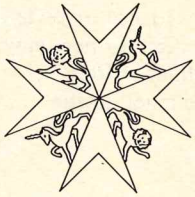


Australian First Aid

The Authorized Manual of
St John Ambulance Australia

Australian First Aid

Australian First Aid



The Authorised Manual of
St. John Ambulance Australia

St. John Ambulance Australia
Canberra Avenue
FORREST ACT 2603

© St. John Ambulance Australia

Australian first aid

Includes index.
ISBN 0 9597204 6 4 (Limp)
ISBN 0 949569 06 2 (Cased)

1. First aid in illness and injury
I. St John Ambulance Association (Australia)
616.02 '52

This book is copyright. Apart from any fair dealings for purposes of private study, criticism or review, as permitted under the Copyright Act, no part may be reproduced by any process without written permission. Inquiries should be made to the Publishers.

Editors: Marjorie Pressley, Lynne Macdonald
Designer: John van Loon
Illustrator: Carol Aitken
Language consultant: Angela Ridsdale
Production management: Gordian Book Production Consultants

Wholly set up and printed in Australia by Ruskin Press,
North Melbourne, Victoria

The Order of St John in Australia

The Priory of the Order of St John in Australia, with headquarters in Canberra, is part of the Most Venerable Order of the Hospital of St John of Jerusalem. The Order's short title is the Order of St John. The Queen is the Sovereign Head of the Order, and the British Commonwealth headquarters is at St John's Gate London.

Arising from a centuries-old tradition, the original Order was founded in the eleventh century as an arm of the Church. It was a body of monks dedicated to the care of sick and injured pilgrims to the Holy Land. The Order's patron saint was St John the Baptist and its badge was the now familiar eight-pointed cross. The influence of the Order

spread rapidly throughout Christendom and, in order to preserve the Crusader Kingdom of Jerusalem, it gradually adopted a military role as Knights Hospitaller. After the fall of Jerusalem, the Order fought a valiant rear-guard action across the Mediterranean to Malta, which became its headquarters until the end of the eighteenth century. Its badge was to become known as the Maltese Cross.

With the increase in power and influence of the Order, Grand Priories were set up in the major Kingdoms or 'Tongues' of Europe. The English Grand Priory was recreated as a non-sectarian organisation in the early nineteenth century. From the 1880s, its work rapidly spread throughout the British Empire. It was granted a Royal Charter in 1888, and received the styles and titles of a Royal Order of Chivalry from successive British Monarchs. Its success resulted from a popular wish to acquire basic medical skills in a world undergoing rapid industrial development.

The three Foundations

The Order of St John maintains three Foundations, namely:

- The St John Ambulance Association
- The St John Ambulance Brigade
- The St John Ophthalmic Hospital in Jerusalem.

The objects of the Order are expressed in its motto *Pro utilitate hominum (For the service of mankind).*

The St John Ambulance Association

The Association is concerned with the laying down of standards for the teaching of first aid and home nursing, the publication of text books and manuals for this purpose, the running of classes in these subjects and examinations for certificates of proficiency in the same. There is an Association Centre in each State capital.

Teachers carrying out the work consist of doctors, nurses, ambulance officers and trained lay instructors who give their services voluntarily. There are some paid executive staff. The Association is administered in Australia by its Director.

The St John Ambulance Brigade

This consists of voluntary members who wear the St John uniform and give first aid to the general public as a service to the community. They are to be seen at football matches, parades and national disasters etc. In several States, brigade volunteers also serve with the ambulance networks maintained by St John. The Brigade consists of officers and other ranks, adults and cadets, male and female. Cadets graduate through the Brigade, obtaining, by examination, certificates in the subjects of first aid or home nursing.

Brigade organisation is on a corps basis in the various States and districts throughout Australia, with headquarters in each capital city. The Chief Commissioner controls the Brigade in Australia.

The Ophthalmic Hospital in Jerusalem

This third Foundation situated in Jerusalem gives very comprehensive patient care and nursing treatment to sufferers from eye disease in the region. The hospital and its paid staff are supported by subscriptions from the Order of St John throughout the world.

The above Foundations constitute the active working teams of St John and all endeavour to assist mankind in accordance with the motto of the Order.

The Australian beginning

On 13 June 1883 a public meeting was held in the Melbourne Town Hall to form a local branch of the Association. By the end of that month, a centre had been formally set up under the guidance of Dr Edward Neild.

The first Australian division of the St John Ambulance Brigade was constituted at Glebe, Sydney, in 1903.

The work of St John flourished, and a national organisation with a level of autonomy befitting Australia's national status was developed.

Thus, for over a century, St John has worked for the benefit of Australians and has become one of the nation's foremost charitable and health training institutions.

In 1987, the organization adopted a single public title, St. John Ambulance Australia.

Foreword

It is one hundred years since the first centre of the St John Ambulance Association was formally established in Australia to pioneer the teaching of first aid. It is now 15 years since the Association's first all-Australian manual was published. This was designed and produced to suit Australian conditions and customs, and draws upon the unique expertise and experience of St John gained in the field of first aid and ambulance work in Australia.

While new texts have been made available from overseas, the Association has again felt that it should write its own first aid manual to suit Australian conditions and that it should be wholly set up, printed and published in this country.

The St John Ambulance Association in Australia is conscious of its public responsibility as the acknowledged authority for teaching first aid and this entirely new edition is the result of much research and expert advice received from all branches of the medical profession both from within and outside the Order of St John.

The Director of the St John Ambulance Association in Australia, Mr A. H. Toyne, has once again been responsible for the preparation of this manual and Mr John Cook has overseen production. On behalf of the Order of St John in Australia, I wish to thank all those who have contributed to the development of this manual, and I congratulate them on producing an expert and practical manual for the teaching of first aid.

J. McI. Young,
Chancellor,
The Priory of
The Order of St John in Australia

Acknowledgements

This first aid manual has been produced as a result of the work of many people throughout Australia. It is not possible to list all those who have so generously and tirelessly contributed their time and expertise to the manual. It is desired to thank them all collectively. However some in particular require special mention. In the preparation of the text thanks are extended to:

From St John Ambulance Association:
Mr J.H. Revitt, South Australia; Dr N.W. Stevenson, Queensland; Dr C.R.B. Richards, New South Wales; Mr L.M. Davies, Australian Capital Territory; Dr H.F. Oxer, Western Australia; Mrs D. Tomsett, Western Australia; Mr T. Stal, Victoria.

From St John Ambulance Brigade, Dr E. Brentnall and Dr J.A. Mawdsley, Victoria; Dr J.P. Bush, Chief Surgeon.

Professor John Masterton, MB, ChB, DObst, FRCS, FRACS, — Department of Surgery Monash University; Dr Julian Keogh, MB, BS, FRCS, FRACS — Royal Children's

Hospital, Burns Unit, Melbourne; Dr Struan K. Sutherland, MD, FRCPA, FRACP — Commonwealth Serum Laboratories; Dr Garry Nervo, MDSc, LDS, FRACDS — Australian Society of Endodontology.

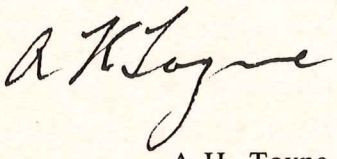
And in particular:
Mr P. McMurtrie and Mr D.E. Bush of St John Ambulance Brigade.

For the advice given to the artist thanks go to: Dr Ian Aarons and Mr I. Anson both of South Australia.

For the overall correlation of the work I make particular mention of my deputy, Mr A.M. Beech, as well as Mr P. Smyth and Miss V. Purmalis.

Finally without the expert work of our professional producers the manual would not have reached the excellence it has.

The St John Ambulance Association wishes to express special appreciation to:
Mrs Marjorie Pressley — Medical Editor
Ms Lynne Macdonald — Editorial Services
Mr John van Loon — Designer
Mrs Carol Aitken — Illustrator
Mr John Cook — Gordian Book Production Consultants
Miss Angela Ridsdale — Language Consultant



A.H. Toyne
Director

Contents

	The Order of St John in Australia	v
	Foreword	ix
	Acknowledgements	xi
	Contents	xiii
	Illustrations	xvii
	How to use this book	xxiii
1	Introduction	
	1 First aid — general principles	1
	2 The structure and function of the human body	21
2	General management of the casualty with a life-threatening condition	
	3 The ABC of resuscitation	39
	4 The unconscious casualty	77
	5 Severe bleeding	87
	6 Shock	101

3 Principles of injury care

7 Wounds and related infection 107

8 Bone, joint and muscle injuries — general principles of management 119

9 Burns 131

10 Dressings, pads, bandages, slings and splints — general principles for their use 143

4 Injuries by body area

11 Head, face and jaw injuries 167

12 Eye, ear, nose and throat conditions 181

13 Spinal injuries 195

14 Chest injuries 201

15 Injuries and emergencies of the abdomen and pelvis 211

16 Limb injuries 221

5 Care of the acutely ill

17 Breathing disorders 243

18 Heart conditions 257

19 Brain illness and disorders of the nervous system 265

20 Poisoning 277

21 The abuse of drugs 285

22 Emotional disturbance 291

23 Bites and stings 297

24 Overexposure to heat and cold 317

6 Specific areas of first aid

25 Sports injuries 333

26 Emergency childbirth 349

27 First aid in remote areas 359

28 Traffic accident injuries 363

29 Safety, prevention and protection 373

7 Practical skills

30 Lifting and moving casualties 389

31 Special bandaging, dressings and splints 413

8 Appendices

A Non-toxic materials 427

B Syllabus 429

9 Glossary 433

Index 445

Notes

List of Illustrations

1.1 Shake and shout
1.2 Taking the carotid pulse
1.3 Taking the radial pulse
1.4 St John action plan

2.1 The respiratory system
2.2 Inspiration
2.3 Expiration
2.4 The heart (showing four chambers and the direction of blood circulation)
2.5 Schematic diagram of the circulation of blood to various parts of the body
2.6 The skeleton: from the front
2.7 The skeleton: from the back
2.8 The skull
2.9 The spine
2.10 The chest, shoulders and arms, collar-bone and breastbone
2.11 The whole leg, hip joint, knee, lower leg and ankle and foot and toes
2.12 The digestive system
2.13 The urinary system
2.14 The skin

3.1 Structure of the airway
3.2 Positioning the casualty so that fluid can flow away
3.3 Clearing the airway (adults)
3.4 Clearing the airway (small children)
3.5 Clearing the airway (infants)
3.6 Opening the airway

3.7 Jaw thrust
3.8 Neck lift
3.9 Casualty in the coma position
3.10 Opening the airway (infants)
3.11 Assessing breathing
3.12 EAR: pinching the nostrils
3.13 EAR: mouth-to-mouth resuscitation
3.14 EAR: checking for chest movement
3.15a-c Mouth-to-nose resuscitation
3.16 Mouth-and-nose resuscitation
3.17a-b Breathing for an infant
3.18 Feeling for the carotid pulse
3.19 Feeling for the heart beat in a baby
3.20 Shake and shout
3.21 CPR: locating the heart
3.22 CPR: positioning the hands
3.23 CPR: alternative hand position: wrist grip
3.24 CPR: alternative hand position: interlocked fingers
3.25 CPR: heart compression: one operator
3.26 CPR: heart compression: two operators
3.27 CPR: heart compression and breathing: two operators
3.28 CPR: hand position for a small child
3.29 CPR: chest compression for infants

4.1 An example of a medical warning device: Medic alert
4.2a-d Placing a casualty in the coma position
4.3 Handling an obese casualty
4.4 Supporting a casualty with a broken limb
4.5a-b Supporting the trapped casualty
4.6a-c Placing a casualty in the lateral position

5.1 Direct pressure over a wound
5.2 Bulky dressing on a wound
5.3 Direct pressure with a bare hand
5.4 Elevating the part
5.5 A casualty with legs elevated
5.6 Placing a dressing over the first dressing
5.7 Grasp the sides of the wound and squeeze
5.8 Applying hand pressure to a cut large blood vessel
5.9 Applying a constrictive bandage
5.10 Dressing a crater wound
5.11 Controlling bleeding from the palm of the hand

6.1 The management of shock

7.1 An abrasion
7.2 An incised wound

7.3 A lacerated wound
7.4 A penetrating stab wound
7.5 Management of a foreign body in the wound
7.6a-b Removal of a fish-hook
7.7a-b Removal of a fish-hook: alternative method
7.8a-b R.I.C.E.

8.1 A fracture
8.2 Direct force
8.3 Indirect force
8.4 Abnormal muscular contraction
8.5 A closed fracture
8.6 An open fracture
8.7 A complicated fracture
8.8a-d Immobilise by: steadying the fractures, supporting the fractures, securing the fractures
8.9 A sprain
8.10 A dislocation
8.11 A strain of a muscle
8.12 A strain of a tendon

9.1 Two types of burn
9.2 'Rule of nines'
9.3 A blister
9.4a-c Management of burns

10.1 Some approved dressings
10.2a-c Retaining a dressing in position by using a roller or folded triangular bandage
10.3 Making a ring pad
10.4 Some approved bandages
10.5a-d Applying a roller bandage
10.6a-c A triangular bandage in various folds: a broad bandage; a narrow bandage; a triangular bandage being folded for storage (also used as a pad)
10.7a-b Tying a reef knot
10.8a-c A collar and cuff sling
10.9a-c Making a clove hitch
10.10a-c An arm sling
10.11a-d A St John sling
10.12a-d Improvised slings
10.13a-c Using splints

11.1 Positioning the casualty with a head injury
11.2a-b Applying a scalp bandage
11.3a-d Applying a jaw bandage
11.4 Splinting a tooth

12.1 The structure of the eye
12.2 The eye from the front
12.3a-c Everting the upper lid
12.4 Irrigating the eye
12.5 Section illustration of the ear
12.6 Bleeding from the ear
12.7 Removing an insect from the ear canal
12.8 Section illustration of the nose
12.9 Bleeding from the nose

13.1 An improvised cervical collar
13.2 A flotation board for a casualty of a diving accident

14.1 A rib fracture damaging the lung
14.2a-c Management of fractured ribs
14.3 Flail chest
14.4 Flail section movement
14.5 Management of flail chest
14.6a-b A penetrating chest wound
14.7 Management of a penetrating chest wound

15.1 Management of an abdominal injury
15.2 Management of a crush injury to the lower back
15.3 A casualty with a pelvic injury awaiting medical assistance
15.4 A casualty with a pelvic injury prepared for transport

16.1 A patient with a fracture of the collar-bone
16.2 Management of fractures of the collar-bone
16.3 A fracture of the upper arm (close to the elbow)
16.4a-b Management of a fracture of the upper arm (close to the elbow)
16.5a-b Management of a fracture of the upper arm (mid-shaft)
16.6 A fracture of the forearm
16.7a-c Splinting a forearm fracture
16.8 A fracture of the finger
16.9 Management of a fracture of the thigh
16.10 Management of a fracture of the thigh using a splint
16.11 Management of a fracture of the knee
16.12 Fracture of the lower leg
16.13 Management of a fracture of the lower leg with wound covered
16.14a-b A casualty with a fracture of the lower leg, prepared for transport
16.15 A casualty with a fracture of both legs, prepared for transport
16.16a-b Cardboard splints

17.1 EAR: mouth-to-nose while wading ashore
17.2a-b Management of a drowning casualty

17.3a-c Management of a choking infant and child
17.4 Management of a choking adult
17.5 Management of swollen tissues of the throat
17.6 Management of an asthma attack

18.1 The heart

19.1 Management of a stroke victim
19.2 Management of a seizure in a child
19.3 Management of a fainting casualty

23.1a-d Management of snake bite
23.2 Male and female funnel web spiders
23.3 Redback spider
23.4 Removing a bee sting
23.5a-b A honey bee and a European wasp
23.6 A tick
23.7a-b Removing a tick
23.8 Blue-ringed octopus
23.9 Cone shell
23.10 Stonefish
23.11 Bullrout
23.12 Sting ray
23.13 Box jellyfish
23.14 The 'frosted ladder' sting pattern of a jellyfish

25.1 Management of tennis elbow
25.2 Mallet finger
25.3 Management of a knee injury
25.4 Bandaging for a muscle injury
25.5 Stretching muscle in a corked thigh
25.6 Management of muscle cramp

26.1a-d Normal childbirth sequence
26.2a-b Immediate care of the baby
26.3 The placenta
26.4 Tying the umbilical cord

28.1 Safety at the scene
28.2 A trapped casualty's head tilted, with jaw support
28.3 A message form
28.4a-b Applying a prepared cervical collar
28.5a-b Applying an improvised cervical collar
28.6 Removing a casualty from inside a crashed vehicle
28.7a-b Removing a motor cyclist's protective helmet
28.8 The St John motorists' first aid kit

30.1 Correct posture for lifting a casualty
30.2 Moving a casualty: cradle lift
30.3 A human crutch: one First Aider
30.4 Pick-a-back
30.5a-c The fireman's lift and carry
30.6 The lift and drag
30.7 A human crutch: two First Aiders
30.8a-b The four-handed seat
30.9a-b The three-handed seat
30.10a-b The two-handed seat
30.11 The fore-and-aft method of transport
30.12 The fore-and-aft chairlift
30.13 Securing a casualty to a stretcher
30.14a-e Blanketing a stretcher
30.15 Loading a stretcher without using blankets
30.16a-c Blanket lift
30.17 An improvised stretcher with poles and coats
30.18 The Jordon lifting frame

31.1a-b Supporting a fractured collar-bone using figure-of-eight bandaging (front and rear views)
31.2a-b Supporting a fractured collar-bone using broad bandaging (front and rear views)
31.3 Some prepared dressings and bandages
31.4a-c Applying prepared dressings
31.5a-b Immobilising a fracture with splints and bandages
31.6 An inflatable splint
31.7 A Tridon traction splint
31.8 A Hare traction splint
31.9 A modified Thomas traction splint

How to use this book

Australian first aid is intended to help the First Aider learn the art and science of first aid and, afterwards, to be able to revise those skills quickly. This requires that the book be both a *learning guide* and a *back* reference.

As a *learning guide* it has been arranged in a progression of topics grouped in parts. Part 1 is an introduction to first aid, its general principles as well as what the First Aider must be able to do to help a casualty who needs assistance. This introduction also includes a basic outline of the way the human body is built and works. This information, which is necessary for the First Aider to perform his skills, is presented in simple language. Medical terms are only used where it is necessary for the First Aider to know them.

Part 2 is a collection of four chapters that deal with the general management of the casualty with a life-threatening condition.

This is, perhaps, the aspect of practical first aid requiring the greatest urgency.

There then follow chapters grouped together in parts that teach the general principles of injury care, and the application of these principles to specific injuries, illnesses and other situations.

Each chapter begins with a descriptive title, followed by a brief statement about the chapter. Objectives are given for student learning. In some chapters where complex or medical terms will be used, a vocabulary of these words is listed. Information about the nature of the injury being discussed and possible prevention then follow.

Assessing the casualty in relation to the incident, in a methodical way and, finally, management of the casualty and the incident are outlined.

Illustrations are also numbered and listed in such a way that the First Aider can refer back to them quickly. They are listed in the front of the book, after the Contents.

The first number indicates the chapter in which the illustrations can be found; the second number is its sequence in that chapter e.g. Figure 16.2, Management of fractures of the collar-bone, tells the First Aider that this particular skill is shown in the second illustration in Chapter 16.

Illustrations are occasionally inaccurate in some detail or over-simplified in order that the learner can see the main points: e.g. in Figure 10.11a the First Aider should normally stand facing the patient. However, this would not have allowed a view of the procedure.

Many things are repeated in this book, in order to emphasise their importance. The DRABC logo is one. It is a reminder that a life-threatening situation exists. However, it

may not be included in all places, although these priorities must always be remembered.

In each chapter, certain regular features may be seen. These help in the initial learning process and also as a quick *back reference.*

This symbol alerts the First Aider that a life-threatening situation may exist and that the first priority is the assessment and management of Danger, Response, Airway, Breathing and Circulation. The procedure is described in the St John Action Plan in Chapter 1.



Management of the casualty and the incident, i.e. things the First Aider *must do,* are marked by a vertical blue line.

Management

Things that require *special notice* or are a *warning* to the First Aider are marked by a vertical red line and a red caption in the margin.

Warning

Thus, the First Aider is able to refresh his memory by quickly identifying a particular management skill or a warning.

Where symptoms and signs are listed for a condition, no attempt has been made to give all the possible variations. This book only includes those that are most common, or most helpful in assisting a First Aider to correctly manage a casualty. Similarly, examples of injuries or causes are not intended to be anything other than some of the most common.

