Known asthmatic, wheeze with reduced peak expiratory flow rate (PEFR)
Pneumonia	Fever, cough (productive), chest pain
Exacerbation COPD	Known COPD, physical stigmata of COPD, wheeze with reduced PEFR, increased sputum volume / tenacity / purulence
Pneumothorax	Sudden onset in healthy individual, pleuritic chest pain
Pulmonary oedema	Known cardiac disease or ischaemic chest pain, signs of heart failure and myocardial dysfunction, frothy sputum
Pulmonary embolism	Chest pain, risk factors for DVT/PE, haemoptysis

covers chronic bronchitis and emphysema. Acute exacerbations of COPD present as increased dyspnoea and wheeze often associated with an increase in sputum production, purulence and volume. Life threatening deterioration is associated with signs of infection (pyrexia, frankly purulent sputum), severe airways obstruction (audible wheeze, tachypnoea, use of accessory muscles), peripheral oedema, cyanosis and confusion. Oxygen, bronchodilators and antibiotics are often required although the oxygen concentration may need to be closely monitored once resuscitation is underway (35,43). The majority of pulmonary emboli originate in the deep veins of the pelvis and lower limbs and are therefore associated with risk factors for venous thrombo-embolism and clinical features of deep vein thrombosis (44). Finally, once respiratory conditions have been considered, the possibility of a metabolic cause (e.g. diabetic ketoacidosis) and dehydration or blood loss resulting in hypovolaemia and a compensatory rise in respiratory rate should be considered.

Chest pain

Acute chest pain is a common medical emergency which can be very difficult to assess and manage out of hospital. Roughly 30% of patients with acute chest pain who present to an emergency department will have an acute coronary syndrome (myocardial infarction or unstable angina) (45). An algorithm for the initial assessment of severe chest pain is given in Figure 3. When considering whether the presentation may represent an acute coronary syndrome, risk factors such as age, smoking, diabetes, hypertension and family history are helpful.

Non-cardiac causes of chest pain such as pneumothorax, pulmonary embolism, aortic dissection and pneumonia should also always be considered. The pain associated with an acute coronary syndrome and reflux oesophagitis or oesophageal spasm may be indistinguishable: if in any doubt treat as an acute coronary syndrome. Immediate treatment requires oxygen (if available), aspirin 300 mg, intravenous access, an anti-emetic and opioid analgesia. Aortic dissection presents with severe pain which is often instantaneous in onset and frequently associated with neurological symptoms and signs (46). Major arrhythmias and hypotension should be actively sought and treated during transport to the emergency department. Whether to initiate pre-hospital thrombolysis is a subject of much debate. Ambulance services have however started to undertake this intervention in the pre-hospital phase and clear guidelines have been developed (47).

A defibrillator should be available given the high incidence of pre-hospital cardiac arrest in patients with cardiac chest pain. The Resuscitation Council produces regular guidelines for basic and advanced life support which are readily available and regularly updated (3,48). There is no doubt that in primary cardiac arrest (e.g. following myocardial infarction or arrhythmia), effective cardiopulmonary resuscitation (CPR) and early defibrillation are the most important pre-hospital interventions. All immediate care practitioners must, therefore, be competent in these skills. However, there are several critical decisions related to CPR in the pre-hospital environment that should also be considered.

