DIAGNOSIS AND MANAGEMENT

EMERGENCY MEDICINE

SIXTH EDITION

Anthony FT Brown
and Michael D Cadogan

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DEDICATION

To Regina, my beautiful and understanding wife, for her encouragement and patience. And to Edward and Lucy, who continue to impress and amaze, and bring such joy and happiness whilst reminding me what really matters.

A.F.T.B.

To my wonderful wife Fiona for her tolerance and support. To my enigmatic children William, Hamish and Olivia for their enduring patience and inspiration.

M.D.C.

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PREFACE TO THE 6TH EDITION OF *EMERGENCY MEDICINE*

Many changes have been made to this new edition, which incorporates the latest ideas and evidence base underpinning the best emergency medicine care. The whole text has been revised and updated from the latest 2010 international guidelines on cardiopulmonary resuscitation, right through to favourite handy hints and practical tips. Also included are brand new sections on Critical Care Emergencies and Practical Procedures, plus expanded sections on Paediatric Emergencies, Infectious Disease and Foreign Travel Emergencies, and Environmental Emergencies, and the addition of normal laboratory values and precise drug doses.

A standardized approach to every condition has been retained throughout, with the text consistently formatted to maximize ease of use and the practical delivery of patient care. This book is as much designed for the bedside as it is for studying.

The text is now supported by a wealth of additional online material at http://lifeinthefastlane.com/. This includes high-resolution clinical images, procedural videos, case-based clinical questions, additional reading material and links to online references, all available for *free*.

The emergency department is rightly regarded as the 'front door' to the hospital. No matter how busy it may be, or how much inpatient beds are at a premium, each new patient deserves high-quality care from the moment he or she arrives. We hope this book will help you deliver on this challenge.

Anthony F T Brown
Mike Cadogan
December 2010

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Tony Brown and Mike Cadogan
December 2010

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Section I

CRITICAL CARE EMERGENCIES

CARDIOPULMONARY RESUSCITATION

INITIAL APPROACH

DIAGNOSIS

1 Cardiopulmonary resuscitation (CPR) is required if a collapsed person is unconscious or unresponsive, not breathing, and has no pulse in a large artery such as the carotid or femoral.
   (i) The following may also be seen:
      (a) occasional, ineffectual (agonal) gasps
      (b) pallor or cyanosis
      (c) dilated pupils
      (d) brief tonic grand mal seizure.

2 Sudden cardiac arrest still causes over 60% of deaths from coronary heart disease in adults.

MANAGEMENT

1 This is based on the International Liaison Committee on Resuscitation (ILCOR) 2010 International Consensus on CPR Science with Treatment Recommendations (CoSTR).
   (i) The first person on the scene stays with the patient, checks for danger and commences resuscitation, making a note of the time.
   (ii) The second person summons help to organize the arrival of equipment, then assists with the resuscitation.

2 ***Immediate actions***

The aim is to maintain oxygenation of the brain and myocardium until a stable cardiac output is achieved.
   (i) Lay the patient flat on a hard surface such as a trolley. If the patient is on the floor and enough people are available, lift the patient onto a trolley to facilitate the resuscitation procedure.
   (ii) Rapidly give a single, sharp precordial thump within the first few seconds of the onset of a witnessed or monitored arrest, where the rhythm is pulseless ventricular tachycardia (VT) or ventricular fibrillation (VF), and a defibrillator is not immediately to hand.
   (iii) Check the victim for a response, and then open the airway by tilting the head and lifting the chin if there is no response ('head tilt, chin lift'):
      (a) this prevents the tongue from occluding the larynx
      (b) look, listen and feel for breathing for no more than 10 s, while keeping the airway open.
   (iv) If breathing is not normal or absent, check for signs of a circulation:
      (a) assess a large pulse such as the carotid or femoral, or look for signs of life for no more than 10 s.

(v) Start CPR immediately if there are no signs of life:
  (a) commence external cardiac massage
  (b) commence assisted ventilation.

3 *External cardiac massage*

(i) Place the heel of one hand in the centre of the patient's chest. Place the heel of the other hand on top, interlocking the fingers.
(ii) Keeping the arms straight and applying a vertical compression force, depress the sternum 5–6 cm at a rate of at least 100 compressions/min (but not exceeding 120/min):
  (a) release all the pressure on the chest without losing contact with the sternum after each compression
  (b) do not apply pressure over the upper abdomen, lower end of sternum or the ribs, and take equal time for compression and for release.
(iii) Perform 30 compressions, which should create a palpable femoral pulse.
(iv) Use a one- or two-hand technique to compress the lower half of the sternum in small children by approximately one-third of its depth, at a rate of at least 100 compressions/min but not greater than 120/min:
  (a) use the tips of two fingers in infants, also at a rate of at least 100/min (see p. 343).

Warning: avoid using excessive or malpositioned force causing rib fractures, flail chest, liver lacerations, etc.

4 *Assisted ventilation*

(i) Open the airway again using head tilt and chin lift.
(ii) Start mouth-to-mouth/nose or mouth-to-mask respiration without delay if breathing is absent, using a pocket mask such as the Laerdal.
(iii) Deliver two effective rescue breaths that should be completed within 5 s total time, and immediately resume compressions.
(iv) Use a bag-valve mask setup such as an Ambu or Laerdal bag with oxygen reservoir attached and face mask instead, if trained in the technique
  (a) quickly look in the mouth and remove any obstruction with forceps or suction. Leave well-fitting dentures in place
  (b) or try inserting an oropharyngeal (Guedel) airway if necessary
  (c) check for leaks around the mask or convert to a two-person technique if the chest fails to inflate
  (d) consider possible obstruction of the upper airway, if ventilation is still ineffective (see p. 13).