Symptoms and signs

Some methods of management mentioned early in the book, though relevant, may not be repeated throughout the book except

where they are very important. As an example, it is assumed that the First Aider will always reassure the casualty, not only in words, but by acting in a calm confident manner. This has not been included for each condition, to avoid repetition.

The manual gives precise instructions on recommended methods of bandaging, and other practical skills. It is important to remember that alternative methods may be acceptable, so long as they achieve the same result.

1

Introduction

1

First aid — general principles

First aid is the initial care of the injured or the sick.

After studying this chapter you should:
- know what a First Aider must be able to do
- know the principles of management of an emergency situation.

Learn these words before studying this chapter:

• Airway	the passage by which air enters and leaves the lungs
• Cardio-pulmonary resuscitation (CPR):	
cardio	relating to the heart
pulmonary	relating to the lungs
resuscitation	reviving one who is dying
• Casualty	a victim of an accident or sudden illness
• Expired air resuscitation (EAR)	breathing for the casualty who cannot breathe for himself
• Nausea	a feeling of sickness
• Pallor	paleness of skin.

First aid begins immediately the First Aider arrives at the scene of an accident or emergency, and continues until medical aid arrives or the casualty recovers. Medical aid is treatment by a doctor, registered nurse or ambulance officer. The First Aider should be prepared to remain and assist if needed.

First aid can:
- preserve life
- protect the unconscious
- prevent injury or illness from becoming worse
- promote recovery.

Principles of management of an emergency situation

General first aid procedure

When the First Aider arrives at the scene of an accident or emergency, the following procedure is carried out in a logical and ordered sequence. Firstly, check whether there is danger to yourself, the casualty or any bystanders. Only proceed if it is safe to do so.

Prevention

Perhaps the most important principle underlying the whole field of medicine, which includes first aid, is that of prevention. It is also probably the most neglected.

Principles of prevention

The aims of first aid can be stated as the

principles of prevention. They still follow the logical sequence of incident and casualty management. They are:

- prevent the incident occurring
- prevent complications arising from the incident
- prevent the casualty dying
- prevent the casualty's condition becoming worse
- prevent delay in the recovery of the casualty
- prevent your intervention being harmful.

Prevent the incident occurring. **Most accidents are preventable!** As a First Aider, you should know the safety rules for the home, for work, for recreation and on the roads (see Chapter 29, 'Safety, prevention and protection').

Prevent complications arising from the incident (dangers) e.g. wearing seat belts, or the second accident.

You must be able to:

- assess and control the situation
- protect yourself, the casualty and others from danger by removing the cause or by removing the casualty from the source of danger (see 'Emergency rescue' below). Make use of bystanders to warn oncoming traffic of danger.

Prevent the casualty dying

- assess the casualty
  - is the casualty unconscious? (Response)
  - airway (A)
  - breathing (B)
  - circulation (C)
    - pulse
    - bleeding
    - shock
- decide on the management needed

- start to manage the situation and the life-threatening problems according to priorities decided on as a result of assessment.

Prevent the casualty's condition becoming worse.
After controlling the life-threatening problems
- obtain a **detailed** history of the incident
- conduct a **detailed** assessment of the casualty (see 'Principles of Assessment' below)
- manage other problems and anticipate complications
  – immobilise any fractures
  – cover any wounds.

Prevent delay in recovery of the casualty, e.g. reassurance, blankets
- arrange for further care of the casualty (see 'Seeking Medical Aid' below).

Prevent your intervention being harmful
- always show a caring attitude towards your casualty
- learn and accept your limitations
- maintain and improve your level of skills and knowledge
  – first aid skills need regular practice and updating.

The principles of assessment

The principles involved in the detailed assessment of the casualty are now described.

History

The history of the incident is the account of the accident or the illness obtained from the casualty and from any witnesses, and by observing the scene of the incident.

Symptoms

The symptoms are the sensations the casualty

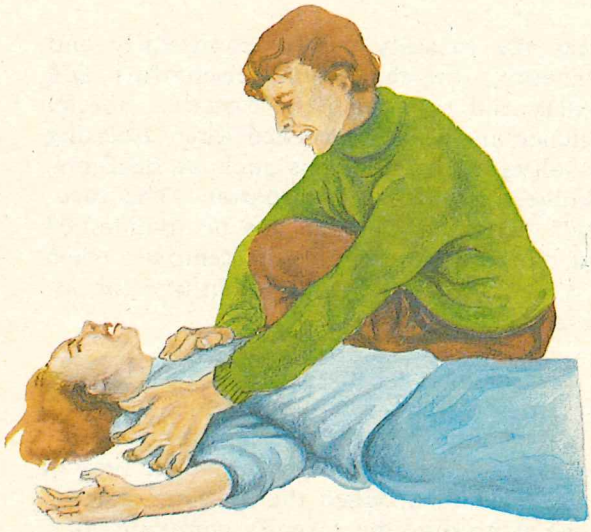
describes, for example pain, nausea, headache.

Signs

Signs are the evidence of injury or illness detected by the First Aider, for example tenderness, deformity, pallor.

Initial assessment of the casualty

The most important single observation you need to make is whether the casualty is conscious or unconscious. A casualty is conscious if he responds to the spoken word and obeys a shouted command (see Figure 1.1). Ask the casualty his name and give him a simple command:
'Can you hear me?'
'Open your eyes'
'What is your name?'
If he does not respond, gently shake him by grasping the shoulders.



1.1 Shake and shout

If the casualty is unconscious, then:

- check the **A**irway and clear it if blocked (see p. 42)
- check the casualty's **B**reathing and breathe for him if respiration is absent
- also, check the casualty's **C**irculation by feeling the neck for the carotid pulse. If the carotid pulse is absent, try to restore circulation, using cardiopulmonary resuscitation (CPR). These techniques are described in Chapter 3, 'The **ABC** of resuscitation'.
- check for and control serious external bleeding.

Detailed assessment

Having controlled the life-threatening problems, then make a detailed assessment of the casualty.

You need to obtain a history of the incident and note the symptoms and signs presented by the casualty.

Treat the casualty gently, confidently and efficiently, thereby easing discomfort and anxiety and reassuring the casualty. Special patience and skill are needed when assessing casualties with handicaps such as deafness, blindness or mental retardation. The casualty's privacy should always be maintained and clothing should only be removed when it is necessary to expose an injury for assessment and treatment.

Obtaining a detailed history

If an accident, ask the casualty or witnesses for a description. Then determine:

- the casualty's name, age and sex
- what the casualty was doing at the time of the incident or when the problem started
- the symptoms the casualty complains of
- the location of the problem, to identify the body system involved
- the duration of the problem

- whether there were any contributing factors, such as a dizzy spell before a fall
- whether there are factors that ease the problem or make it worse, such as posture or medication
- the casualty's past medical history in cases where the problem appears to be medical rather than the result of an accident.

Past medical history

You are only concerned with details of the casualty's past medical history that are relevant to the current problem.

The casualty may not be able to give this information but it can be sought from the family, from documents carried by the casualty or from a medical warning bracelet or pendant.

Try to determine whether the casualty:
- has had a similar episode previously
- is presently under treatment for:
  - diabetes
  - high blood pressure
  - any other medical condition
- has a close relative who suffers a similar condition
- attends a doctor or local hospital for regular treatment
- takes any medications
- has any known allergies.

Examination of the casualty

Once the initial assessment has been made, you should undertake an orderly examination of the casualty, noting any tenderness, swelling, wounds or deformity while examining each area in the following order:
- head
- chest (including shoulders)
- abdomen (including hip bone)
- upper limbs
- lower limbs
- back, except in potential spinal injuries in the conscious casualty.

Use all of your senses to obtain signs for assessment — look, listen, feel, smell.

Making a detailed examination

When making a detailed examination of the casualty, you will need to observe and assess the features discussed below.

Breathing

Normal breathing is quiet, easy and regular. The normal breathing rate at rest is:

- in adults, 16 to 18 per minute, but this increases considerably with exercise
- in children, 20 to 36 per minute
- in infants, 30 to 50 per minute.

Check to see if breathing is:

- laboured — this may be due to a blocked airway or asthma
- noisy — this may be due to head injuries
- irregular, weak and gasping — this indicates that breathing is failing
- shallow — this may result from chest injuries.

Pulse

The pulse is the pressure rise felt over the arteries, as a result of each heart beat.

The pulse rate is the rate of the heart beat. The normal pulse is regular and strong and the usual rate at rest is:

- in adults, 60 to 80 per minute
- in children, up to 100 per minute
- in infants, up to 140 per minute.

But, the rate in healthy humans can vary considerably. Athletes have much slower pulses, sometimes as low as 40 per minute. The rate can also be much faster during exercise and excitement, sometimes as high as 180 per minute.

In illness and after injury the pulse can change considerably. Check whether the pulse is:

- weak and rapid — this may indicate bleeding, shock

- bounding and slow — this may indicate brain injury
- irregular — this may indicate heart conditions.

Check the pulse early in the assessment and continue to monitor and record it. The pulse is usually checked at the neck, where it is called the *carotid pulse* or at the wrist, where it is called the *radial pulse.*

To take the carotid pulse

- lay your hand, palm downwards, across the front of the neck
- draw your outstretched fingers backwards across either side of the neck until the tips of your fingers rest in the groove behind the Adam's apple and in front of the strap muscle of the neck
- gently roll your fingers until you can feel the maximum beat
- your thumb must not press on the other side of the neck while feeling for the pulse.



1.2 Taking the carotid pulse

To take the radial pulse

- place at least two fingers along the inner border of the bone on the thumb side of the wrist (the radius) about 1 centimetre in from the thumb side of the lower end of the forearm
- gently roll the artery under your fingers until you can feel maximum beat
- in severely injured or ill casualties the radial pulse may be difficult or impossible to feel (see Chapter 6 — Shock).



1.3 Taking the radial pulse

Skin

Normal, 'white' Caucasian skin is pink, warm and dry but can become red and moist in a hot environment and after exercise. Pigmented skin undergoes the same changes, but these may be more difficult to see. The changes may be more obvious inside the mouth. Changes of the circulation may reduce the flow to the skin. Consequently, the blanching of the skin with pressure may take longer to disappear.

Check whether the skin is:

- cold and dry — these signs may indicate cold exposure
- blue — this may be due to lack of oxygen
- hot and moist — these signs may indicate fever
- hot and dry — heat stroke.

Note: Blueness of the skin of mucous membranes indicates lack of oxygen.

To assess, inspect an area at body temperature, such as the tongue or the inside of the lips. Lips and finger nail-beds will look blue when the environmental temperature is low or if the casualty is lacking oxygen (asphyxia).

Note: Some fluorescent lights and mercury vapour lamps will make a casualty look blue.

Eyes

Normally the eyes move together and the pupils are equal in size. Check whether:

- the casualty can see
- the eyes move
- the pupils are large or small
- the pupils are equal in size and regular in shape
- there is an injury.

Deformity

Deformity is caused by damage to soft tissue and/or bones

- compare with the opposite side, check and determine the cause.

Loss of function of a limb

Loss of function of a limb may be caused by:

- a stroke
- spinal injury
- damage to a nerve
- a limb fracture
- pain such as that caused by a fracture.

Ask the conscious casualty the following:

- 'Can you feel your toes and fingers?'
- 'Can you move your toes and fingers?'
- 'Do you have any pain in the neck or back?'

If the casualty is lying on the side, feel along the whole length of the spine for possible deformity, but do not move a conscious casualty suspected of having a spinal injury (see Chapters 13 and 30).

Wounds, marks, bruising and swelling

All wounds, marks and bruising must be assessed for size, shape, depth and amount of bleeding. Most swelling in soft tissue is due to bleeding into tissue spaces. This should be managed promptly with R.I.C.E. (see below).

At all times maintain verbal contact with the conscious casualty so that you can quickly recognise any change in the conscious state.

Remember the quality of immediate care is determined by:

- accurate observation together with:
- the history and physical examination
- immediate treatment of life-threatening conditions.

Management of the casualty

You must now decide on the management needed. After assessing the casualty, any bleeding must be controlled and the casualty reassured. All fractures must be immobilised and large wounds dressed before the casualty is moved. Handle the casualty gently and avoid unnecessary movement. Then treat other injuries, if time permits, before medical aid arrives. Further care of the casualty should be arranged, if necessary, and you should be prepared to help if needed.

Seeking medical aid

Immediately it is decided that medical aid is needed, then:

- send for medical aid, but do not leave the casualty
- state the **exact place, with directions how to get there**
- state the time of the incident
- state **number of casualties, with some indication of their seriousness**
- ask the likely time of arrival of aid.

Messages should be brief; you must confirm that they are understood.

Make use of bystanders to:
- telephone for ambulance/police
- assist in management of the casualty
- make a written note of your observations and the time you made them.

Further care of the casualty, including transport

You may need to initiate transfer of the casualty to shelter, home or medical aid. Skill in the use of simple techniques of transport should be practised. To prevent the casualty's condition from becoming worse, careful selection and use of the correct method of transport is necessary.

The basic principles of first aid must be continued during transport. These are as follows:
- the airway is clear at all times
- bleeding is controlled
- the casualty is safely maintained in the correct position
- the casualty is safely secured to the stretcher, where one is used
- regular checks of the casualty's condition are made
- supporting bandages and dressings remain effectively applied but do not restrict circulation
- the method of transport is as safe and comfortable as the casualty's condition permits
- the casualty is not left alone.

Remember, your responsibility ceases when medical aid arrives, but you should wait in case it is necessary to give further care or information.

Emergency rescue

Emergency rescue is a procedure for moving a casualty from a dangerous location to a

place of safety. Rescue of the casualty should be left to trained personnel if they are available, but you may have to move the casualty yourself in an emergency. Examples of such emergencies are:

- traffic accidents

or where there is:

- danger of fire or explosion
- danger of suffocation due to toxic gases or smoke
- risk of drowning
- exposure to cold or intense heat
- possibility of injury from collapsing walls
- possible electrical danger.

Warning

Take care not to become a casualty yourself.

Principles of management of injuries (R.I.C.E.)

The following are notes on some of the principles of management of injuries using rest and ice (R.I.C.E.) or heat and exercise.

Rest

Rest tends to reduce the flow of blood to a part. Resting the whole casualty allows the blood pressure and pulse rate to drop, and this also reduces the flow of blood around the body. This helps to reduce bleeding.

Ice

Ice or other forms of cold, causes the small blood vessels in the skin and other tissues to constrict. This reduces the blood flow through those tissues. If some of the blood vessels have been damaged by a blow, blood escapes into the tissues. This is a bruise (contusion). Cold helps to reduce this bleeding, and the narrowed blood vessels will block with blood and clot more quickly. This in turn means that less blood accumulates in the tissues, there is less fluid swelling, less pain, and recovery will be quicker.

Ice should never be put directly on the skin.

A good method of application is to put ice into a plastic bag with a little cold water, seal the bag tightly, and wrap it in a damp towel. The whole cold pack can then be applied to the injured area. It should not be left on for longer than 20 minutes at a time. It may be reapplied again after a further 20 minutes, '20 minutes on, 20 minutes off' for 4 hours, and thereafter every 4 hours.

Do not use anything that is very cold indeed, such as from a deep-freeze. It may be cold enough to freeze the tissues which would be harmful.

Commercially available cold packs can be used, but ice is cheaper, usually available and just as good.

Compression

Compression helps to narrow bleeding vessels and reduce swelling. It can be used as an addition to cold, or as an alternating form of management. Compression bandages should extend well beyond the injured area. Good elastic bandages are best. Old crepe bandages that have lost their stretch will not help very much.

Compression also helps to stop the spread of some injected poisons, such as snake venom. This also works by squeezing the small vessels of the limb so that they close sufficiently to delay the circulation, and hence stop the poison from reaching the rest of the body.

Elevation

Raising part of the body also helps to reduce the blood pressure and flow of blood in that part. It is difficult for a casualty to hold a limb elevated for long, as he will tire quickly. The casualty needs assistance, such as bandaging, a sling, or to be flat with the limb raised and supported.

All four methods of management above are used to reduce bleeding from a wound (internal or external). They may be of use for as long as 48 hours after an injury. After that time, damaged blood vessels will be blocked, and active bleeding stopped. From then on, it is useful to encourage the circulation in order to remove the fluid and remaining escaped blood from the tissues.

Heat

Heat causes blood vessels to dilate (widen) thus increasing the blood flow to the part. This is good management but only 48 hours or more after an injury. Before that time the use of heat might increase bleeding. Any form of heat can be used, and special apparatus is not needed. The heat should be gentle. (Inflicting a burn is bad management!) Domestic electric radiators, a hot-water bag, or simply hot bathing can be used, so long as they are used carefully.

Exercise

Exercise is used in the rehabilitation, or recovery, after injury. While not first aid, it is an important part of the later management of sports injuries. It is important that exercise after injury should be supervised by a competent trainer, sports medicine specialist, etc. because there is a real risk of re-injury. A programme of regular graduated exercise is needed.

The St John action plan — DRABC

In an emergency it is necessary to have an action plan, one that will work every time, regardless of the type of incident. The St John action plan is called DRABC. Each letter of the DRABC action plan stands for something the First Aider must do, and the order in which it will be done.

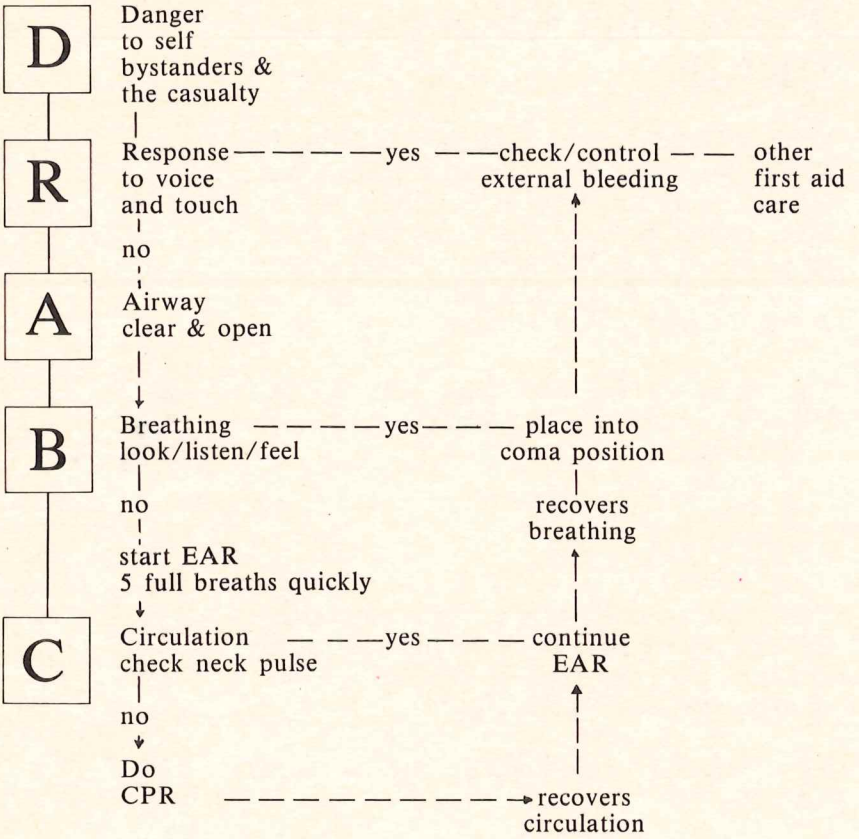


The chart on the next page sets out the DRABC action plan. It includes:

D Danger
R Response
A Airway
B Breathing
C Circulation.

The chart also shows the order of priority and the appropriate time for the control of bleeding and the care of the unconscious casualty (the coma position).

All first aid management begins with DRABC.



1.4 St John action plan

D—Danger

Check for danger to:
- yourself
- bystanders
- the casualty.

Act only if safe to do so:
- do not become the next casualty
- warn bystanders of any danger and ask them to keep a safe distance
- remove danger from the casualty, or if necessary the casualty from danger.

If unsafe, wait for expert assistance to arrive.

R—Response

Check for response:
- gently shake and loudly shout
- if the casualty responds, check and control serious external bleeding
- if no response, proceed with ABC.

A—Airway

Firstly:
- open the mouth
- clear if needed
- clear and open the airway (head tilt and jaw support).

B—Breathing

Look, listen and feel:
- is the lower chest or abdomen rising and falling
- can you hear breathing sounds
- can you feel breathing

Then:
- if the casualty is breathing but not responding place into the coma position
- if the casualty is not breathing, start expired air resuscitation (EAR); do five full breaths quickly within 10 seconds and proceed within the DRABC action plan.

C—Circulation

Check the carotid pulse:
- if present, continue EAR at about one breath every 5 seconds (12/minute)
- if absent, start CPR.