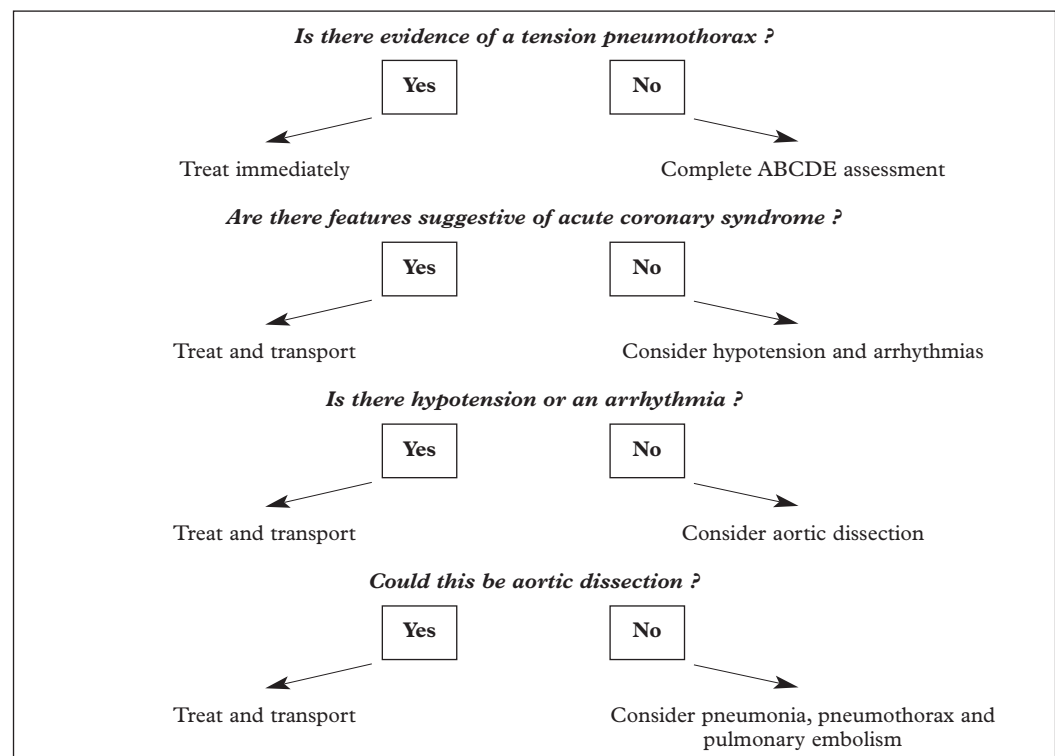


Fig 3. Immediate assessment of severe chest pain.