Warning: adequate oxygenation is achieved by the above measures. Endotracheal intubation should *only* be attempted by those who are trained, competent and experienced.

5 ***Basic life support: external cardiac massage with assisted ventilation***

(i) Continue with chest compressions and rescue breaths in a ratio of 30:2.

(ii) Change the person providing chest compressions every 2 min, but ensure minimum interruption to compressions during the changeover.

6 ***Defibrillation***

(i) As soon as the defibrillator arrives, apply self-adhesive pads or paddles to the patient whilst continuing chest compressions
- (a) rapidly shave excessive male chest hair, without delay
- (b) place one self-adhesive defibrillation pad or conventional paddle to the right of the sternum below the clavicle, and the other adhesive pad or paddle in the mid-axillary line level with the V6 electrocardiogram (ECG) electrode or female breast
- (c) avoid positioning self-adhesive pads or paddles over an ECG electrode, medication patch, or implanted device, e.g. pacemaker or automatic cardioverter defibrillator.

(ii) Analyse the rhythm with a brief pause, and charge the defibrillator if the rhythm is VF or pulseless VT. Continue chest compressions until fully charged.

(iii) Quickly ensure that all rescuers are clear, then give the patient an immediate 150–200 J direct current (DC) shock using a biphasic waveform defibrillator (all modern defibrillators are now biphasic)
- (a) minimize the delay in delivering the shock, which should take less than 5 s
- (b) ensure good electrical contact is made when applying manual paddles by using gel pads or electrode jelly, and apply firm pressure of 8 kg force in adults
- (c) give a 360 J shock if an older monophasic defibrillator is used.

(iv) Immediately resume chest compressions without reassessing the rhythm or feeling for a pulse.

(v) The *only* exception is when VF is witnessed in a patient already connected to a manual defibrillator, or during cardiac catheterization, and/or early post-cardiac surgery
- (a) use a stacked, three-shock strategy rapidly delivering three shocks in a row *before* starting chest compressions.

(vi) Continue external chest compressions and assisted ventilation for 2 min, then pause briefly to assess the rhythm again.

7 Observe one of four possible traces (see Fig. 1.1 for a rapid overview of treatment):

(i) Shockable rhythms such as VF (see p. 7) or pulseless VT (see p. 7).

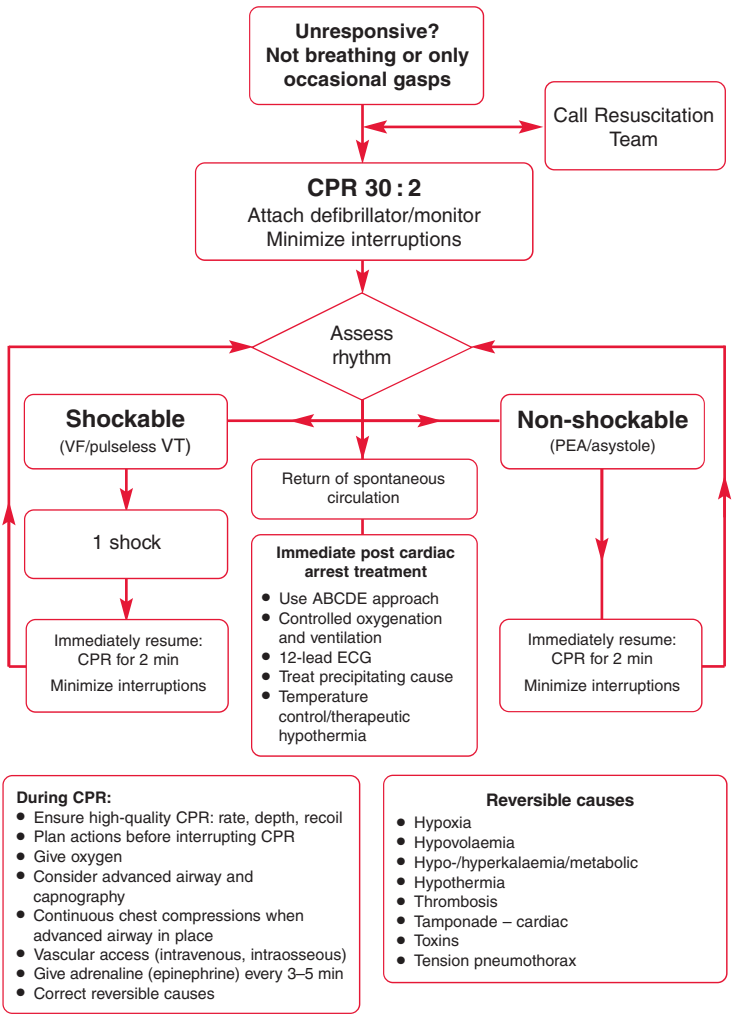

Figure 1.1 Adult advanced life support algorithm. ABCDE, airway/breathing/circulation/disability/exposure; CPR, cardiopulmonary resuscitation; ECG, electrocardiogram; PEA, pulseless electrical activity; VF, ventricular fibrillation; VT, ventricular tachycardia. Reproduced with kind permission from European Resuscitation Council (2010) European Resuscitation Council Guidelines for Resuscitation 2010. Section 1. Executive summary. *Resuscitation* **81**: 1219–76.