2

The structure and function of the human body

The First Aider needs to understand how the human body is built and works before effective first aid can be carried out.

By the end of this chapter you should be familiar with the major organs and systems in the human body and understand basically how they work. This information will help you to assess accurately and treat the injuries of a casualty from the *symptoms* (what the casualty tells you) and the *signs* (the things that you can see and feel).

In the past, it was considered important that the First Aider learn the correct anatomical name for each organ in the body. It is now thought that the time spent learning long and difficult names can be put to better use learning the correct management of each injury. With this in mind, the terminology in the manual has been simplified, and common names like 'collar-bone' are used in preference to 'clavicle', where possible.

General

The human body is made of millions of tiny living 'building blocks' called *cells.* Most of these cells are smaller than a grain of very fine sand.

Groups of cells that perform a special function, such as the lining of the mouth, are called *tissues.*

Many different types of tissues are grouped together to perform a special task and these are called *organs.*

Organs are usually part of a *system*; for example, the heart is part of the *circulatory system.* The human body is a living machine that converts food into energy. For this to happen, each cell has to be provided with food, oxygen, water and a waste disposal system. The various systems in the body provide these services.

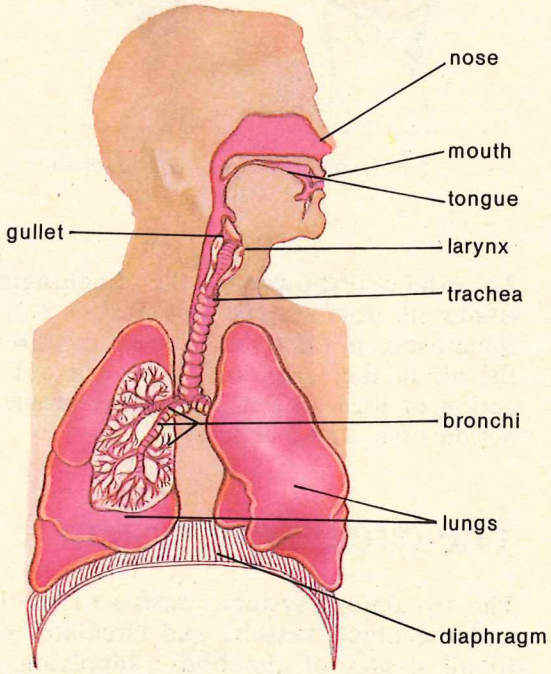
The respiratory system

The act of breathing in, removing oxygen from the air, and breathing out air containing carbon dioxide, is called *respiration.* Every time a breath is taken in, air is drawn through the mouth or nose and down the windpipe

into the lungs. The windpipe branches into two main tubes before it enters the lungs, then divides again into many smaller tubes that branch out through the lung tissue. At the end of each tube is a tiny air sac, which is surrounded by blood vessels. The blood in these vessels takes up *oxygen*, a gas contained in the air, and gives up a gas called *carbon dioxide*. In breathing out, the air passes back through the same passages.

The major components in the respiratory system (see Figure 2.1) include the:

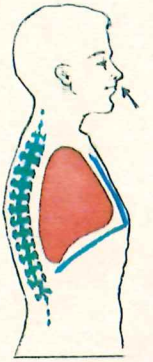
- mouth and nose
- voice box or *larynx*
- windpipe or *trachea*
- *bronchi* (tubes that divide from the windpipe)
- lungs.



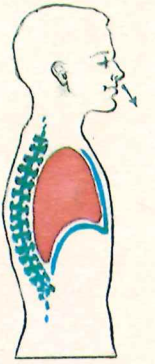
2.1 The respiratory system

Mechanics of breathing

The act of breathing in (i.e. inspiration) is produced when the chest wall expands and a large dome-shaped muscle, called the *diaphragm*, under the lungs, flattens out (see Figure 2.2). Air is sucked into the lungs because the air pressure inside the lungs becomes lower than air pressure outside the body.



2.2 Inspiration



2.3 Expiration

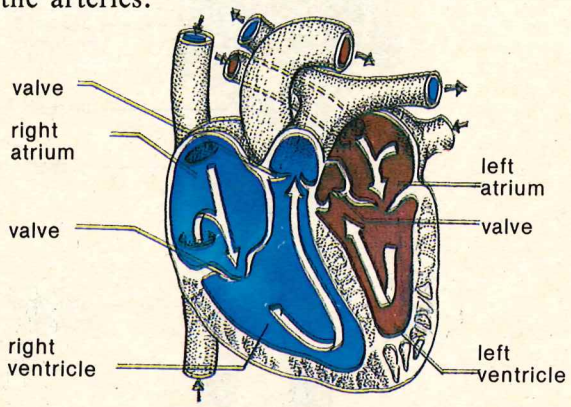
To exhale (expiration), the diaphragm resumes its dome shape (see Figure 2.3) and the muscles in the rib cage relax, compressing the air in the lungs and forcing it out. The action of breathing in and out resembles the action of a set of bellows.

The circulatory system

The circulatory system consists of the heart and the blood vessels, and circulates blood to all tissues of the body, supplying food and oxygen and removing waste products.

The heart

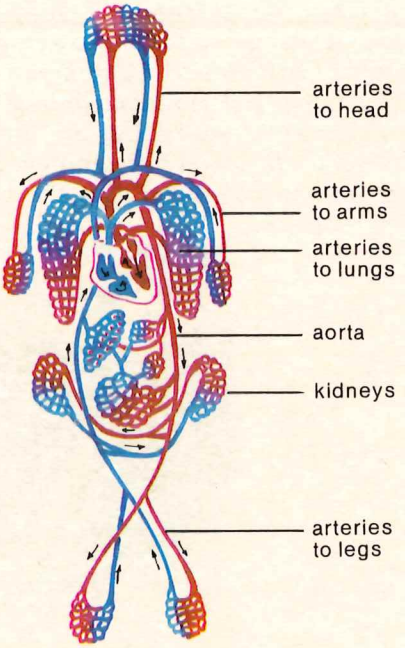
The heart is a muscular pump, located in the centre of the chest. It is approximately the size and shape of a clenched fist. The heart is divided into four separate chambers. The upper chamber on the right (right atrium) receives blood from the body via the veins and transfers it to the lower right chamber (right ventricle) to be pumped to the lungs. The upper left chamber (left atrium) receives oxygenated blood from the lungs and transfers it to the lower left chamber (left ventricle) to be pumped back into the circulation via the arteries.



2.4 The heart (showing four chambers and the direction of blood circulation)

The heart pumps by contracting and squeezing blood out through the blood vessels. It then relaxes and fills with more blood. Non-return valves prevent the blood from flowing in the wrong direction. The pumping action of the heart is felt as a *pulse* in various locations. The heart or pulse rate is controlled by chemical changes in the blood and by nervous reactions. Remember that **veins carry blood toward the heart, arteries away from the heart.**

As blood circulates through the body, it collects oxygen from the lungs, carbon dioxide from the cells, food from the intestines, and is cleaned and filtered. There are over 100 000 kilometres of blood vessels in the body.



2.5 Schematic diagram of the circulation of blood to various parts of the body

Blood

Apart from its transport function, the blood contains many substances that fight infection and immunise the body against disease.

The main components of blood are:

- red cells — these carry oxygen and carbon dioxide

- white cells — these combat infection; the number of white blood cells increases whenever the body is under attack from infection
- plasma — the fluid component of blood
- platelets — these help the clotting process which assists in the control of bleeding.

The nervous system

The nervous system controls every conscious and unconscious action of the body. It may be compared to a sophisticated computer that is able to program itself. There are three major organs in the system: the brain, the spinal cord and the nerves.

The brain receives messages through incoming or *sensory* nerves and the special nerves connected with sight, hearing and smell, as well as touch, pain, temperature and balance.

The brain then decides on a course of action and sends commands to various parts of the body through outgoing or *motor* nerves.

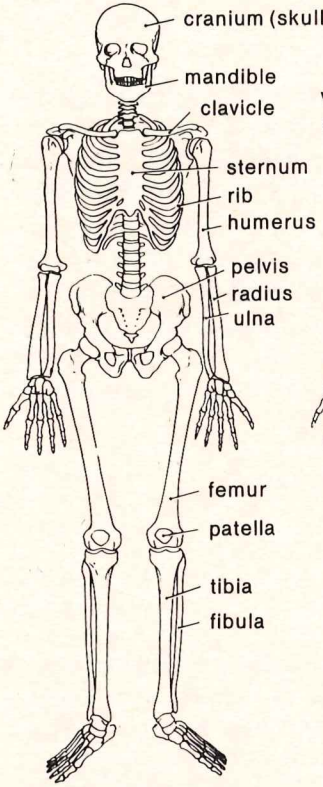
Some body functions continue without conscious effort on our part. The *autonomic nervous system* controls these through the *involuntary muscles* of:

- breathing
- the heart and blood vessels
- the bowel
- the glands
- the bronchi
- other organs.

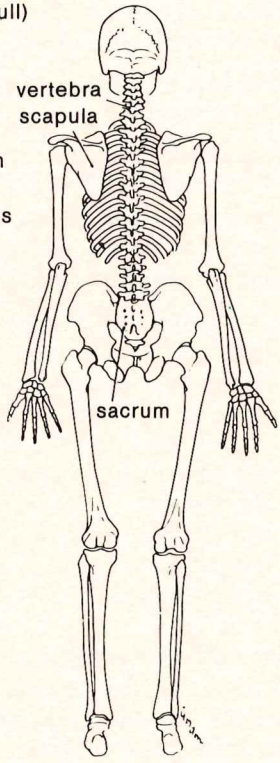
The spinal cord is composed of tissue similar to that in the brain; it leaves the under surface of the brain through an opening in the base of the skull. It contains the many nerve tracts along which travel the signals that make contact with muscles, the skin and other organs.

Whenever the passage of information is interrupted, for example if the spine is broken or the nerves are damaged or cut, there is no access for messages to or from that part of the body to the brain. If this damage is in the neck region, the casualty may be paralysed from the injury site down. Lower down the back, the paralysis could include less of the body.

The skeletal system



2.6 The skeleton: from the front

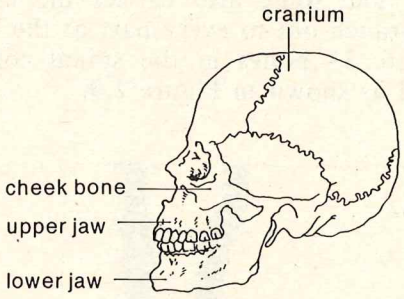


2.7 The skeleton: from the back

The skeletal system forms a strong framework for the body. There are 206 bones in the adult skeleton. Bones combine remarkable strength with lightness and have the added benefit of being able to repair themselves. Inside bones is *bone marrow*, which makes blood cells.

The skeleton has the following functions; to:
- give shape to the body
- allow movement (muscles pull against bones)
- protect vital organs (ribs and skull)
- make blood cells (bone marrow).

For ease of learning, the skeleton can be divided into three sections. These are: the skull, the trunk and the limbs.



2.8 The skull

The skull

The skull consists of:
- the *cranium*, and
- the bones of the face.

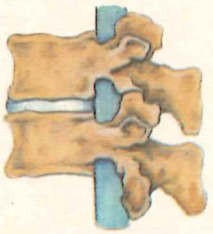
The cranium is made up of a number of bones that have fused together to hold and protect the brain. There are several openings in the skull for blood vessels and nerves to enter and emerge. A large opening at the base of the skull permits the spinal cord to connect with the brain.

The bones of the face are the upper and lower jaw and two cheek-bones. These bones support the muscles that are used in chewing, swallowing and speaking.

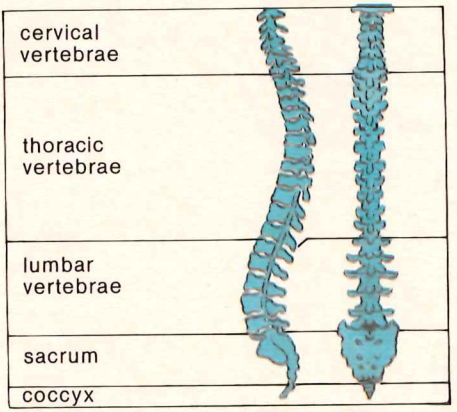
The trunk

The spine

The spine is a strong, flexible pillar, which supports a number of structures of the body. Very strong muscles allow heavy weights to be carried, and a series of flexible discs, between the backbones, absorb sudden shocks. The spine also carries the nerves, which branch out to every part of the body. There are 33 bones in the spinal column, grouped as shown in Figure 2.9.



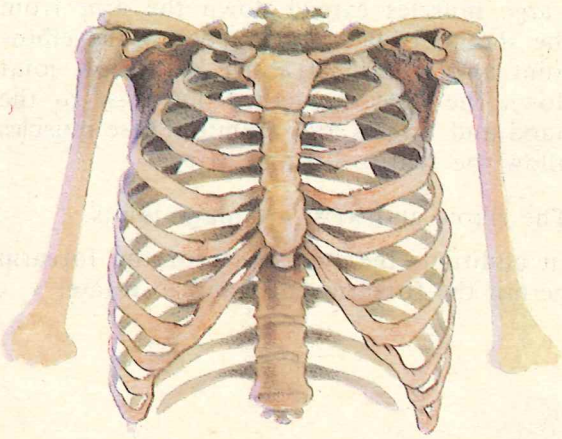
spinal cord, vertebrae and disc



2.9 The spine

The chest

The chest is formed by the backbone, in the rear, and 12 pairs of ribs curving round to the centre of the chest. Ten pairs of ribs meet in the centre of the chest and attach to the breastbone. The other two pairs of ribs, which do not join the breastbone, are called *floating ribs.*



2.10 The chest, shoulders and arms, collar-bone and breastbone

The function of the rib cage is to provide protection to the heart and lungs inside the chest cavity and to help in the process of breathing.

The abdominal and pelvic cavities

These cavities are enclosed by the lower spine behind, the diaphragm above and abdominal muscles and the *pelvis* on the sides and front.

They contain the major digestive organs, the *spleen*, the reproductive organs in the female, and the urinary system.

The limbs

The skeletal framework of the limbs has several parts.

The shoulders and upper arms

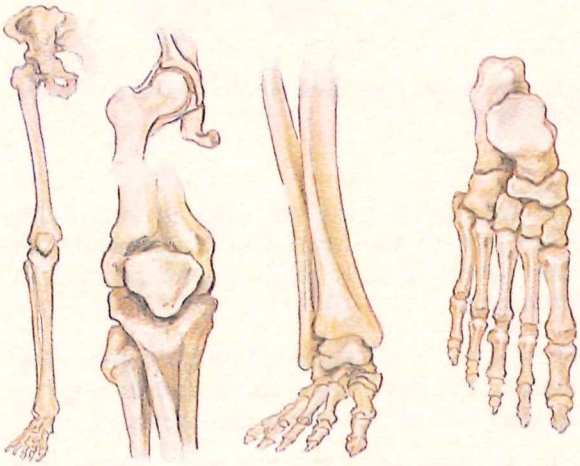
The shoulder-blade has a socket into which the upper arm is fitted (see Figure 2.10). This ball-socket arrangement allows for maximum mobility. The collar-bone supports the whole joint.

Large muscles extend down the arm from the shoulder-blade to just below the elbow joint and from just above the elbow joint down the forearm across the wrist to the hand and fingers and thumb. These muscles allow the arm to lift and carry.

The elbows, wrists, hands and fingers

The elbow and wrist are hinge joints.

In addition, the two bones of the forearm permit the forearm and hand to rotate.



2.11 The whole leg, hip joint, knee, lower leg and ankle and foot and toes

The hand is composed of a series of small bones, which have only a small amount of movement between them and serve to widen the area of grip and area of attachment of the fingers.

The fingers have a series of joints, which allow the fingers to curl and secure the grip. The thumb can also roll round to oppose the fingers, to encircle the object grasped.

The hip and thighs

The pelvis is a series of large flat bones fused together, with sockets on either side for the ball of the thigh-bone. The hip joint is a ball–socket joint similar to the shoulder but there is less movement due to the heavy muscles in the thigh (see Figure 2.11).

Very large muscles extend from the pelvis to the thigh, the thigh to the lower leg and the lower leg to the ankle. These are seen as large fleshy areas on the back and front of the thighs and in the calves. These muscles allow the body to stand upright, walk and run.

The lower leg, knees, ankles, feet and toes

The lower leg consists of two bones to give attachment to large strong muscles that move the knee and ankle joints. These are hinge joints, which are strong enough to support the body and any load that it carries (see Figure 2.11).

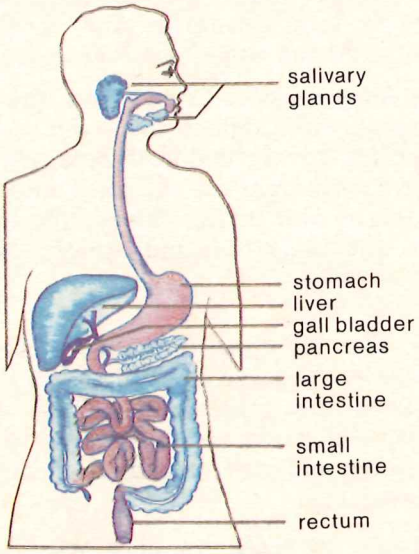
The foot is made up of a series of small bones firmly bound together for stability and set at right angles to the ankle to give a long, broad weight-bearing surface.

The toes have a number of small joints, which allow them to curl and give added grip.

The digestive system

The digestive system is concerned with the taking in of food and converting it into a form that the cells can use. After use, the waste that is left over is compacted and passed out of the body.

Major organs include the:
- mouth and gullet
- stomach
- liver and digestive glands
- intestines.



2.12 The digestive system

Digestion

Food enters the digestive system through the mouth, where it is broken into small pieces for swallowing. Chewing also mixes the food

with *saliva*, which contains chemicals that begin to dissolve it. The food then travels down the gullet into the stomach, where it is mixed with a strong *acid.*

The acid turns the food into a semi-liquid form. As food is expelled from the stomach it is mixed with other digestive juices from the *gall bladder* and *pancreas.* These juices help to break down the complex structure of the food into more simple forms that the body can use.

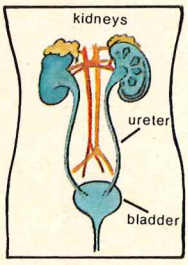
As the food travels through the intestines the useful components are extracted. Some of these are used immediately, others that are of future use are stored as body *fat, protein* and *carbohydrate.*

The urinary system

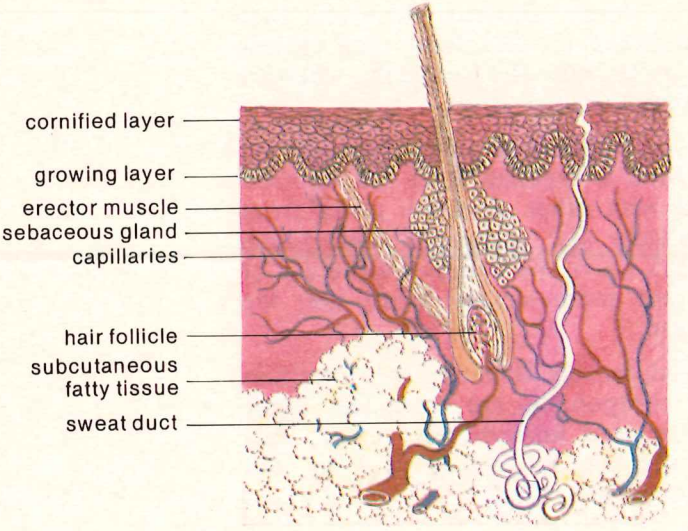
The urinary system filters the blood and removes from the body excess fluid and poisonous wastes collected by the blood. The major organs in this system are the *kidneys* and *bladder.*

There are two kidneys in the body. They lie deep inside the upper part of the abdominal cavity, on either side of the spine. Each kidney is bean shaped, and measures about 10 centimetres in length and 5 centimetres in width.

Blood enters the kidneys and filters through the tissues inside them, where the waste products are extracted. These pass down a tube called the *ureter* and collect in the bladder until there is a sufficient quantity for elimination. These wastes are collectively called *urine.*



2.13
The urinary system



2.14 The skin

The skin

The skin is a waterproof cover designed to protect the cells of the body from damage, drying out, infection and from temperature changes. It is liberally supplied with special nerve endings that transmit sensations of touch, temperature and pain. *Sweat* glands open on to its surface, and *sebaceous* glands provide a protective oily substance for the skin.

2

General management of the casualty with a life-threatening condition

3

The ABC of resuscitation

This chapter is about saving life.

It is about resuscitation, the skill that enables the First Aider to maintain the casualty's **A**irway, **B**reathing and **C**irculation.