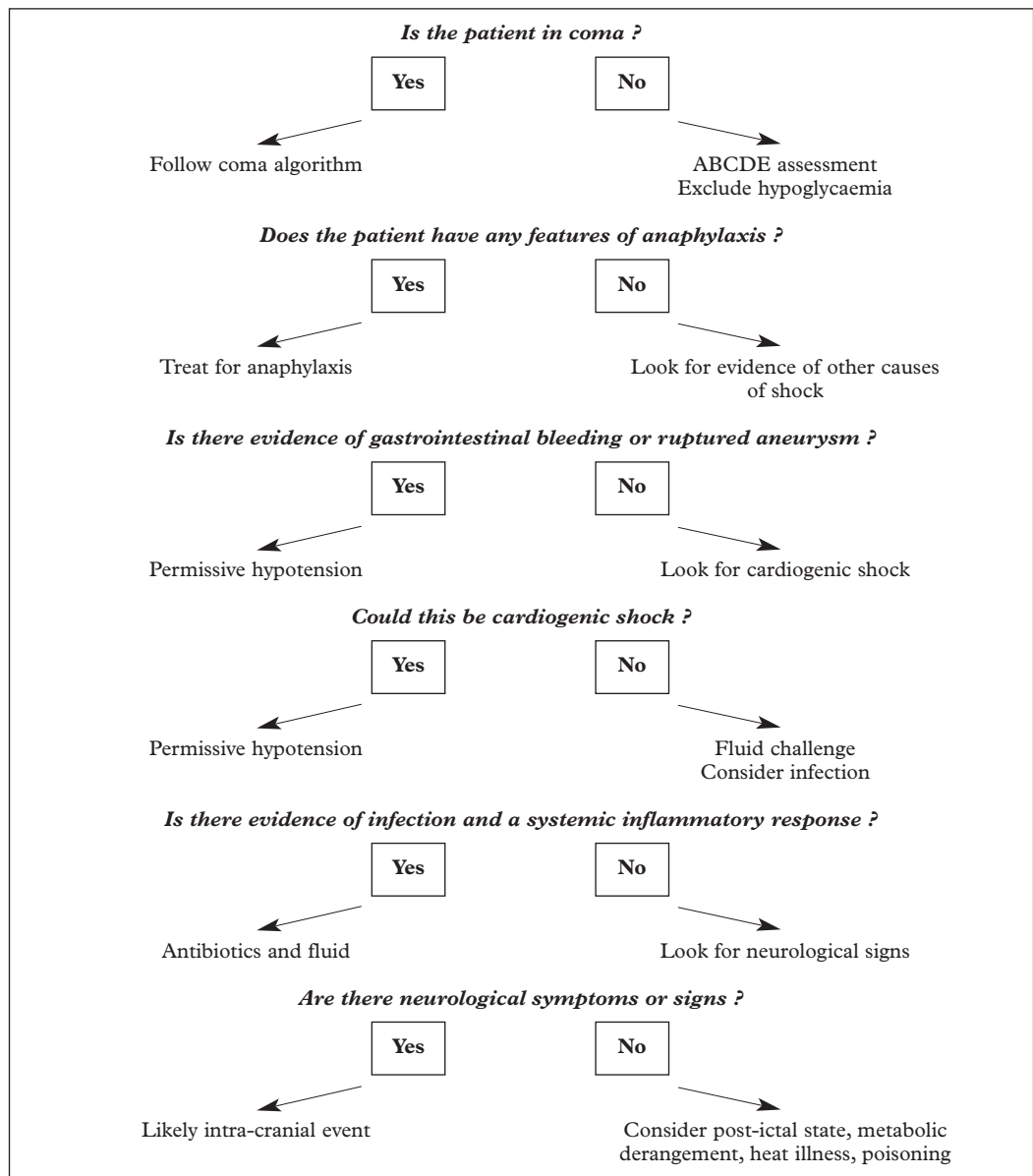


Fig 4. Immediate assessment of the collapsed patient.

- Recognising and treating the reversible causes of cardiac arrest
- Whether CPR can be maintained in transit to further care
- When to start and when to stop CPR
- The availability of post resuscitation care

Guidance on all aspects of the management of pre-hospital cardiac arrest is available from the Resuscitation Council and the Joint Royal Colleges Ambulance Liaison Committee national clinical guidelines (3,47,48).

The collapsed patient

There are a group of conditions which often present as a sudden, unexplained collapse of a patient. These include anaphylaxis, hypotension, cerebro-vascular accidents, seizures and heat illness. The patient is typically found in a collapsed state but has a normal or only slightly reduced level of consciousness (in contrast to coma). Of all the possible causes of sudden collapse, profound hypotension secondary to acute anaphylaxis is the most rapidly fatal. If there

is any suspicion of anaphylaxis (history, urticaria, erythema or wheeze), epinephrine (adrenaline) must be administered immediately (0.5 mg 1:1000 IM) followed by intravenous fluids and hydrocortisone. Some patients may require intravenous epinephrine (49). Other causes of hypotension and shock must be actively sought in the collapsed patient (Figure 4). Immediate management is to lie the patient down and elevate the legs. Oxygen should be administered whilst intravenous access is obtained. Shock is a clinical syndrome resulting from inadequate tissue oxygenation. Shocked patients are commonly pale, cool and sweaty (clammy) with a tachycardia, tachypnoea and weak thready pulse. Blood loss from gastrointestinal haemorrhage should be excluded and a ruptured aortic aneurysm considered. In these cases, permissive hypotension is likely to be less harmful than aggressive fluid replacement. The concept of permissive hypotension derives from recent studies of the role of fluid replacement in patients with

active haemorrhage following traumatic injury. In essence, a patient is 'permitted' to maintain a systolic pressure of approximately 100mmHg and no attempt is made to restore blood pressure to the normal range (50). If there is no evidence of continued bleeding then the possibility of cardiogenic shock (hypotension with pulmonary oedema) should be considered. This might be secondary to infarction, myocarditis or arrhythmia. A fluid challenge in these patients may also cause deterioration (51). In contrast, where hypotension is unlikely to be due to bleeding or left ventricular failure, a rapid fluid challenge (500 ml saline) is appropriate whilst assessment continues. An important cause to consider at this stage is overwhelming infection (31). Meningococcal disease is relatively more common amongst young people in institutions such as halls of residence and barracks (52). The toxic shock syndrome may result from wound infections, cellulitis, abscesses and retained tampons (53). Septic shock refers to sepsis with hypotension unresponsive to fluid replacement. In all cases of suspected overwhelming infection, aggressive fluid replacement (with monitoring of urine output and cardiovascular status) and intravenous antibiotics should be commenced in the pre-hospital phase if there is any delay to definitive care (31).

If hypovolaemia and overwhelming infection are unlikely in the collapsed patient, attention should focus on assessment of neurological disability. Focal neurological signs and/or neck stiffness indicate a cerebrovascular accident (stroke or intracranial haemorrhage) (54,55). In the absence of neurological signs, other causes of collapse include seizures (the patient may be post-ictal), metabolic derangement, poisoning and heat illness. The assessment of the actively fitting patient is extremely difficult and the priority is to stop the fitting process (56). Thus it may be necessary to abandon attempts to assess the airway and breathing in the actively fitting patient and focus on either rectal administration of diazepam or intravenous access and administration of a benzodiazepine (diazepam as Diazemuls® or lorazepam).