After studying this chapter you should understand the importance of:

- the airway
- breathing
- circulation
- cardio-pulmonary resuscitation.

Priorities in an emergency



In an emergency, regardless of the cause, you must first follow the DRABC Action Plan (see Chapter 1):

Danger

- look for danger to yourself, the casualty and bystanders
- take action to ensure safety, or await trained rescuers
- only move casualty if in danger.

Response

- quickly assess the state of consciousness of the casualty
- shake firmly but gently and shout.

Airway

- clear and open the airway (see p. 44).

Breathing

- check for breathing.

Circulation

- check the neck pulse.

If the casualty has stopped breathing, after clearing the airway you must breathe for him. If the casualty's heart has stopped beating, you must provide artificial circulation. The techniques of resuscitation enable you to do this.

Problems with airway breathing and circulation are all separate problems dealt with individually. However, they must also be considered collectively as part of a total package. Any casualty may need management of only one or maybe all three of these areas.

---

1 Introduction to resuscitation

After studying Section 1 you should be able to:

- state the objective of resuscitation
- state the reasons for immediate action
- define effective resuscitation
- define successful resuscitation
- describe the order of priorities of action in an emergency.

The objective of resuscitation techniques

Resuscitation techniques aim to preserve life and to maintain an adequate supply of oxygen to the brain, thus preventing irreversible brain damage.

Immediate action

Resuscitation must be started immediately. Death or serious brain damage may result after 3 minutes without breathing and circulation.

Effective resuscitation maintains an adequate supply of oxygen to the brain.

Successful resuscitation restores breathing and circulation (pulse). Consciousness may also return.

It must be understood that effective resuscitation may sometimes not be successful; such as when:

- the illness or injury is too great to allow recovery
- brain death has occurred before effective resuscitation was started.

If the casualty is not breathing, but still has a pulse, then attempts to restore breathing will be necessary. But if circulation has also ceased, then attempts to restore both breathing and circulation must be carried out.

2 Airway

After studying Section 2 you should be able to:

- describe the structure of the airway
- clear, open and maintain a clear and open airway
- state the common causes of a blocked airway
- describe the course of action if the airway is blocked
- describe the procedure if the casualty is unconscious and trapped
- state the problems of regurgitation and vomiting and perform the actions necessary to prevent airway blockage.

Learn these words before studying this section:

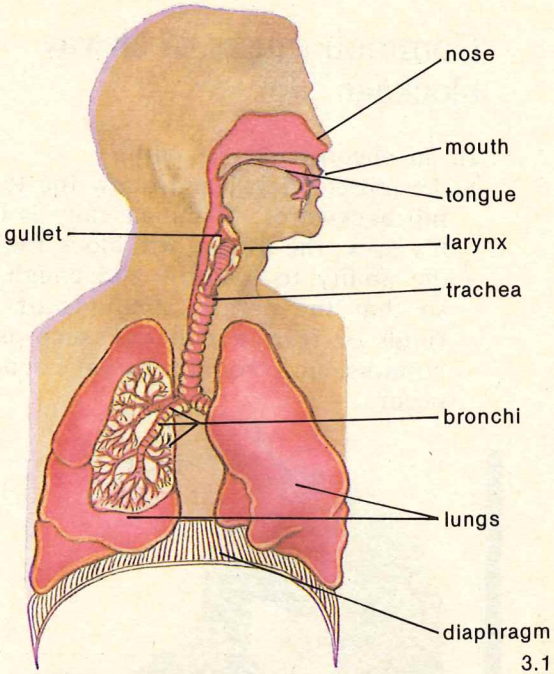
Mucus	sticky fluid from some parts of the body, for example the nose, the bronchi
Regurgitation	backward flowing of stomach contents into the throat and mouth area
Saliva	secretions in the mouth
Vomiting	the forceful ejection of stomach contents (vomitus).

Structure of the airway

The entry of air to the lungs is through the airway. It includes the:

- mouth, nose and throat
- voice box (larynx)
- windpipe (trachea)
- bronchi.

The airway is the passage through which air is drawn into and breathed out of the lungs.



3.1 Structure of the airway

In the lungs, oxygen is then transferred from the air to the blood for distribution throughout the body, and in a reverse process carbon dioxide is transferred from the blood to the air and breathed out.

If the airway is blocked, air will not reach the lungs. The supply of oxygen to the blood will be cut off. The brain cells will begin to die. After 3 minutes without oxygen irreversible brain damage will begin and very soon death will result.

However, if the circulation is still present, even though breathing has stopped, the casualty will survive for a longer period, until all available oxygen in the lungs has been used.

Many unconscious casualties have died from blockage of the airway alone. They could have been saved by simple first aid measures.

Common causes of airway blockage

In an unconscious casualty:

- the muscles relax and allow the tongue to fall backwards. If the casualty is lying on his back, the tongue will block the airway
- the ability to swallow and cough is lost, so that the natural methods of clearing fluids or foreign material (such as blood, vomitus, etc.) from the throat can no longer occur.

Immediate management



3.2 Positioning the casualty so that fluid can flow away

To clear the upper airway

- quickly turn the casualty on to the side (Figure 3.2)
- tilt the head backwards with head turned slightly downward (this allows the tongue to fall forward, and fluid to drain from the mouth)
- open the mouth
- check the mouth for foreign objects or matter
- if these are present, clear these, using the fingers if necessary (Figure 3.3)
- remove dentures only if they are loose or broken



3.3 Clearing the airway (adults)

For small children

Turn the child on the side and clean the mouth of foreign material. If this fails to clear the blockage, place the child with the head down and give several firm blows between the shoulder-blades (Figure 3.4).



3.4 Clearing the airway (small children)

For infants

Hold the infant upside down. Clear the airway if necessary with your little finger (Figure 3.5).



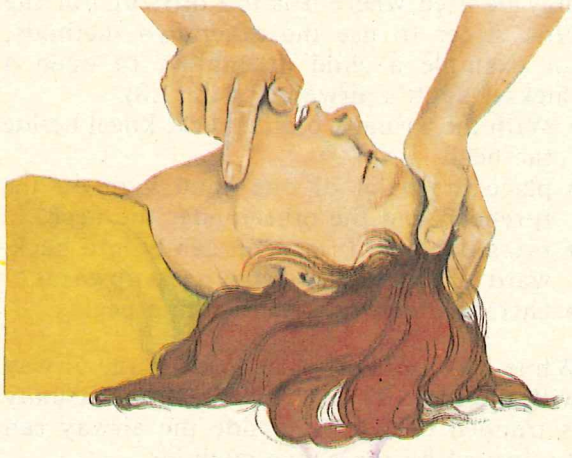
3.5 Clearing the airway (infants)

To open the airway

Head tilt/ jaw support (pistol grip)

To open the airway, proceed as follows:

- with the casualty lying on the back, kneel beside the head of the casualty
- place the palm of one hand high on the forehead, support the chin with the other hand and firmly but gently tilt the head backwards. The chin is supported with the thumb along the front of the lower jaw just above the point of the chin. The index finger lies along the jaw and with the other three fingers curled into the palm, press up on the bony part of the jaw with the knuckle of the middle finger under the point of the chin. Keep the other two fingers curled under and well clear of the soft tissues of the jaw and throat (see Figure 3.6)
- lift the jaw forward and support whilst opening the casualty's mouth slightly.



3.6 Opening the airway

Where difficulty is experienced in gripping the casualty's chin or in opening the airway using the above method, the *jaw thrust* method should be tried.

Head tilt/ jaw thrust

- with the casualty on the back, kneel beside the head
- place one hand on the forehead and press the head into a backward tilt and, at the same time
- place your other hand under the angle of the lower jaw and lift the jaw upwards and forwards
- if the airway is still obstructed use both hands, one behind each angle of the jaw (Figure 3.7).

Maximum jaw thrust may minimise the amount of head tilt needed when neck injury is suspected.

Head tilt/ neck lift

A further method of opening the airway is the *neck lift*. This is less effective and should

only be used where it is too difficult for the First Aider to use the other two methods, for example a child attempting to open a thickset adult's airway (Figure 3.8).

- With the casualty on the back, kneel beside the head
- place the palm of one hand high on the forehead and the other under the neck
- press the head firmly but gently into backward tilt while lifting the neck upwards
- check to see whether breathing begins.

While it is more efficient to open the airway with the casualty on the back, if the casualty is trapped or is on the side the airway can be opened by the above methods.



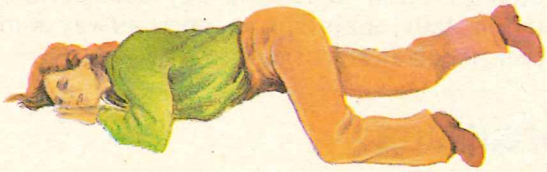
3.7 Jaw thrust



3.8 Neck lift

To maintain the airway

If the casualty is unconscious, the airway must be constantly kept clear and open.
If the casualty is not breathing, expired air resuscitation (EAR) (see p. 52) must be started.

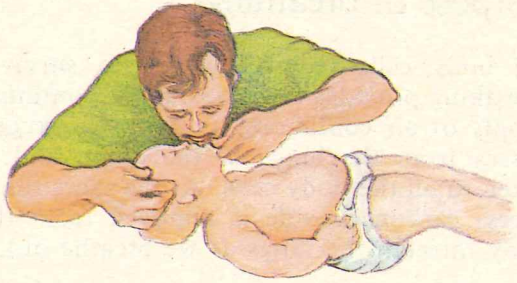


3.9 Casualty in the coma position

If the casualty is breathing, place in the coma position (Figure 3.9).

For infants

In infants it can be very difficult to maintain a clear airway. The head should be kept horizontal without head tilt. The lower jaw should be supported without pressure on the soft tissues of the neck (Figure 3.10).



3.10 Opening the airway (infants)

A partially blocked airway

The airway of the unconscious casualty could be partially blocked.
The casualty may:

- breathe heavily and noisily, like snoring
- wheeze
- choke
- cough
- become blue, about the face, lips, fingers, nails etc.

Management

- attempt again to remove any obstruction; if this fails, maintain an open airway and seek medical aid urgently.

3 Breathing

After studying Section 3 you should be able to:

- state how and why we breathe
- state the causes of absent or ineffective breathing
- state how breathing is assessed
- be able to breathe for the casualty.

Learn this term before studying this section:
EAR expired air resuscitation.

Purpose of breathing

All body cells require oxygen to survive. Breathing provides the lungs with a continual supply of air containing oxygen; the oxygen passes from the lungs to the blood and is taken to all the body cells. At the same time, excess carbon dioxide is removed from the body through the lungs as we breathe out.

Common causes of absent or inadequate breathing

Absent or inadequate breathing may be caused by:

- interruption of the brain's ability to control breathing, e.g.
  - head injury (see p. 168)
  - stroke (see p. 267)
  - chemical inhalation (see p. 282)
  - drug overdose
  - electric shock

- interference with the mechanism of breathing as in,
  - chest injuries (see p. 202)
  - asthma (see p. 253)
- blockage of the air passages by
  - the tongue or foreign material (see p. 250)
  - immersion in water or near drowning (see p. 246)
  - suffocation
  - smoke inhalation.

To assess the presence or absence of breathing

To check for breathing, watch for the rise and fall of the lower chest and upper abdomen of the casualty and listen and feel for the escape of air from the casualty's mouth and nose. These must be checked for at least 10 seconds. Occasionally it may be necessary to place a hand on the lower chest/abdomen to feel for movement if conditions are dark, noisy or windy, however, it is preferable to maintain the jaw support already established (see Figure 3.11). If no air movement is heard or felt, or no movement of the chest and abdomen is seen, then the casualty is not breathing.



3.11 Assessing breathing

During quiet respirations in unconscious patients most of the breath is taken in by the downward movement of the diaphragm which produces a corresponding outward movement of the abdomen. Movement of the chest is generally only seen easily in deep breathing. Attention only to chest movements may lead to incorrect assessment.

Principles of breathing for the casualty

If the casualty is not breathing you must breathe for him. This is called expired air resuscitation (EAR). With the airway clear and open, you breathe into the casualty's mouth or nose, or both. With small babies and young children your mouth covers the casualty's nose and mouth.

The air you breathe out contains sufficient oxygen for the needs of the casualty as about only one-fifth of the oxygen in the air you breathe in is used by the body.

---

4 Performing EAR

After completing this section and having received practical instruction on an **approved training manikin,** you should be able to:

- perform EAR for the adult, child and infant casualty.

Methods of EAR

There are three methods:
- mouth to mouth EAR
- mouth to nose EAR
- both.

All are equally effective but the mouth to mouth method is more commonly used. If blockage of the nose prevents adequate inflation, mouth to mouth must be used.

Performing mouth to mouth resuscitation

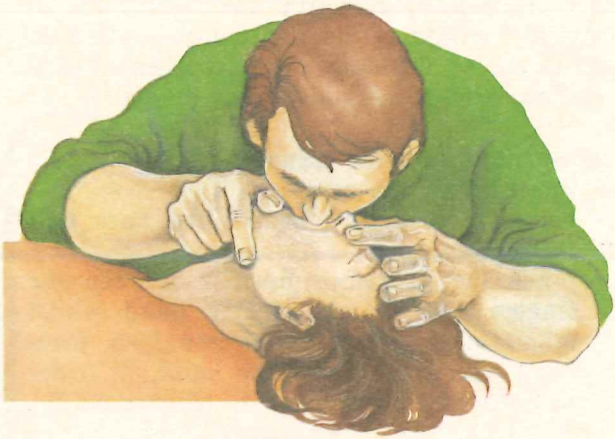
If possible, turn the casualty onto the back:

- kneel beside the casualty
- keep the casualty's head tilted back and the airway open
- pinch the casualty's nostrils between the fingers and thumb of one hand whilst maintaining pressure on casualty's forehead with the side of the hand, in order to keep maximum head tilt (Figure 3.12)



3.12 EAR: pinching the nostrils

- with your other hand lift the jaw forward
- take a deep breath and open your mouth wide
- place your mouth firmly over the casualty's slightly open mouth, making an airtight seal (Figure 3.13)
- breathe into the casualty's mouth to inflate the lungs until the casualty's lower chest is seen to commence to rise



3.13 EAR: mouth-to-mouth resuscitation

- remove your mouth and turn your head so that one ear is close to the casualty's mouth
- observe the chest fall and listen or feel for exhaling air (Figure 3.14)
- give a total of five quick full breaths within 10 seconds. It is not necessary to wait for the chest to fall completely between breaths
- check that the carotid pulse is present
- if present, then continue at the rate of 12 breaths per minute (1 every 5 seconds)
- check for the carotid pulse after 1 minute, then at least every 2 minutes



3.14 EAR: checking for chest movement

- if the carotid pulse is absent, start CPR (see p. 62)
- if breathing starts, cease EAR and quickly place the casualty in the coma position as vomiting often occurs at this stage
- continue to monitor the casualty to make sure breathing continues. Breathing may be irregular or very slow, and may need to be assisted with EAR until a normal respiratory rate is established.

Alternative method of sealing the airway

The airway may be sealed by the following alternative method:
- place the palm of one hand on top of the head and tilt the head backwards
- hold the chin forward with your other hand
- take a deep breath and open your mouth wide
- place your mouth over the casualty's mouth
- seal the casualty's nose with your cheek.

If the chest does not rise during ventilation ensure:
- maximum head tilt and jaw support
- no foreign material in the airway
- adequate volume of air used
- no signs of air leak.

If the chest still does not rise it may be necessary to change to the jaw thrust method or there may be foreign material deep in the back of the throat. The management of such an obstructed airway is the same as for choking (see Chapter 17, p. 251).

Signs of air leak

An air leak is indicated by:
- escaping air around the mouth or nose
- failure of the chest to rise.

To correct for air leak

- ensure that your mouth covers the casualty's mouth, forming an airtight seal, and that the casualty's nose is obstructed.

Warning

Constantly check to see that the casualty's stomach is not distended with air. If the stomach is distended check the airway for obstruction. If it is obstructed, air can pass down the gullet to the stomach.

Do not apply pressure to the stomach. This may lead to regurgitation of stomach contents into the mouth and subsequently to inhalation into the lungs, or blockage of the airway.

Mouth to nose resuscitation

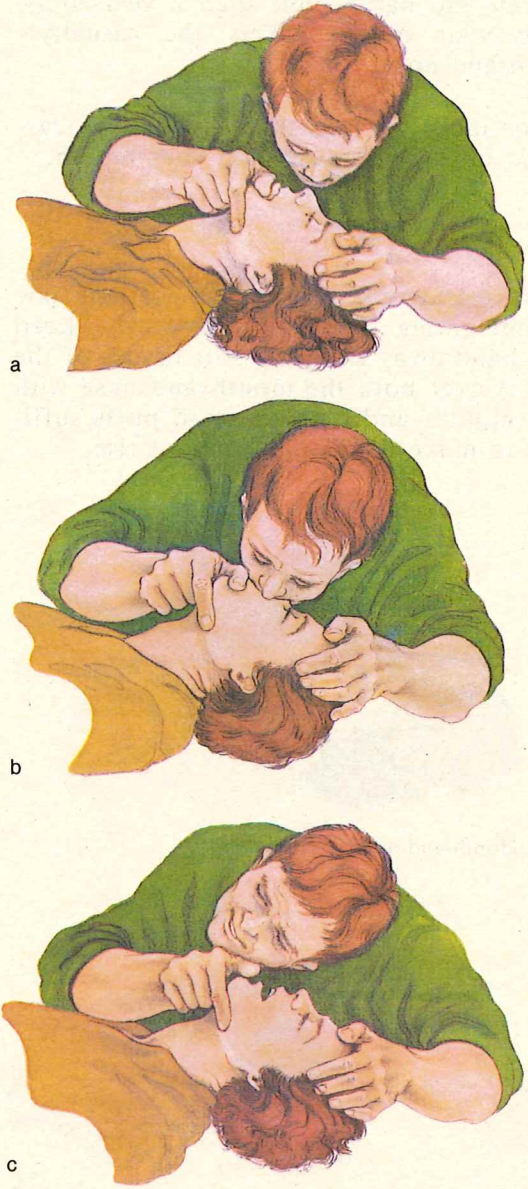
This method is used when:
- it is your choice
- the jaws are tightly clenched
- resuscitating in deep water
- there is gross injury to the jaw
- there is obstruction to the mouth
- a corrosive poison or cyanide has been swallowed and some is still on the skin and lips (see Chapter 20).

Performing mouth to nose resuscitation

This is the same as for the mouth to mouth method except that you:
- close the casualty's mouth and place your thumb on the lower lip to keep the mouth closed (Figure 3.15a)
- support the jaw to lift the tongue and open the airway
- seal your mouth around the casualty's nose without compressing the soft part (Figure 3.15b)
- remove your mouth after breathing in and use your thumb to open the casualty's lower lip to allow the casualty to exhale (Figure 3.15c).

Both mouth and nose resuscitation

This method is used when resuscitating small



3.15a-c Mouth-to-nose resuscitation

children and babies (less than 2 years old), where your mouth covers the casualty's mouth and nose.

Performing mouth and nose resuscitation

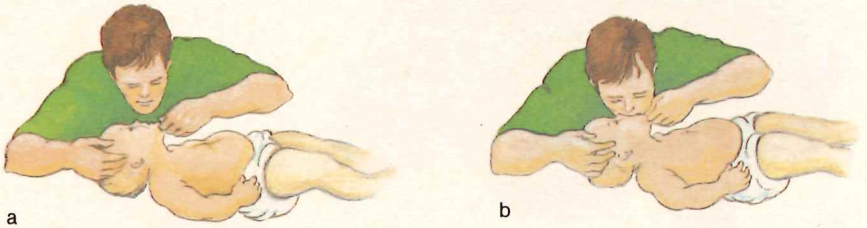
As for mouth to mouth but cover the casualty's mouth **and nose** with your mouth.

EAR in small children and babies

After clearing the airway, support the jaw without tilting the head backwards. Keep your hand away from the soft tissues of the neck. Cover both the mouth and nose with your mouth, and blow in small puffs sufficient to make the casualty's chest rise.



3.16 Mouth-and-nose resuscitation



a b

3.17a-b Breathing for an infant

Overblowing will distend the stomach. Wait until the child exhales and repeat 20 times a minute (once every 3 seconds).

Warning

Circulation 5

After studying Section 5 you should be able to:

- state the purpose of circulation
- list common causes of absent circulation
- state how the presence or absence of circulation is assessed
- state the principles of maintaining circulation.

Learn these words before studying this section:

Cardiac arrest	sudden stoppage of effective heart action
CPR	cardio-pulmonary resuscitation
ECC	external cardiac compression.

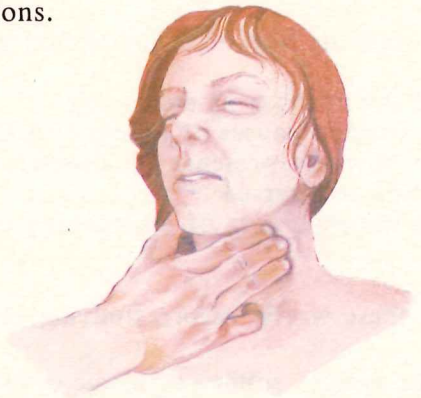
Purpose of circulation

Circulation is the term used to describe the pumping of blood through the blood vessels around the body, by the heart. Blood transports oxygen and food to the cells of body tissues to keep them alive. It also transports wastes from the tissues to the kidneys and carbon dioxide to the lungs for disposal.

Common causes of absent circulation

Circulation ceases if the heart stops pumping. Causes may include:

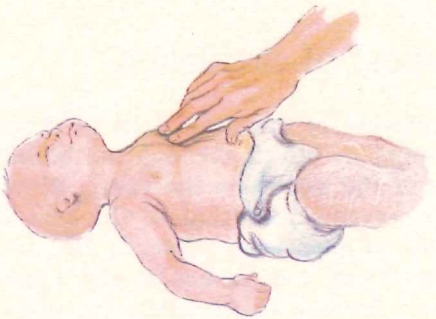
- heart disease or damage
- lack of oxygen, for example through not breathing, drowning, or breathing toxic gases
- electric shock
- poisons.



3.18 Feeling for the carotid pulse

To assess the presence or absence of circulation

Check for circulation by feeling for the carotid pulse for at least 5 seconds while maintaining maximum head tilt. If the carotid pulse is absent the casualty has no circulation.



3.19 Feeling for the heart beat in a baby

In small babies the heart beat can be felt by placing your fingertips over the baby's left nipple. The carotid pulse is often difficult to feel in infants.

Principles of maintaining circulation

When the heart stops, circulation of the blood ceases. The casualty will be unconscious and breathing will be absent. By rhythmically compressing the heart between the breastbone and the spine an artificial circulation can be provided. This is called external cardiac compression (ECC). Correctly performed, an adequate supply of blood can be circulated to prevent brain damage and to sustain life. However, ECC must be combined with EAR. The combination of EAR and ECC is called cardiopulmonary circulation.

EAR + ECC = CPR

To achieve effective CPR, there must be compression of the heart combined with breathing into the casualty's lungs through his mouth or nose. These techniques are described in Section 6 of this chapter.

Warning

Brain damage may start after 3 minutes but there are known cases where circulation and breathing have stopped for longer periods without brain damage (usually in younger people). Therefore all casualties with absent circulation must be given CPR.

Do not wait — start immediately — always try!
In order to preserve body function this is absolutely essential. CPR must only be stopped:

When to cease CPR

- if the casualty recovers circulation
- at a doctor's direction
- when expert resuscitation help takes over
- or if you are incapable of continuing.

Call for help at the first available opportunity.

Arranging further care

Resuscitation given by the First Aider should be accompanied, within the shortest possible time, by special intensive medical care to restore the function of the heart. This means you must summon medical aid at the first available opportunity. Do not leave the casualty. Try shouting for help! If possible send somebody to telephone for an ambulance using 000 or the local emergency number.

CPR is best performed by two operators, but one First Aider acting alone can successfully perform CPR.

---

6 Performing CPR

In Sections 2 to 5, you have studied **A**irway, **B**reathing and **C**irculation separately. Now, in Section 6, they are put together and studied under the heading of cardio-pulmonary resuscitation (CPR). If the casualty has stopped breathing and has no pulse, you must carry out CPR.

After completing Section 6 and having received practical instruction on an **approved manikin**, you should be able to:

- perform one and two operator CPR for the adult, child and infant casualty.



General management procedure

As described earlier, general management procedure involves DRABC.

Danger

- look for danger to yourself, the casualty and bystanders
- take action to ensure safety or await trained rescuers.

Response

- quickly assess the state of consciousness of the casualty
- shake the casualty firmly but gently and shout.



3.20 Shake and shout

Airway

If the casualty is unconscious:

- check if the airway is clear — if not, clear it (see p. 44)

Breathing

If the casualty is breathing:

- maintain an open airway (see p. 46) and place the casualty in the coma position.

If the casualty is not breathing:

- perform EAR (see p. 52).

Circulation

Has the casualty a pulse? (see p. 9) — if yes, continue EAR, if not, carry out ECC as well as EAR (EAR + ECC = CPR).

ECC

If unconscious — no breathing, no carotid pulse:

- start CPR.

Performing ECC

If possible, have the casualty lying on a firm surface:

- kneel alongside the casualty's body with one knee level with the casualty's chest, and the other level with the casualty's head, so that vertical pressure can be applied with your hands and arms.

Positioning the hands

The hand position is important, as too low compression over the abdomen may rupture internal organs, or produce severe regurgitation of stomach contents. If off-centre, the ribs may be damaged, if too high, compressions will be ineffective.

- Locate the lower end of the breastbone, by running your fingers along the lowest rib on each side from the outside inwards; where the fingers meet in the midline marks the lower end of the breastbone — leave one index finger here
- the heel of the other hand should be positioned just above this finger along the midline of the breastbone.

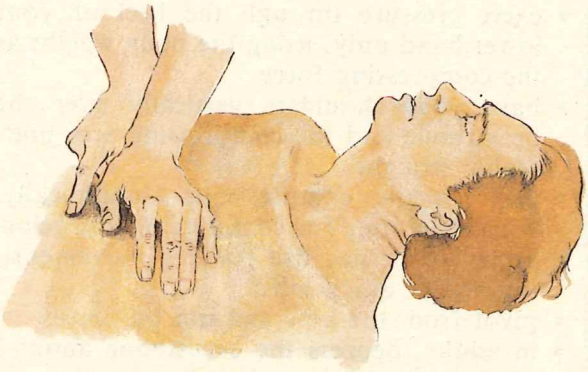


3.21 CPR: locating the heart

Caliper method

Another technique for finding the correct position is the caliper method. This method is accurate but too slow for adults, especially in single operator CPR where time is important. However, this method is necessary for children, infants and the obese:

- place the index finger of one hand at the notch (or hollow) just at the top of the breastbone
- place the index finger of the other hand at the bottom of the breastbone, just where the ribs join
- using both thumbs, divide the breastbone into two equal parts
- leave the lower hand in this position and put the heel of the upper hand on the breastbone between the thumb and index finger of the lower hand. (As the heart lies in the chest at approximately this location, this point will give the most effective compression of the heart)
- your lower hand is now over the compression point



3.22 CPR: positioning the hands

- your fingers are relaxed and pointing across the chest, preferably slightly raised from the surface so that no pressure will be exerted directly on the ribs
- place your other hand securely on the top of the first; to help to prevent slipping, either lock the top thumb around your lower wrist, or interlock the fingers of both hands.



3.23 CPR: alternative hand position: wrist grip



3.24 CPR: alternative hand position: interlocked fingers

Exerting pressure

The technique of locating the correct hand position must be practised regularly so that you can do it quickly and accurately.

- exert pressure through the heel of your lower hand only, using the body weight as the compressing force
- have your shoulders vertically over the breastbone and the compressing arm preferably straight
- perform the compressions rhythmically, with equal time for compression and relaxation — do not use rocking movements, thumps or quick jabs
- pivot from the hips and not the knees
- in adults, depress the breastbone about 5 centimetres (1½ to 2 inches) with each compression

- release the pressure to allow proper expansion of the chest but do not remove the hands from the chest wall.

EAR must be combined with ECC.

ECC should only be performed by trained operators.

Important points

The technique must be correct to give effective compression and to avoid damage to underlying structures. Even when correctly performed, ECC only provides less than half the normal blood flow to the brain. There is no margin for inefficient techniques.

EAR combined with ECC

The ratio of ventilations to compressions in CPR depends on whether there are two operators, or only one.

The technique used in CPR also varies depending on whether the casualty is an adult or a small child or infant.

CPR for adults

This can be performed by either one or two operators, but it is much more efficient with two.

- You have already found that the casualty has no breathing
- you have then given 5 quick full breaths within 10 seconds
- you have felt for the carotid pulse, and it is not present
- start CPR.

One operator

Proceed as follows:

- give 15 compressions in 10-12 seconds
- then give 2 ventilations within 3-5 seconds.

(The complete cycle should not take more than 15 seconds.)



3.25 CPR: heart compression: one operator

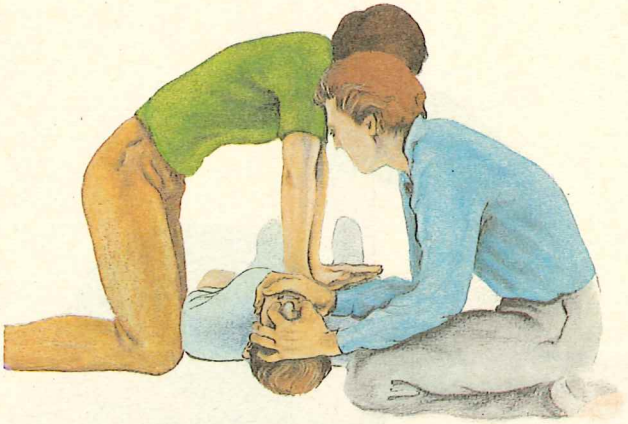
- Continue at 4 cycles per minute. This achieves 60 compressions and 8 ventilations per minute (a ratio of 15:2).

Revival checks

- after 1 minute check the carotid pulse and breathing and thereafter check every 2 minutes — checking takes 5 seconds
- if the circulation is restored, stop ECC but continue EAR
- if breathing is restored, stop EAR. Place the casualty in coma position and ensure that the airway is kept clear
- if consciousness returns, check his conscious state every 2 minutes while observing the casualty continually. If he becomes unconscious again, check ABC, and if necessary, start CPR again.

Two operators

The most experienced First Aider should perform EAR:



3.26 CPR: heart compression: two operators

- each of you should kneel on opposite sides of the casualty's body
- give five compressions and one ventilation in 5 seconds
- continue at 12 cycles per minute.

This achieves 60 compressions and 12 ventilations per minute (a ratio of 5:1).

- There must be no pause in compressions and the ventilations must be interposed between the last compression of one cycle and the first of the next — the First Aider performing ECC should call '1,2,3,4,5' to allow the First Aider performing EAR to interpose ventilations at the right time, that is with the fifth compression, without pause in compressions.

- see above, under 'One operator CPR'.

Revival checks

Changing from one operator to two

The second First Aider gives the casualty a full ventilation and the first First Aider changes to 60 compressions a minute without pause, with a ratio of one ventilation to five compressions as for two First Aiders.



3.27 CPR: heart compression and breathing: two operators

Changing over between two operators

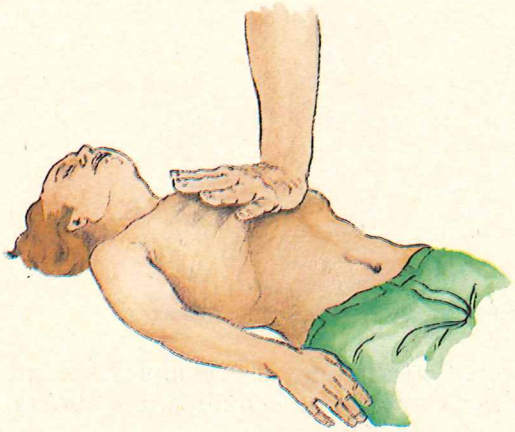
CPR is tiring, and operators will need to change over regularly.

- The First Aider performing ECC initiates a change as needed. To do this smoothly with the minimum of interference to resuscitation, the changeover should be during the revival check (when the pulse and breathing are being checked).

CPR for small children

For children under 8 years but over 12 months, proceed as follows:

- locate the middle of the breastbone using the caliper method
- apply compressions with the heel of one hand placed over the middle of the breastbone
- depress the breastbone 2.5 centimetres (about 1 inch) at a rate of 100 compressions per minute



3.28 CPR: hand position for a small child

- keep the same ratios as for adult CPR, that is, 15 compressions to two ventilations (6 cycles a minute with one operator) or five compressions to one ventilation (20 cycles a minute with two operators)
- cover the small child's nose and mouth with your mouth
- use less force and volume when doing EAR; give just enough air to expand the child's chest.

Children vary greatly in size. The site and depth of compression depends more on their size and maturity than on their actual age. The age groups should be taken as a guide only.

CPR for infants

An infant is, for resuscitation purposes, a child below the age of 12 months.

- Apply compression with the tips of your index and middle fingers over the middle of the breastbone
- compress to a depth of 1.5 centimetres (½ inch)



3.29 CPR: chest compression for infants

- rates of ventilation and compression are the same as for small children (see above).

Warning — Complications when doing CPR

Regurgitation of stomach contents is a common and serious complication of CPR. After regurgitation it is essential that you **first clear the airway again** before continuing with EAR.

Rib fracture may occur. A good technique will avoid rib fracture in most cases, but with elderly casualties it may be an unfortunate but unavoidable complication of doing CPR. The rib will be heard to snap. Continue CPR but ensure that your fingers do not touch the chest wall and ensure that the compression depth does not exceed the depth recommended for the casualty.

Reminder

CPR cannot be learned from a textbook. Demonstration and actual practice on a training manikin are essential. Never practise CPR on a live conscious person. Regular refresher sessions are required to maintain the necessary skills.

After successful resuscitation

- stay with the casualty

- keep him warm and comfortable
- observe him closely — watch especially for signs of vomiting which is common after resuscitation
- keep regular checks on ABC and conscious state
- be ready to help the ambulance crew in any way.

Rates of compression

In **two operator** CPR compressions should be at the rate of 60 uninterrupted compressions per minute, together with one ventilation interposed after every fifth compression without any pause. One cycle should take 5 seconds and there should be 12 cycles per minute.

In **one operator** CPR, compressions cannot continue uninterrupted as ventilations need to be interposed with compressions. To compensate for time lost while stopping for breathing the speed of compressions needs to be increased to about 80-90 per minute with 2 ventilations after every 15 compressions. The compression phase of the cycle should take between 10-12 seconds and the 2 ventilations and change from compressing to ventilating and back should take only 3-5 seconds. The complete cycle must only take 15 seconds and there should be 4 cycles per minute.

Warning — compression rates

Any compression rate which exceeds 90 per minute (i.e. takes less than 10 seconds for 15 compressions) may not allow adequate time for the heart to refill with blood between compressions.

Summary table

Casualty	Position for compressing breastbone	Mode of pressure	Depth of pressure	Compressions per minute	Ratio of compressions to ventilations		Cycles per minute		Ventilations per minute	
					2 operators	1 operator	1 operator	2 operators	1 operator	2 operators
Adult	lower half	2 hands	4-5 cm (1½-2")	60	5:1	15:2	4	12	8	12
Child 12 months to 8 years of age	middle	1 hand	2.5 cm (1")	100	5:1	15:2	6	20	12	20
Infant under 12 months of age	middle	2 fingers	1.5 cm (½")	100	5:1	15:2	6	20	12	20

Flow chart — basic life support

Collapse

Check response to 'shake and shout'

Conscious

Make comfortable

Observe: Airway
Breathing
Circulation

Unconscious

Casualty on side
Clear airway
Head tilt — jaw support
Turn face slightly downward
Check breathing

Breathing

Place in coma position

Observe: Airway
Breathing
Circulation

Not breathing

Casualty on back
EAR — 5 full breaths in 10 seconds
Check pulse

Pulse present

Continue EAR
Check pulse and breathing after 1 minute and then at least every 2 minutes

Pulse absent

CPR
EAR & ECC
Check breathing & pulse after 1 minute and then at least every 2 minutes

4

The unconscious casualty

A conscious person is aware of himself and his surroundings. He responds normally to voice, touch and other sensory stimuli.

This chapter is about the unconscious casualty who is not aware of himself and his surroundings in a normal way, and whose responses are abnormal or absent.

Therefore, it is the First Aider's responsibility to protect such a casualty from the dangers of his unconscious state and his surroundings.

After studying this chapter you should be able to:

- recognise the symptoms and signs of altered consciousness
- position an unconscious casualty in a way that will aid management of his condition and make him safe
- manage an unconscious casualty
- include injuries and/or medical conditions in such management.

Learn these words before studying this chapter:

Coma position	the position in which the unconscious casualty is placed to ensure that the airway is clear and that any likely obstruction flows out from the mouth
Lateral position	an alternative to the coma position
Unconsciousness	a condition in which a person is not normally aware of the surrounding environment.

Unconsciousness is a condition in which the brain fails to respond to messages sent to it. This failure may be partial or complete, so there will be varying degrees of mental activity. Unconsciousness may be progressive, with the casualty becoming worse as time passes.

Altered consciousness may be caused by:

head injuries, drug and alcohol overdose, bleeding, poisons, fainting, lack of oxygen, seizures and convulsions, extreme heat and cold, diabetes, stroke or illnesses affecting the brain.

You may recognise that a casualty has an altered state of consciousness by his altered or absent responses to stimuli. The unconscious casualty is unable to:

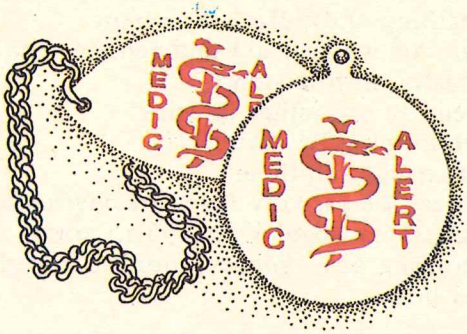
- communicate
- be aware of danger or protect himself from danger
- maintain a clear airway.

Failure to maintain a clear airway can result in death or brain damage.

Assessment of the casualty

History

- DRABC
- check with witnesses
- look for any obvious causes such as injury, empty tablet bottles, or for medical conditions
- check for any medical warning medallion, bracelet or card (Figure 4.1).



4.1 An example of a medical warning device: Medic alert

Signs

The casualty may be drowsy, being easily aroused but lapsing into unconsciousness again.

Consciousness may be judged by the way in which the casualty responds to a spoken command or to touch, pressure or a painful stimulus:

- check responses to voice and touch, that is shake and shout (see p. 5)
- if responses are absent or abnormal but the casualty is breathing, the casualty is unconscious.

You should check whether:
- breathing is quiet, rapid, or noisy
- the casualty coughs or swallows
- there are any differences in pupil size — this may indicate compression of the brain (see Chapter 11).



Management of the unconscious casualty

- DRABC — this is continuous
- ensure a clear and open airway at all times especially when breathing is noisy, which may indicate a partial obstruction
- place the casualty in the coma position if breathing and pulse are present
- send for medical aid and remain with the casualty until it arrives
- attend to any other injuries
- give nothing by mouth
- loosen tight clothing
- protect the casualty from the environment
- reassess at regular intervals, noting and recording any changes; monitor breathing and pulse.

One of the most important steps in management of the unconscious casualty is correct positioning (see below).

Objectives for positioning the unconscious casualty

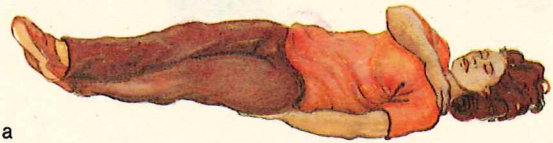
The posture should achieve as many of the following objectives as possible:
- to obtain and maintain a clear airway
- to provide ready access to the airway
- to facilitate drainage from the mouth and nose and to prevent inhalation of foreign material
- to permit continuing observation of the casualty
- to provide stability of the casualty's position
- to minimise impairment of breathing

- to minimise rotary and forward movements of the neck and shoulders
- to maximise ease of achievement of a stable position.

For positioning the unconscious casualty with the above objectives in mind, the St John Ambulance Association favours the teaching of the **coma position,** (the lateral position can also be used (see p. 84)), to ensure a clear airway is maintained.