Acute abdominal pain

Although acute severe abdominal pain is frequently associated with an underlying surgical pathology, it should be considered an acute medical emergency in the wider sense. Inflammation (e.g. appendicitis), perforation (e.g. peptic ulcer), obstruction (e.g. renal colic), haemorrhage (e.g. ectopic pregnancy) and infarction (e.g. strangulated hernia) are the basic pathological processes that result in acute abdominal pain. Many of the underlying conditions occur suddenly in previously healthy individuals and can be immediately life-threatening (Box 4). Urgent

surgical review should be arranged and the patient evacuated if necessary to achieve this. General management principles in the intervening period and during transport are listed in Box 5 (22). The practice of withholding analgesia in patients with acute abdominal pain to prevent masking of the signs necessary for diagnosis has been shown to be unfounded (57,58). In terms of immediate pre-hospital assessment, Figure 5 provides a systematic approach. Central to this is the fact that the site and character of the pain may suggest an underlying diagnosis and therefore focus urgent treatment needs. Surgeons tend to divide the abdomen into nine areas to allow an easy description of the site of pain, but it is simpler to use four abdominal quadrants - right and left upper and lower quadrants. Pain arising from the stomach, duodenum, pancreas and small bowel is typically localised to the central abdomen. Pancreatic pain can also radiate to the back as can the pain of renal or ureteric colic and aortic aneurysm. Pain from the gall bladder and bile duct is well localised to the right upper quadrant whereas pain from the appendix or large intestine is localised to the lower quadrants.

Box 4. Immediately life-threatening causes of acute abdomen.

Perforated ulcer
Ruptured ectopic pregnancy
Ruptured spleen
Small bowel infarction
Acute pancreatitis
Sepsis following bowel perforation
Leaking abdominal aortic aneurysm

The acutely unwell patient with tachycardia, fever, severe abdominal pain and generalized rigidity and tenderness of the abdomen has peritonitis. This indicates a significant intra-abdominal infective or inflammatory process. Regardless of cause, initial resuscitative measures should be commenced and arrangements made for evacuation or transfer. In addition to generalized peritonitis, progressive abdominal distension, localised guarding and rigidity are also indications for urgent surgical review and these patients must be evacuated with supportive care (Box 5).

Box 5. General treatment of acute surgical emergencies.

Adequate pain relief
Intravenous fluid resuscitation to make up for losses and maintenance
Nil orally
Nasogastric aspiration
Urinary catheter
Accurate recording of fluid balance
Broad-spectrum antibiotics if peritonitis or sepsis
Frequent re-evaluation
Surgical review

Coma

Coma is defined as a conscious level of P or U on the **A**lert, responds to **V**oice, responds to **P**ain, **U**nresponsive scale or a Glasgow Coma Scale (GCS) Score of 8 or less (59).