To place the casualty in the coma position

If the casualty is lying on the back:
- kneel beside the casualty
- place the casualty's nearer arm, palm up, under the buttocks
- cross the farther leg over the nearer leg
- place the casualty's farther arm across the chest (Figure 4.2a)



a

4.2a-d Placing a casualty in the coma position

- support the casualty's head and neck with your hand that is nearer the head
- grasp the farther hip with your other hand
- rotate the casualty towards you, right over until he rests against your knees (Figure 4.2b)
- remove the farther arm from under the body starting at the shoulder
- remove your hand from under the neck
- flex the nearer (upper) leg at a right angle to the body

- extend the head back to ensure an open airway (Figure 4.2c)
- place the hand of the casualty's upper arm next to the chin, with the fingers under the chin, taking care to avoid obstructing the casualty's mouth (Figure 4.2d)
- if the casualty has no teeth, ensure that the casualty's mouth remains open.



b



c

4.2a-d
Placing a casualty in the coma position



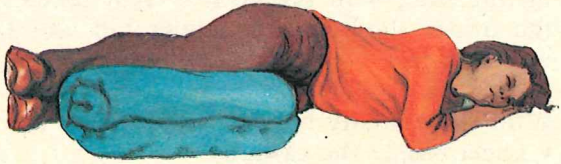
d

If the casualty is larger than can be handled easily, before rotation grasp the casualty with both hands, at the shoulder and hip. Ask a bystander to support the casualty's head and neck during the movement (Figure 4.3).



4.3 Handling an obese casualty

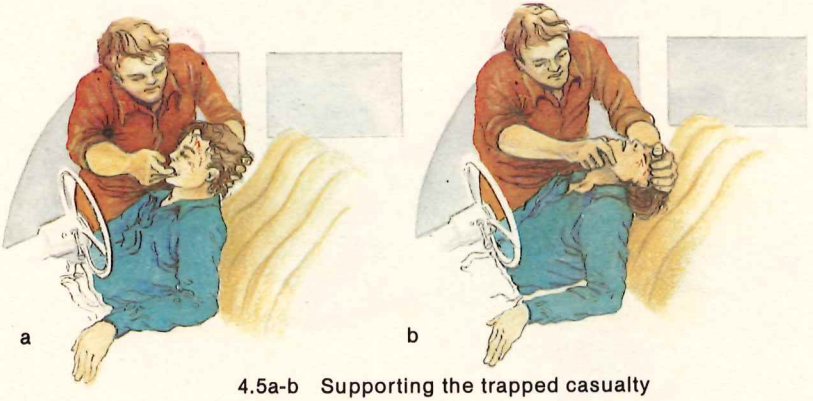
If the upper leg is broken or a joint is dislocated it may not be possible to flex the leg to a right angle. In this case support the



4.4 Supporting a casualty with a broken limb

casualty in the coma position with pillows, a folded blanket or rug in front of the legs (see Figure 4.4), or place him in the coma position on the other side.

It may not be possible to place a trapped casualty in the coma position. In this case, gently tip the head forward and remove any airway obstruction. Then tilt the casualty's head fully back and support the jaw up and forward (see Figure 4.5). This will maintain an open airway.



4.5a-b Supporting the trapped casualty

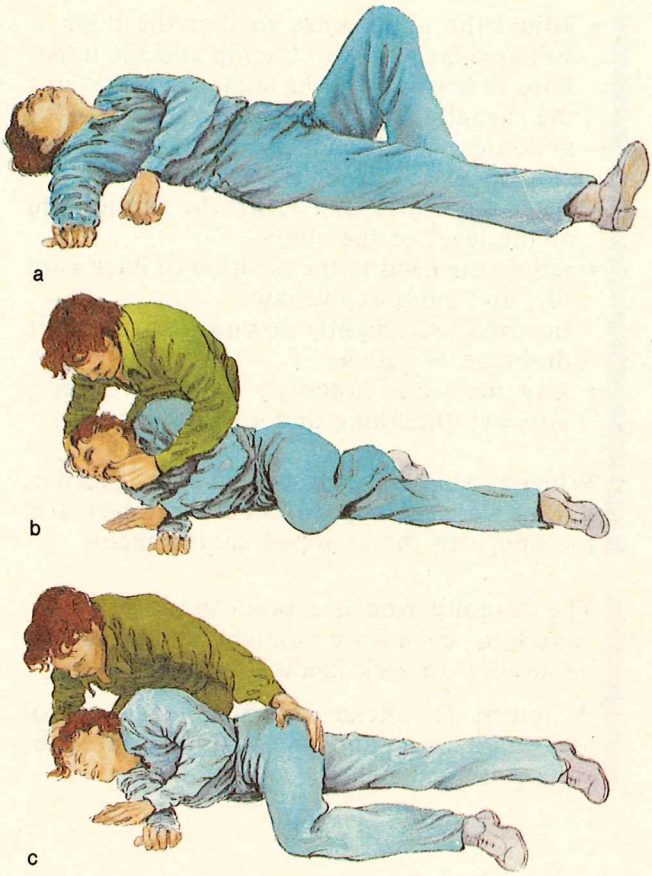
In some circumstances, the lateral position may be used to position the unconscious casualty provided there is adequate support for the head.

In this position the casualty lies completely on the side, with the body weight taken on the under shoulder, the under hip and the upper knee.

To place the casualty in the lateral position

With the casualty lying on the back:

- kneel beside the casualty
- place the farther arm horizontally at right angles to the body
- place the nearer arm across the chest



4.6a-c Placing a casualty in the lateral position

- bend the nearer knee to bring the thigh at right angles to the hip; keep the farther leg straight (Figure 4.6a)
- grasp the casualty's nearer shoulder and pelvis and roll him on to his farther side, keeping the spine straight; if an assistant is available, he should support the head, protecting the neck and maintaining a clear airway

- adjust the upper knee so that the thigh is still at right angles to the hip and the upper knee is bent at a right angle; this prevents the casualty from rolling forward on to his abdomen — do not have the upper leg resting on the lower leg
- place the nearer arm across the farther arm at the level of the elbow
- adjust the head to the position of backward tilt, and support the jaw
- turn the face slightly downwards to ensure drainage of saliva
- stay near the casualty's head to observe *A*irway, *B*reathing and *C*irculation.

When a casualty is transported on a stretcher, it may be necessary to bend the lower arm to cope with the cramped environment.

Warning

The casualty who has been temporarily unconscious, even for a moment, should always be advised to seek medical aid.

A return to unconsciousness is a sign of serious danger and medical aid must be sought immediately.

5

Severe bleeding

Bleeding is a loss of blood from the blood vessels. Severe or continued bleeding may lead to collapse and death. The First Aider must be able to recognise and, if possible, control blood loss.

After studying this chapter you should be able to:

- recognise and control external bleeding
- recognise internal blood loss
- recognise and manage the effects of blood loss.

Learn these words before studying this chapter:

Blood pressure	the force exerted by the blood against the wall of an artery; an important sign in medical diagnosis
Crater wound	a wound that results when tissue is torn from the body.

Bleeding can be external from a cut or internal into one of the cavities of the body, an organ, or tissues.

Severe bleeding may lead to shock (see Chapter 6) or death in a very short time. Because it is a major threat to life, severe bleeding must be managed before attending to less serious injuries.

The total quantity of blood in the human body varies according to a person's body weight. A large adult will have more blood than a small adult. Children and infants will, of course, have a still smaller volume of blood. A person who weighs 70 kilograms has about 6 litres of blood. A child weighing 30 kilograms has about 2.5 litres. An infant weighing 6 kilograms has about 750 ml. A relatively small loss of blood can be catastrophic in a small child or infant. For example, an adult can donate 500 ml of blood without any harm, but the loss of 300 ml might cause death in an infant.

Very approximately, a healthy person can lose up to 20% of their blood without serious effects. However, if bleeding continues, the casualty develops progressive problems so that by the time he has lost 40%, he will be suffering from severe shock.

Remember. Blood is precious. Do not waste it. **Act quickly!**

Assessment of the casualty



- DRABC
- look for severe external bleeding and control it if found
- proceed with the assessment of the casualty (see Chapter 1).

History

The history can be obtained from the casualty, and/or bystanders, or from a medical

warning device. The following may suggest that the casualty is suffering from the effects of severe or continued bleeding (external or internal):

- any serious accident or injury
- any known medical condition, such as a stomach ulcer, which might bleed internally
- any recent unexplained collapse.

Symptoms

- faintness or dizziness
- restlessness and apprehension
- nausea
- thirst.

Signs

- a weak and rapid pulse
- pale face and lips
- cold and clammy skin
- rapid breathing.

These symptoms and signs will become progressively more evident as bleeding continues.

The body's response to bleeding

When a blood vessel is cut or torn, the body reacts automatically by:

- forming a blood clot to help seal off the wound
- constricting the cut ends of blood vessels to reduce blood flow
- lowering blood pressure to reduce the force of bleeding
- maintaining blood supply to vital organs, particularly the brain, at the expense of other parts of the body, such as the limbs and the skin.

Therefore, in some cases, bleeding will tend to stop naturally as a result of these reactions.

General management of bleeding

You can help the body to control bleeding by taking the following general and local measures.

General measures (for all bleeding):
- lay casualty down
- maintain absolute rest
- elevate the legs
- make the casualty comfortable but do not heat
- loosen tight clothing
- give nothing by mouth
- reassure.

Local measures (for external bleeding only):
- apply direct pressure
- elevate the affected part
- rest the affected part.

In all cases, seek medical aid urgently.

External bleeding

History

- usually a history of injury.

Symptoms

- as above
- there may be symptoms of local injury.

Signs

- as above
- bleeding is usually obvious. The source is sometimes difficult to find — e.g. a small scalp wound may result in severe bleeding.

Management of external bleeding

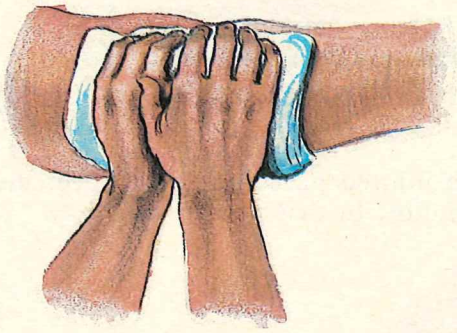
- all general and local measures as above.

Direct pressure over the wound

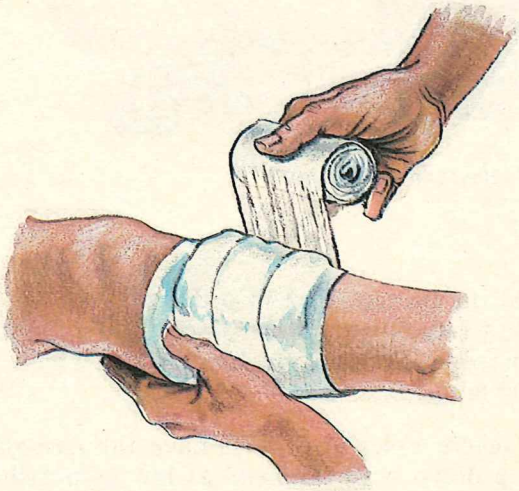
Application of direct pressure to a bleeding wound is of first importance. It controls bleeding by:

- compressing the blood vessels leading to the wound
- retaining blood in the wound long enough for it to clot.

Apply pressure by placing a bulky dressing over the wound. The dressing should extend well beyond the edges of the wound. It should be held in position by a firm bandage (Figure 5.2).



5.1 Direct pressure over a wound



5.2 Bulky dressing on a wound

If a dressing is not available, apply direct pressure to the wound with your bare hand (Figure 5.3).



5.3 Direct pressure with a bare hand

Elevating the part

Raise the injured part in order to decrease the blood flow to that part (Figure 5.4).



5.4 Elevating the part

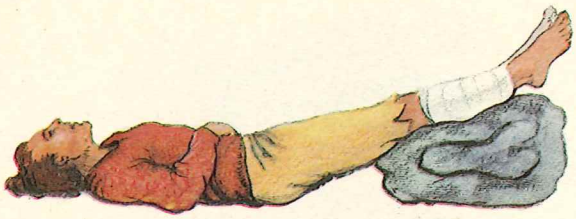
Resting the part

Rest the injured part in order to:

- lessen the demand for blood by the tissues
- preserve the delicate blood clot, which is forming.

Resting the casualty

In severe cases you must have the casualty lying down with the head as low as possible (see Figure 5.5). With minor bleeding the casualty may rest, partly sitting up, with the bleeding part elevated if possible.



5.5 A casualty with legs elevated

Elevating the lower limbs

In cases of severe bleeding, elevate the casualty's lower limbs and keep them elevated. This allows venous blood from the legs to drain to the main circulation. But do not elevate the legs if they are broken.

Further action

If bleeding has not quickly been brought under control by a properly applied dressing:

- put another dressing **over** the first dressing
- press down firmly on this dressing with the palm of your hand, until bleeding ceases (Figure 5.6).



5.6 Placing a dressing over the first dressing

In an emergency

- if bleeding is profuse or a dressing is not readily available, grasp the sides of the wound and firmly squeeze them together
- apply firm finger pressure directly to the bleeding point.



5.7 Grasp the sides of the wound and squeeze

Applying bare hands to or direct pinching of the wound could introduce infection but this is justified and may be lifesaving where bleeding is severe. **But never remove a dressing once applied.** This will only lead to further bleeding by dislodging the blood clot. Sufficient pressure applied to the wound will almost always control bleeding. Occasionally, when a large artery is involved, bleeding can only be controlled by constant pressure with the hand over the cut vessel (see Figure 5.8). This pressure must not be released until the casualty receives medical aid.



5.8 Applying hand pressure to a cut large blood vessel



5.9 Applying a constrictive bandage

Uncontrolled bleeding

Occasionally, in major limb injuries such as amputations, shark attack, or severe crush injuries, severe bleeding cannot be controlled by the measures outlined above. Only then, it may be necessary to resort to the application of a constrictive bandage above the elbow or knee.

Warning — using a constrictive bandage

A constrictive bandage acts by blocking the blood flow through the arteries.

- select a strip of firm cloth, at least 75 millimetres (3 inches) wide and about 750 millimetres (30 inches) long. This may be improvised from clothing or a narrow folded triangular bandage
- bind the cloth strip firmly around the injured limb above the elbow or knee and tie firmly
- note the time of application
- inform medical aid of the location and time of application of the constrictive bandage.

Large wounds

Tissue is sometimes torn from the body. This can happen when contact is made with moving machinery or power boats, in shotgun injury, or in shark attack. Large amounts of tissue may suddenly be removed, resulting in a crater wound or amputation. Severe bleeding is probable and shock is likely to develop rapidly.

Symptoms and signs are those of severe bleeding (see above).

Management of crater wounds

- general measures for the management of bleeding as above
- crater wounds leave a bleeding crater, which must be firmly packed with sterile or clean material prior to bandaging and application of firm pressure (Figure 5.10)
- elevate and rest the affected part
- seek medical aid urgently.



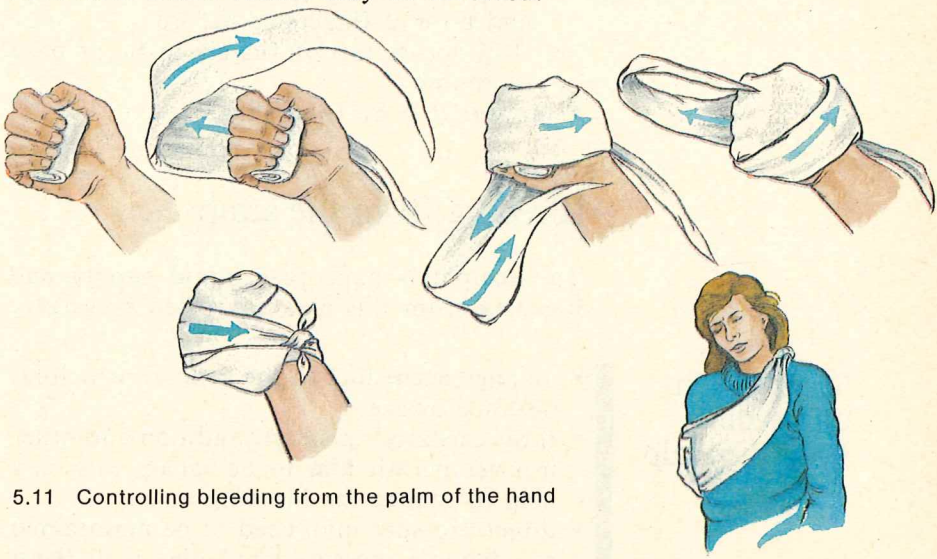
5.10 Dressing a crater wound

Management of amputations

- for management of the amputated part, see Chapter 7
- the amputation site may be managed as above, according to size, and severity of bleeding.

Bleeding from the palm of the hand

Bleeding from this area can often be severe, as several blood vessels may be involved.



5.11 Controlling bleeding from the palm of the hand

Management of bleeding from the hand

- immediately apply firm pressure to the whole palm of the hand by means of a firm pressure pad held in place by the casualty. This pad may be a firmly folded handkerchief or triangular bandage, an unopened roller bandage, or a clean cloth wrapped around an object such as a matchbox, a stone, or two or three fingers of the other hand
- elevate the hand above the head
- bandage firmly over the hand and fingers with a broad roller or a triangular bandage so as to maintain the pressure. One method of applying this bandage is to:
  - place the short tail of the bandage near base of thumb
  - take bandage over back of hand then downward over fingers
  - continue back to thumb side and enclose tail

  - take across back of hand to other side
  - pass across front of hand and enclose fingers and thumb
  - take further turn around back of hand and around fingers as before
  - then across top of fingers to tie at base of thumb
- support in a St John sling

Bleeding from the scalp

The scalp has a profuse blood supply and bleeding from this area can often be severe.

Management of bleeding from the scalp

- manage according to the general principles outlined above
- if the casualty's general condition and other injuries permit him to be sat up this may help to reduce the bleeding
- direct pressure may need to be maintained as adequate pressure bandaging is difficult to achieve.

Bleeding from varicose veins

Management of a ruptured varicose vein

Varicose veins occur when valves in the veins fail. Back pressure fills the veins and they become enlarged and painful. The most common site is in the legs. If a varicose vein ruptures, severe bleeding will occur.

- place the casualty flat with the leg well raised (this empties the veins)
- remove any constricting bands from the limb
- apply a clean pad and firmly bandage the site
- transport the casualty to medical aid, with the leg elevated.

Internal bleeding

Internal bleeding is bleeding into the tissues and cavities of the body. It may result from injury or disease. It may be visible or concealed.

Visible internal bleeding

Internal bleeding is evident when blood escapes via the natural passages:

- the lungs — blood is coughed up and is bright red and frothy because it is mixed with air
- the stomach — blood is vomited. It often has the colour of coffee grounds, being mixed with the acid of the stomach. If bleeding is severe the blood may be bright red in colour. It may be mixed with food
- the small intestine — the blood is mixed with the motions and due to the action of strong digestive juices in this part of the bowel they have a black tarry appearance
- the large intestine — the motions may be red (as no digestive juices are present in the large intestine)
- the kidneys or bladder — the blood in the urine gives it a red or smoky appearance.

Concealed internal bleeding

Internal bleeding into the cavities of the body can be very severe. Major closed fractures can also result in very severe bleeding. As a guide, a fracture of the thigh bone can result in the loss of 1.5 - 2.0 litres of blood, and on occasions, a severe fracture of the pelvis can result in life-threatening bleeding. You must learn to recognise concealed bleeding.

Evidence suggesting concealed bleeding may be obtained from the nature of the incident

Assessment of the casualty

and from signs of reaction to blood loss, by the casualty.

History

- obtain a history about the incident, for example the casualty may have suffered a blow to the abdomen, or have a gastric ulcer.

Symptoms

- as for any severe bleeding
- pain.

Signs

- tenderness, particularly with bleeding into the abdominal cavity
- rigidity of abdominal muscles ('guarding')
- the general signs of reaction to blood loss (see p. 89).

Management of internal bleeding

As no pressure can be applied to the bleeding part, manage as follows:

- maintain absolute rest for the casualty
- elevate the legs
- loosen tight clothing
- give nothing by mouth
- keep the casualty comfortable
- seek medical aid urgently.

Bleeding from special areas

Bleeding from the ear

The casualty may have suffered a blow to the ear or suffered a fracture of the base of the skull. (See Chapter 12).

Bleeding from the nose

See Chapter 12.

Bleeding from the gums

See Chapter 11.

6

Shock

This chapter is about a life-threatening condition (shock) that occurs in most serious illnesses and injuries.

Shock is a progressive condition in which insufficient circulation of blood to the brain and tissues of the body may lead to a collapse of the circulatory system and death.

After studying this chapter you should be able to:

- describe shock in a casualty
- understand the causes of shock
- understand the dangers of shock to a casualty
- manage the casualty so as to reduce the risks and effects of shock.

Shock is caused by one, or a combination of factors. For example:

- if blood is lost, the volume of blood in the blood vessels becomes insufficient; even though there may be no external bleeding, blood can still escape from the circulation into surrounding tissues, thus taking no part in the circulation (i.e. internal bleeding). Severe bleeding is the most common cause of shock
- if fluid is lost from the tissues, as in severe burns, diarrhoea or vomiting, this is replaced by fluid from the blood and thus a reduction in blood volume results
- if the heart is damaged by a heart attack, it may not be able to act properly as a pump
- widening of blood vessels throughout the body diverts blood from the circulation to the major organs. This causes a drop in blood pressure. This situation may be produced by several different conditions such as
  - injury to the spinal cord
  - severe pain
  - overwhelming infections
  - some poisonings.

Shock is almost always present in serious injury particularly when there is severe bleeding, pain, or fluid loss from burns.

The First Aider must always remember that shock is a progressive condition. Immediately after injury there may be little evidence of shock. The symptoms and signs of shock will develop with time, depending on

- the severity of the injury
- continuation of fluid loss
- the ability of the casualty to compensate for this loss
- effectiveness of the management.

A casualty who is at first only slightly affected (pale colour, cold, with a rapid pulse) may progress to a state of severe shock (altered or loss of consciousness, rapid breathing, and an extremely weak and rapid pulse), or may even die.

Careful assessment of the casualty's condition by regular and recorded observations will greatly assist the later management.

Symptoms

The symptoms and signs of established shock are the same as those of severe bleeding:

- faintness or dizziness
- restlessness and apprehension
- nausea
- thirst

Signs

- a weak and rapid pulse which may be difficult to find
- pale face and lips
- cold clammy skin
- rapid breathing.

These symptoms and signs will become progressively more evident as shock becomes more severe. The extremities may become bluish in colour, and the conscious state may alter, with the casualty becoming drowsy, confused, or unconscious.



6.1 The management of shock

Management of the casualty who may develop shock

The first aider does not treat shock as such **but aims to prevent it by managing the cause.**

The body reacts automatically to shock by directing more blood to the vital organs such as the brain, heart, lungs, and liver, at the expense of skin and muscles. You should, therefore, attempt to ensure an adequate blood supply to the vital organs:

- if necessary, DRABC
- reassure the casualty if he is conscious
- lay the casualty down with head low to maintain blood supply to the brain. Maintain an open airway
- control external bleeding (see Chapter 5)
- dress any wounds or burns (see Chapters 9 and 10)
- immobilise any fractures
- unless fractured, raise the casualty's legs above the level of his heart
- loosen any tight clothing
- keep the casualty comfortable **but do not heat** as this draws blood away from the vital organs
- if the casualty complains of thirst, moisten his lips but do not give anything to drink; he may suck an ice cube
- monitor and record breathing and pulse at regular intervals
- place in the coma position if there is breathing difficulty, if vomiting is likely or if the casualty becomes unconscious
- seek medical aid urgently.

3

Principles of injury care

7

Wounds and related infection

This chapter describes wounds and their first aid management.

First aid management of wounds is to stop bleeding, reduce the risk of infection and thereby promote healing.

After studying this chapter you should be able to:

- distinguish between the various types of wound
- describe the treatment for each type of wound
- describe ways to prevent the spread of infection.

Learn these words before studying this chapter:

Abrasion	an open wound caused by direct contact with a rough surface
Incision	a cut made by a sharp instrument
Infection	the invasion and growth of harmful germs in the tissues of the body
Tetanus	a serious and often fatal infection.

Wounds

A wound is a break in the continuity of the tissues of the body. The wound may bleed and/or become infected.

If a wound is associated with a break in the skin, it allows blood to escape from the circulation and germs *(micro-organisms)* to enter the body, possibly causing infection.

Wounds that result in external bleeding are called open wounds. They may be divided into five types, as follows:

abrasions	direct contact with a rough surface, for example gravel rash
incised	due to cutting by a sharp instrument
lacerated or torn	due to tearing by a blunt object
bites	caused by mouth — human or animal
penetrating or stab	due to a sharp pointed object, for example a knife or missile.

Closed wounds are those that allow blood to escape from the circulation but not from the body. The main closed wounds are:

- contusion — (also called a bruise) due to a blow from a blunt object
- sprains, strains and closed fractures. The resultant bleeding usually shows as bruising, perhaps days later. Some fractures may result in very severe bleeding (see Chapters 5 and 8).



Assessment of the casualty

- DRABC
- check for wounds and serious external bleeding.

History

- check with the casualty and/or witnesses
- check for any medical warning device.

Symptoms

These will vary according to the type of wound but nearly always include:

- pain.

Signs

You will observe different signs for different kinds of wounds. These are discussed separately below.

General management of open wounds

The four steps in management of open wounds are:

- control bleeding
- clean the wound as well as possible, so long as you do not restart severe bleeding
- apply a sterile (or clean) dressing
- seek medical aid.

Remember that in order to help a wound to heal and to prevent further injury the aim of management is to control serious bleeding and, as far as possible, to prevent the spread of infection.

The management of severe bleeding from wounds is described in Chapter 5.

Because infection results from germs entering the body through a wound, it is essential that you take steps to limit further contamination of the wound by:

- avoiding coughing, sneezing or talking over wounds
- not handling a wound unless the emergency control of bleeding makes this necessary
- using sterile (or clean) dressings.

Abrasions

With an abrasion, the outer protective layers of the skin are damaged, usually over bony parts, as a result of skidding falls onto hard

surfaces. Some whole blood may be lost but the raw area oozes mainly the fluid part of the blood. Gravel rash is an example of an abrasion. Dirt is frequently embedded in the wound. Infection may follow.



7.1 An abrasion

Management of abrasions

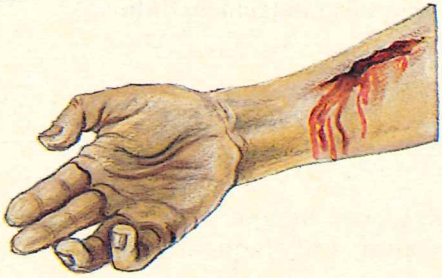
- cleanse the wound thoroughly with sterile gauze, or cotton swabs soaked in sterile or cool boiled water. A diluted **mild** antiseptic may be used according to directions on the label, to help wound cleaning
- if no aids are available, wash the wound under running tap water
- gently apply a non-adherent dressing.



7.2 An incised wound

Incised wounds

An incision is a clean cut through skin and underlying tissues, inflicted with a sharp instrument. These wounds are caused by cuts with sharp objects such as knives and other tools with a cutting edge, glass, and paper. They often bleed profusely. If the wound is deep, blood vessels, tendons and other structures may be cut. Infection may result from germs introduced by the object causing the wound.



7.3 A lacerated wound

as 'General management' above.

Management of incised wounds

Lacerated wounds

These wounds are caused by the tearing action of jagged metal, barbed wire, the claws of animals, or machinery. The wounds are torn and irregular and often dirty. There is usually bruising and damage to tissues around the edges. Bleeding is normally not as profuse as in incised wounds but infection is more likely.



7.4 A penetrating stab wound

Management of lacerated wounds

as 'General management' above.

Bites

Animal and human bites are jagged and penetrating and frequently become infected.

Management of bites

as 'General management' above.
See also Chapter 21 — 'Bites and stings'.

Penetrating stab wounds

A stab wound is a penetrating wound caused by a pointed object that has penetrated the skin. These wounds can be dangerous because they have a small entrance but the object may have penetrated deeply, producing serious damage. Bullets, nails, needles and garden tools are some of the items that can cause this type of wound. Infection may be carried deep into the wound. A special type of penetrating wound is that caused by an impaling foreign object.

Management of stab wounds

- control bleeding by applying direct pressure over the wound (see Chapter 5)
- keep the wound as clean as possible
- cut away or remove clothing covering the wound
- if not bleeding, carefully clean out loose dirt
- do not try to pick out foreign material embedded in the wound
- apply a sterile or clean dressing
- rest the injured part in a comfortable position
- seek medical aid.

For impaling objects, see below.

Foreign bodies in wounds

Foreign bodies, for example gravel, lying on the surface of a wound may be lightly brushed from the wound. As a rule, if the foreign body has penetrated into tissue do **not** remove it as this may cause further tissue injury and bleeding.

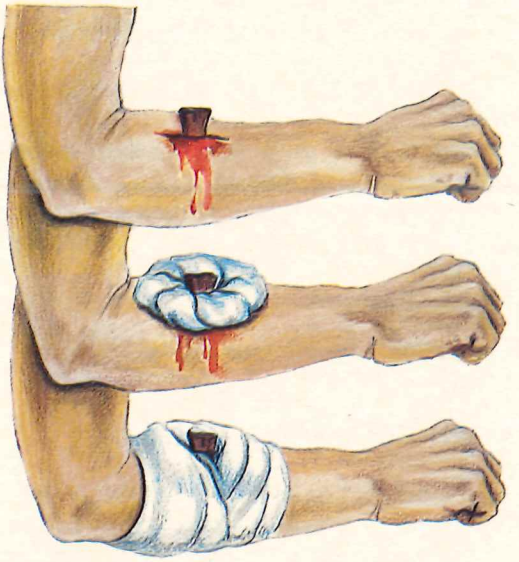
Management of foreign bodies embedded in wounds

If the foreign body penetrates into tissue:

- do not attempt to remove it as this may result in severe bleeding or may damage deep structures
- control bleeding by applying pressure to the surrounding areas but not on the impaling foreign body
- place padding around the object or place a ring pad over the object and a bandage over the ring pad (see p.145 and Figure 7.5)
- if the length of the object is such that it is protruding outside the ring pad, take care to bandage only each side of the pad.

Do not exert any pressure over the object itself.

Do not try to shorten an impaling object unless its size makes it unmanageable.

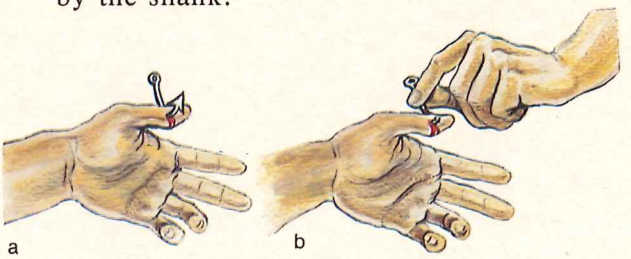


7.5 Management of a foreign body in the wound

Removal of a fish hook

If the barb is embedded:

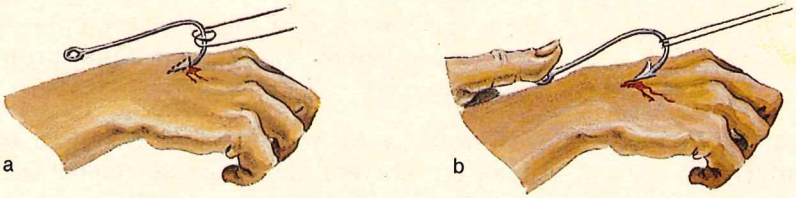
- if medical aid is not readily available, push the barb through the skin
- cut off the shank of the hook and pull the hook out by the
  - barb, or
  - cut off the barb and pull the hook out by the shank.



7.6a-b Removal of a fish-hook

An alternative method is to:

- loop a piece of fishing line around the hook (Figure 7.7a)
- press the 'eye' of the hook, with the thumb, in the direction that would tend to disengage the hook
- grasp the line firmly and give it a hard, sharp jerk (see Figure 7.7b); the hook will be extracted painlessly and will fly off in the direction of the tug.



7.7a-b Removal of a fish-hook: alternative method

Amputated parts

Surgical reattachment of amputated parts is now often possible. Success depends on proper preservation of the parts.

Management of amputated parts

- the part should be placed in a water-tight container, such as a sealed plastic bag
- the plastic bag should then be placed in a container of water to which crushed ice has been added.
- the part should **not** be in direct contact with ice
- send to hospital with the casualty.

Note: the decision as to the possibility of reattachment should only be made by the hospital. Many tissues can now be reattached, such as portions of scalp, as well as limbs, digits, etc. Even apparently unimportant pieces of tissue should be dealt with as above.

Infection

Infection is the invasion and growth of harmful germs in the tissues of the body.

Germs can enter the body through wounds:

- at the time of the injury, from dirt on or in the wound or on the object causing the injury
- after the injury, from careless handling of the wound
- from the nose and throat, for example by sneezing or coughing into the wound (droplet infection).

Reducing the risk of infection

Infection may be prevented at the time of injury, but correct handling can reduce further risk of infection.

Effects of infection

Local areas of infection, after some time, become hot, swollen, red, tender and painful because of increased blood supply and tension.

Antiseptics

These are chemical preparations that have the ability to restrain the growth of germs. They are commonly used as an antiseptic lotion for cleaning the area around the wound. They should be freshly diluted or prepared. Antiseptic creams are better avoided as they often lose their antiseptic properties quite rapidly.

Tetanus

Tetanus is a serious infection, usually of deep wounds, where the object causing the wound is contaminated by dirt containing the spores of the tetanus germ. You should be aware of the potential danger of tetanus. It is a serious and often fatal infection but easily prevented by antitetanus injection. Any dirty wound, regardless of how minor, particularly a puncture wound, must be exam-

ined and treated by a doctor if the casualty has not been immunised against tetanus in recent years.

General management of closed wounds

Prevent further bleeding by R.I.C.E.:
- (R) Rest the casualty and injured part
- (I) Ice or cold packs
- (C) Compression bandaging
- (E) Elevate the part (see Figure 7.8a and b).



7.8a-b R.I.C.E.

Contused wounds

These are caused by falls or blows against hard objects, or by crushing. Bleeding into the deep tissues occurs, causing bruising. There is:
- pain at the site
- swelling
- discolouration — firstly red, then later changing to black and blue
- local tenderness.

Management of contused wounds

As general management of closed wounds above. If contusion is severe or involves head injury, seek medical aid.

Management of bone, joint and muscle injuries

As general management of closed wounds above. See also Chapter 8.

Management of sports injuries

As general management of closed wounds above. See also Chapter 25.

8

Bone, joint and muscle injuries — general principles of management

This chapter describes injuries to bones, joints, muscles and tendons and further describes management of these injuries in order to prevent further damage.

After studying this chapter you should be able to:

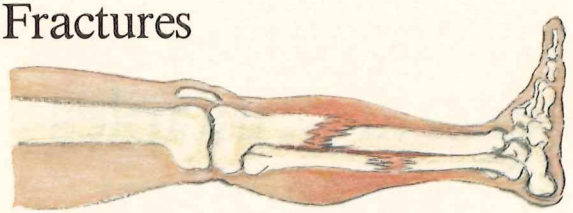
- understand the effects of fractures, dislocations, sprains and strains
- understand the principles of management of these injuries.

Learn these words before studying this chapter:

Dislocation	injuries in which the bones of a joint are pushed out of normal contact with each other
Fracture	break in a bone
Sprain	stretching of ligaments
Strain	overstretching or overexertion of a muscle
Ligaments	tissues connecting bones at joints.

The skeleton is the supporting framework of the body. It is made up of a large number of separate bones joined to each other at *joints,* loosely or firmly attached by means of *ligaments.* Moving these joints are muscles, which are attached to the ends of the bones by tendons. On the ends of the bones and lining joints is *cartilage.*

Fractures



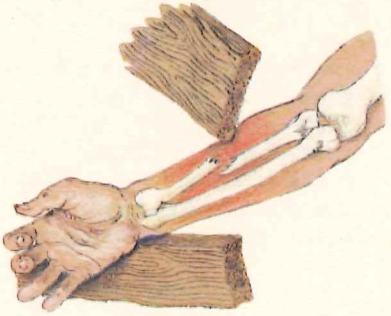
8.1 A fracture

A *fracture* is a broken or cracked bone (see Figure 8.1). The break is usually complete, but in the young the bone can be bent without breaking completely. This is called a 'greenstick fracture'.

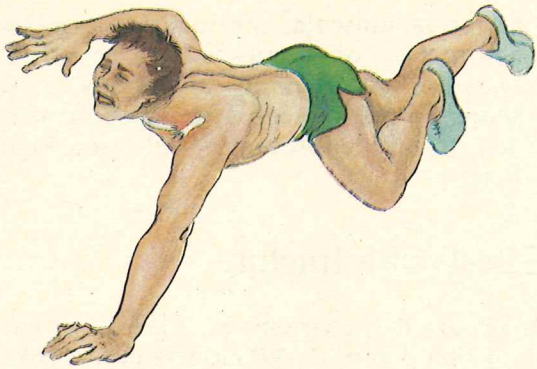
Causes of a fracture

Fractures can be caused in three ways, by:

- direct force — a blow that breaks the bone at the point of impact (Figure 8.2)



8.2 Direct force



8.3 Indirect force

- indirect force — when the bone breaks at some distance from the point of impact, for example where a fall on an outstretched hand results in a fracture of the collar-bone (Figure 8.3)



8.4 Abnormal muscular contraction

- abnormal muscular contraction — a sudden contraction of a muscle may result in a fracture, for example an elderly person snapping the kneecap after catching a foot and trying to prevent a fall (see Figure 8.4).

Effects of a fracture

Bones are living structures. Each bone has a good blood supply. When a bone is broken, bleeding occurs. Bleeding is increased by damage to surrounding tissues and blood vessels.

Fractures of large bones may result in **considerable loss of blood.** For example, a fractured thigh results in the loss of 1 or 2 litres of blood into the tissues. Even though concealed, this is blood lost to the circulation. Pain is present, particularly if movement at the fracture site occurs. Bleeding and pain may lead to shock.

Types of fracture

Closed fractures — The skin around the fracture is unbroken. Blood is lost into the tissues (see Figure 8.5).

Open fractures — There is a wound leading to the fracture, or the bone may protrude through the skin. Germs may enter and cause infection, which is a serious complication. Blood loss may be serious and more significant than the fracture.

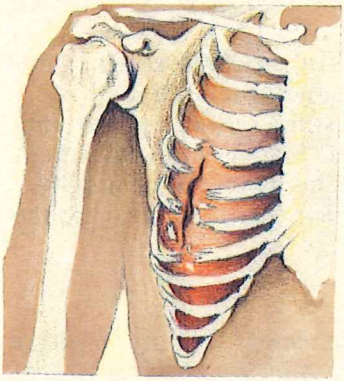
Complicated fractures — As a result of the fracture, vital organs may have been damaged. For example, rib fracture may result in injury to the lung.



8.5 A closed fracture



8.6 An open fracture



8.7 A complicated fracture



Assessment of the casualty

- DRABC
- is there a possible fracture?
- is the fracture closed or open?
- is the fracture complicated?

History

- find out what happened either from the casualty or from bystanders; this will help to assess the extent and nature of the injury.

Symptoms

- the snap of a breaking bone, which may have been felt or heard by the casualty
- pain, usually felt at or near the site of injury
- difficult or impossible normal movement of the limb
- loss of power.

Signs

- deformity, abnormally angled limb, abnormal twist, or shortening
- tenderness at the site of fracture when gentle pressure is applied
- swelling over the fracture, the amount indicating the amount of blood lost to the circulation
- possible swelling around the fracture site
- bruising that may appear progressively (see Chapter 5)
- crepitus, which is a coarse grating sound or feeling when one fractured end of a bone moves against the other; crepitus may occur because of inadvertent movement **but it must never be deliberately sought**
- unnatural movement that may occur at the site of a fracture.

Management of fractures

The first aid management of any fracture must aim to prevent movement at the site of the injury by immobilisation of the joints above and below the fracture. This will prevent the fracture from becoming worse and can help in the control of pain and bleeding.

The principles of management are the following:

- cover all wounds with a sterile or clean dressing and control bleeding
- warn the casualty not to move the injured part
- immobilise fractures before moving the casualty, unless there is danger to the casualty or yourself
- handle all fractures gently
- support the injured part or limb in a position that gives as much comfort as possible, and maintain this support until immobilisation is completed
- watch for signs of loss of circulation to the foot or hand
- support and immobilise with slings, bandages and splints where necessary and possible
- support in the elevated position if possible
- if there is severe deformity, it may not be possible to use ordinary straight splints. Either
  - — improvise splinting to support the limb in that position, or
  - — support with adequate padding
- make and record regular observations (see Chapter 6 — shock)
- seek medical aid
- R.I.C.E. These principles should be applied with care whenever appropriate. Ice (or cold packs) is especially useful on minor fractures. Compression is useful for minor injuries to joints, especially elbow, knee and ankle injuries (see Chapter 1).

Bandages

- ensure that bandages are broad and supportive but if the area is too small for a broad bandage use a narrow one
- use the natural hollows of the body when applying a bandage around the body or limbs
- avoid jerking or jarring movements while

moving the bandages into their correct positions
- if using linen or calico triangular bandages or strips of material, be aware that, because these materials do not stretch, the circulation to the area below the fracture may be impaired when swelling of the limb occurs.