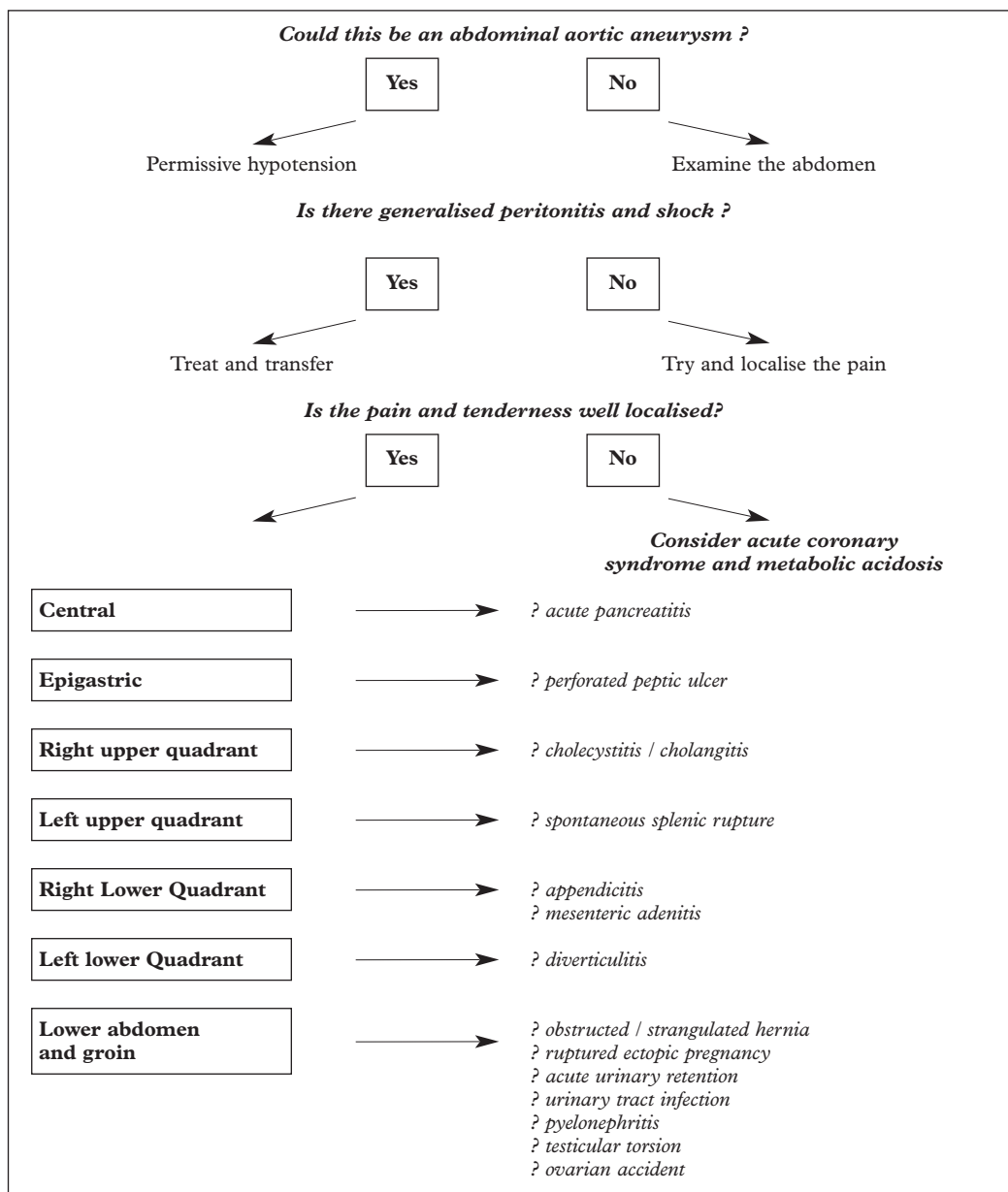


Fig 5. Immediate assessment of acute abdominal pain.

Unconscious patients are at high risk of airway obstruction and aspiration. They require rapid assessment for a wide range of underlying causes (Box 6). An algorithm for initial assessment is given in Figure 6. These patients are often managed and transported in the supine position. This places them at even higher risk of aspiration and once the airway has been assessed, they should be placed in the recovery position unless tracheal intubation has been performed. Reversible causes such as hypoglycaemia and opioid overdose should be considered. A capillary blood glucose less than 4 mmol/L (or 'Lo') in an unconscious patient should be treated with 50 ml of 50% dextrose via a cannula in a large vein. Unconscious patients often have low respiratory rates. In those with a high respiratory rate, consider respiratory failure, sepsis and metabolic acidosis (e.g. diabetic ketoacidosis) as underlying causes. If the respiratory rate is less than 10 / min and the pupils are pinpoint, naloxone 800

micrograms intravenously can be given every two to three minutes until the respiratory rate increases. The intranasal route may also be used (60). Patients who respond to naloxone should have an intravenous infusion during transfer (titrated to respiratory rate and conscious level). Many practitioners administer an intramuscular dose of naloxone prior to the intravenous dose in case the patient wakes up and absconds (a relatively common occurrence in intravenous drug users). The half-life of naloxone is much less than most opioids so it is considered that the intramuscular dose will be absorbed more slowly and provide further protection (61). As many as 30% of deliberate overdoses involve more than one drug. In possible mixed overdoses, the benzodiazepine antagonist flumazenil should not be used because of the risk of increasing the side effects of other ingested drugs (e.g. fitting with tricyclic antidepressants) (15,16). In most cases of poisoning, it is important to

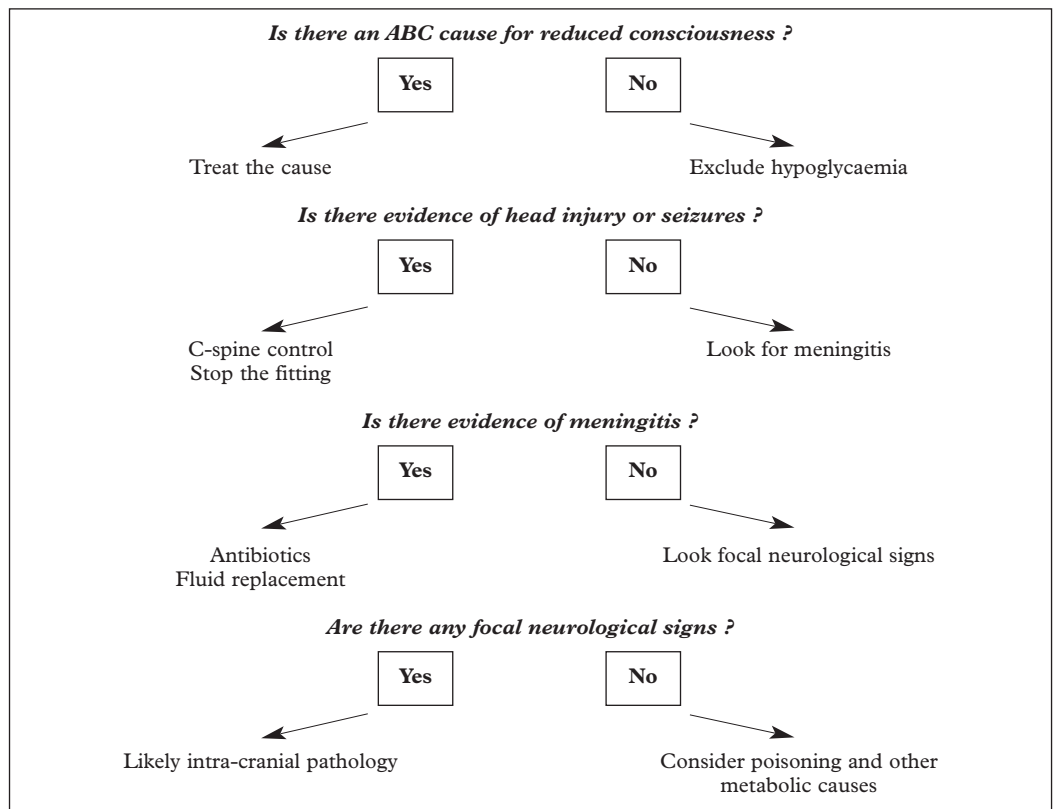


Fig 6. Immediate assessment of the unconscious patient.

understand that supportive care is all that is required once the initial priorities have been addressed (16).

Evidence of scalp injury (bruising, wounds, swelling) or basal skull fracture (bleeding from the ear or nose, bruising over the mastoid process, periorbital bruising, subhyaloid haemorrhage and heamotoympanum) should be sought. If present, head trauma must be assumed and the patient managed accordingly (with the addition of spinal immobilisation). Coma and neck stiffness are usually associated with meningitis and sub-arachnoid haemorrhage. However, encephalitis and cerebral malaria can also give this clinical presentation. If no immediately life threatening cause for coma is found and there is no history of alcohol toxicity or drug ingestion, it is likely that the underlying cause is intra-cranial pathology such as stroke or cerebral haemorrhage. In these cases, there are likely to be focal neurological signs which localize the lesion. Patients who remain comatose for any length of time need protection (airway, eyes, pressure areas), physiological support (oxygen, maintenance fluids and possibly ventilation) and monitoring of vital signs.

Box 6. Medical causes of coma.

After generalized seizure (post-ictal)
Hypoglycaemia
Hypoxia, hypovolaemia, cerebral ischaemia
Hypothermia
Intracranial pathology
Poisoning and alcohol intoxication
Gross metabolic disturbance (e.g. diabetic ketoacidosis)

Summary

The pre-hospital management of acute medical emergencies can be difficult. Critically ill patients must be evaluated quickly and accurately to ensure that immediately life-threatening problems are identified and treated. Figure 1 and Box 2 provide a structured method for rapid assessment in the pre-hospital phase. Although the majority of medically unwell patients will not require an aggressive resuscitation phase during the primary survey, the use of the structured approach in all patients will ensure that 'time critical' pre-hospital medical emergencies are identified. This approach also emphasizes that once immediately correctable problems have been treated, the priority is transfer the patient to the nearest resuscitation facility.

This is the eighth article in the pre-hospital care series. The series is edited by Maj R Mackenzie.

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