Splints

- for splints, you can use any suitable material that is long, wide and firm enough to give support to a fracture and to immobilise the joints above and below the fracture (see Chapter 10 for further details of splints and their use)
- in the case of a leg fracture, when one leg is injured, you can use the uninjured leg as a splint
- in the same way, you can use the trunk of the body to splint a fractured upper arm.

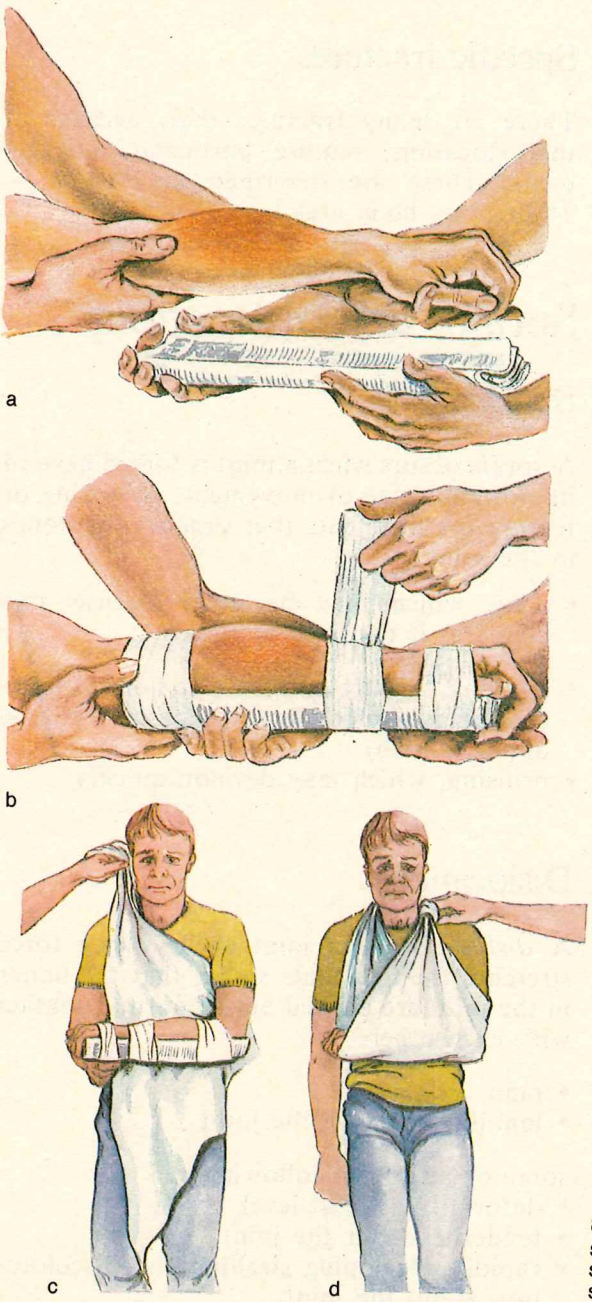
Padding

Padding is useful as it:
- protects skin surfaces and bony points, preventing discomfort or even damage to the skin. Adequate padding should always be placed between the ankles and the knees
- accommodates natural hollows and deformity
- allows splints to fit snugly.

In an emergency, you can improvise padding from newspaper, tissues, rugs, scarves, and blankets.

Precautions during management

Frequently check:
- for impaired circulation of the limb
- that bandages have not loosened.



8.8a-d Immobilise by: steadying the fractures, supporting the fractures, securing the fractures

Specific fractures

There are many fractures that, because of their location, require particular management. These are described in Part 4 — 'Injuries by body area'.



8.9 A sprain

Sprains and dislocations

Sprains

A *sprain* occurs when a joint is forced beyond its normal range of movement, stretching or tearing the ligaments that support the bones in the joint.

Symptoms

- pain, which may be quite intense and increases if the joint is moved.

Signs

- swelling, usually marked (the normal joint contour is altered when compared with the opposite limb)
- bruising, which may develop quickly.

Dislocations

A *dislocation* of a joint occurs when force stretches the ligaments so far that the bones in the joint are pushed out of normal contact with each other.

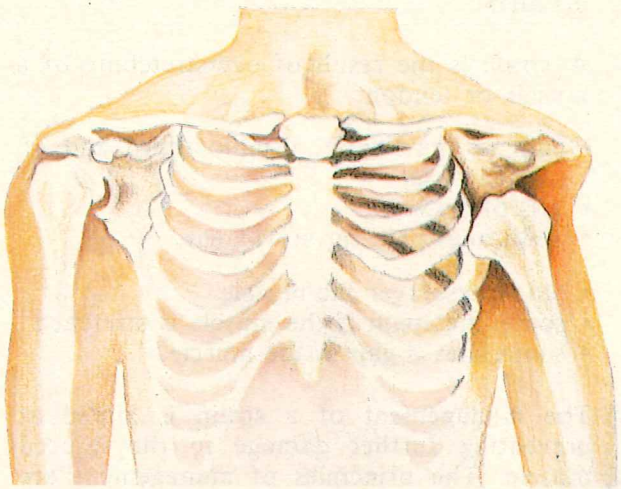
Symptoms

- pain
- inability to move the joint.

Signs

some or all of the following:

- deformity at joint level
- tenderness over the joint
- rapidly developing swelling and discoloration about the joint.



8.10 A dislocation



8.11 A strain of a muscle

Management of sprains and dislocations

Sprains and dislocations are often associated with fractures. **If there is any doubt about the nature and severity of these injuries they should be managed as fractures.**

Sprains

- apply cold packs
- apply a firm bandage to the injured joint
- elevate the part.

Dislocations

- do not attempt to reduce the dislocation
- seek medical aid.

In the case of a limb:

- check the pulse and if absent, gently move the limb to try to restore the circulation
- rest the joint in the most comfortable position
- elevate if possible
- expose the joint and apply cold packs
- use soft padding and splint the joint in the position in which it was found.

Strains

A *strain* is the result of overstretching of a muscle or tendon.

Symptoms

- pain in the region, usually sharp and of sudden onset
- loss of power
- additional pain on movement.

Signs

- tenderness over the muscle
- sometimes pain if the muscle is stretched
- sometimes a gap in the muscle.

Management of strains

The management of a strain is aimed at preventing further damage to the injured muscle. The principles of management are to:

- control any bleeding within the tissues by applying a cold pack over the injured area
- advise the casualty not to further overstretch the muscle
- support the injured muscle with a pressure bandage
- encourage **gentle** exercise to reduce painful spasm and/or shortening of the muscle
- **avoid all massage.**



8.12 A strain of a tendon

9

Burns

This chapter describes the consequences of burn injuries and how immediate first aid will reduce the effects of burn injury.

After studying this chapter you should be able to:

- identify and if possible remove the cause
- apply the principles of immediate first aid for the various types of burn injury
- assess the seriousness of burns
- carry out the continuing management of the burnt casualty
- understand the need for prevention of burns.

Learn these words before studying this chapter:

Asphyxia	deficiency of oxygen and increase of carbon dioxide in the body.
Flammable	easily set on fire (*Note:* the word inflammable has the same meaning).

A burn is damage to the tissues caused by excess heat, friction, chemical agents, electricity or radiation.

Burns may result in:
- death of the superficial layers of the skin or, in severe cases, the whole skin and deeper tissues
- damage to the superficial capillaries with outpouring of fluid from the blood, seen as blisters if the skin surface is intact
- a raw area, which is ideal for the invasion of germs that cause infection
- severe pain
- the injured area possibly becoming red, swollen and blistered.

In addition, where there is **fire**, there may occur:
- asphyxia from a lack of oxygen
- carbon monoxide poisoning due to the inhalation of that gas
- poisoning from the inhalation of the gases given off by plastics and synthetic building materials, for example PVC and polyurethane
- airway burns from breathing hot air
- irritation to the respiratory tract and eyes from smoke and chemical fumes.

Prevention of burn injury

Most burn injury is preventable. To ensure prevention:
- supervise children during their bathtime
- test bathwater for temperature before entering
- turn saucepan handles away from the front of the kitchen stove and preferably obtain and fit a stove guard
- dress children in flame-proof or flame-

resistant clothing, especially where open fires are used
- avoid prolonged exposure to the sun, and make sure babies and young children are fully protected by shade and sun-screen lotion or cream
- do not use petrol or other flammable liquids for starting fires, for example barbecues
- take care, when using flammable liquids for cleaning, painting, etc.
- ensure there is no naked flame when refuelling a motor car; for example, if you tow a caravan, make sure the caravan gas refrigerator is turned off before refuelling
- ensure there is adequate ventilation and no naked flame when refuelling boats, especially those that use petrol or two-stroke fuel
- do not try to remove the cap from a car radiator while the engine is still hot
- take great care in the vicinity of exposed power lines and do not attempt home repairs of electrical equipment.

Rescue of the burnt casualty

The First Aider may be confronted with an emergency where there is a risk of burns, and rescue of the casualty is required. Remember, rescue can be dangerous, especially involving fires and electricity. Leave to expert help when available but, if necessary, you should know certain safety rules.

Rescue involving fires

If entering a burning building:
- feel the temperature of the door before entering. If very hot, do not enter. If cold or slightly warm, crouch low and open slowly
- when entering, crouch low.

Rescue from electrical hazards

Management procedure will depend on the voltage.

Domestic voltage

Switch off the current or jerk the cable free. If this is not possible, remove the casualty from the current. Use non-conducting, dry materials, for example dry clothing, a dry wooden stick. Do not cut the cable.

Higher voltage

Wait until the current is disconnected and ensure that bystanders are safe.

Avoid any contact with the casualty's skin or conducting material that is touching him, until the current is disconnected.

Management of electrical burns is discussed on p.140.



Assessment of the burnt casualty

- DRABC
- assess cause
- assess depth
- assess area.

Causes of burn

Heat	heat at or above 50° Celsius damages or destroys tissues. Heat may be: 'dry'—including fire, flame, hot objects, friction, electricity 'wet'—including hot liquids, steam
Chemical	corrosive substances including caustics, acids, phenols
Radiation	including ultra-violet rays of the sun and sun lamps, microwaves, lasers, and radioactive materials.

Depth of burn

Superficial burns (partial thickness)

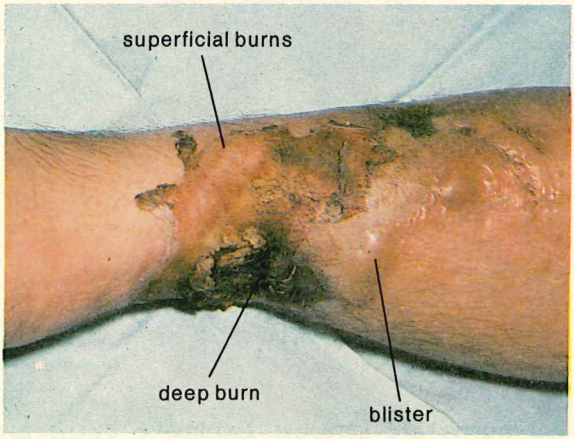
- only the outer layers of the skin are damaged
- the area is red and painful, sometimes with blistering.

Blisters

Blisters, which may appear on the surface of damaged skin as thin bubbles, are formed by the straw coloured fluid portion of the blood escaping into the burnt area just below the outer layer of the skin.

Deep burns (full thickness)

- the damage may extend to the deep layers of the skin, which may then look white. The skin may be totally destroyed and may look black and charred. There may also be damage to the underlying tissues as well.

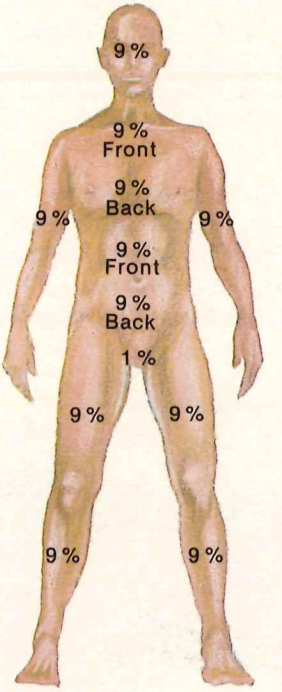


9.1 Two types of burn
(Clinical Photography Department, Prince Henry's Hospital)

Area of burn

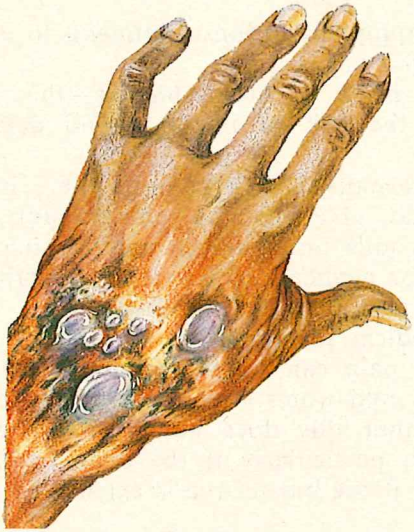
The larger the burnt area the greater will be the effect on the casualty's circulation. Large burns cause severe loss of fluid over a period of time, leading to the progressive development of shock. This will be made worse by pain.

The burnt area is assessed as a percentage of the body surface. This can be calculated in adults by the 'rule of nines', which divides the body surface by percentage into areas of 9 or 18, adding up in total to 100 per cent.



9.2 'Rule of nines'

All burns are serious. Extensive burns are potentially dangerous and may be fatal. Any suspected full-thickness burn, regardless of area, partial-thickness burns larger than a 20-cent piece, and burns involving the hands, face and genital area must be assessed by a doctor. Burns to the airway are particularly serious and often are fatal. As a rough guide, burns that produce more damage than simple redness of the skin, and are more than 10



9.3 A blister

per cent of the body surface area in an adult (5 per cent in a child or an elderly person) are likely to need treatment in hospital.

Management of burns — aim

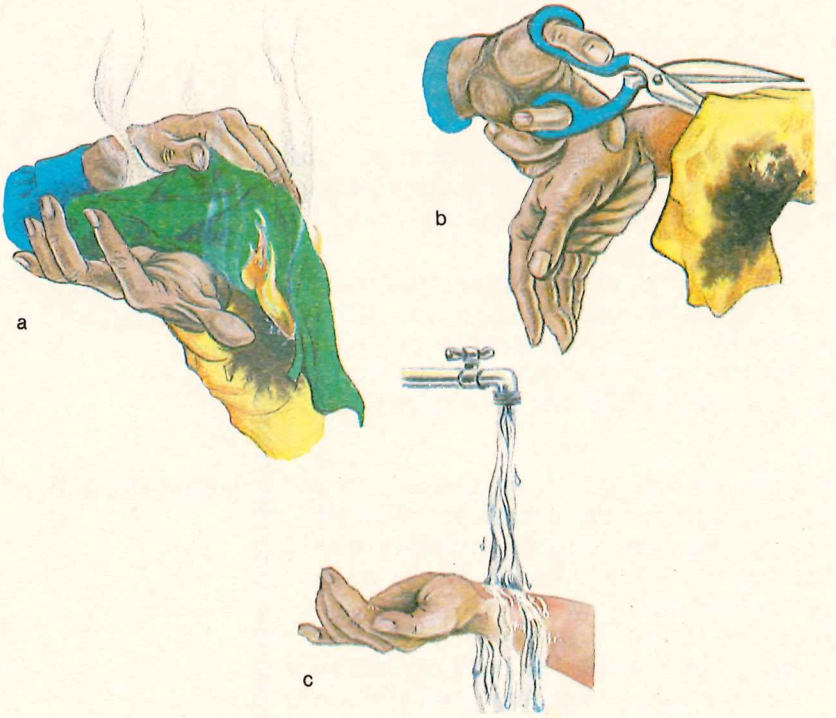
The aim of first aid in burn injuries is to remove the casualty from the cause of heat, and to cool the injured area, to protect the burned area from infection and further damage until medical aid can be obtained.

Immediate action

- remove the casualty from danger; do not become another burns casualty yourself
- put out burning clothing, smother with a blanket, jacket, or similar, or use water
- remove hot clothing
- hold the burnt area under cold, gently running water until the part has returned to normal body temperature, which usually takes up to 10 minutes.

General management

- **do not apply any lotions, ointments or oily dressings**
- **do not prick or break blisters**—this increases the risk of infection and delays healing
- if the casualty is thirsty or if there is a long delay, give frequent small amounts of water or milk unless the casualty is unconscious, or medical aid is readily available. Do not give alcohol
- seek medical aid urgently
- extreme pain can be alleviated by gently pouring cold water over the dressing, but ensure that this does not over-cool the casualty, particularly if the casualty is a baby or if the burnt area is extensive.



9.4a-c Management of burns

Management of superficial and partial thickness burns

When reddening and blisters are present:
- wash with cold water
- do not break blisters
- apply a sterile non-stick or other clean dressing, and bandage lightly.

Management of deep burns

- remove or cut away clothing over the burnt area but leave clothing that is stuck
- if possible, promptly remove constricting rings, bracelets etc. before swelling starts
- wash with gently running cold water to reduce swelling and pain and until temperature returns to normal; this usually takes several minutes
- cover the burnt area with a sterile or clean non-stick dressing, and bandage lightly to minimise fluid loss and pain — improvise if necessary by using freshly laundered linen
- with burns to the face, cut an opening in the dressing to allow for an adequate airway and for vision; however, some casualties fear being enclosed, in which case it may be better to leave the burnt area uncovered.

Radiation burns

Radiation burns may be caused by the sun, sunlamps or nuclear accidents.

Exposure to radiation may lead to extensive superficial burns, with blister formation. **Sunburn is totally preventable** (see Chapters 24 and 29). Take care to prevent it.

Management of radiation burns

The distress of sunburn can be reduced by:
- cold showers
- applying cool moist compresses to the burnt area

- resting the casualty in a cool place
- giving fluids.

Serious sunburn with severe blistering needs medical aid after this treatment. Young babies may need medical aid even if not blistered.

Chemical and corrosive burns

Some chemicals and many corrosive substances can cause serious burns.

Management of chemical burns

- wash off immediately with a large volume of flowing water
- remove contaminated clothing and footwear **but avoid contaminating yourself**
- continue washing for 20 minutes
- do not attempt to pick off contaminants that stick to the skin
- cover the area with a sterile or clean non-stick dressing
- seek medical aid urgently.

Electrical burns

A danger with electrical burns is that the surface skin may show little or no evidence of burning, even though deep tissue might be seriously burnt.



Management of electrical burns

- if necessary, DRABC
- wash and cool the burnt area under gently running water **well away from live wires**
- apply a clean, dry dressing
- seek medical aid urgently for **all** electrical burns.

Bitumen burns

If hot bitumen contacts the skin, a severe burn may result.

Management of bitumen burns

- **do not attempt to remove bitumen from the skin or from the eyes**
- drench the burnt area immediately with cold, preferably running, water; if iced water is available, use it
- apply cold wet towels to the burnt area if it is on the head, neck, shoulders, chest, abdominal wall or back
- change cold wet towels frequently to maintain the cooling effect
- continue the cooling treatment for 30 minutes, but no longer
- seek medical aid urgently.

Warning

When hot bitumen **completely encircles a limb** it may act like a constricting bandage, thus interfering with the circulation. The bitumen should be split, lengthwise along the limb, as it cools.

If the eye is burnt by bitumen, it should be flushed for 20 minutes and padded, after which the casualty should be sent to hospital.

10

Dressings, pads, bandages, slings and splints — general principles for their use

Dressings, pads, bandages, slings and splints are used to cover, protect and support injuries. They will control bleeding, prevent infection, prevent further damage, and may reduce pain.

After studying this chapter you should be able to:

- understand the need for dressings, pads, bandages, slings or splints
- know what is suitable material for a dressing, pad, bandage, sling or splint
- know the principles of application of dressings, pads, bandages, slings or splints.

Dressings

A dressing is a protective covering applied to a wound to help to:

- control bleeding
- control and absorb discharge
- ease pain
- minimise swelling
- protect from further injury and infection.

The dressing should be sterile (germ free) if possible, and act as a cover restricting the entry of germs, which could cause infection of the wound. It should be absorbent so that it will soak up blood and so assist with clotting (see Chapter 5). It should be sufficiently soft and bulky to compress down and control bleeding. All dressings should be large enough to cover the wound and about a further 2.5 centimetres around it.



10.1 Some approved dressings

Dressings should have a surface that will not stick to the wound. Gauze, linen, cotton, and specially prepared non-stick material are suitable, but woollen or fluffy surfaces are not suitable.

Cotton wool should **never** be placed in direct contact with a wound because fibres enter the wound. However, it can be quite useful as padding when placed **over** a layer of gauze, cotton or linen.

Applying dressings

When applying a dressing do not touch the wound (except for the emergency control of bleeding) or any part of the dressing that will come in contact with the wound. Infection in wounds results from contamination by the hands, coughing, sneezing, or talking over the open wound or dressing (see Chapter 7). Expose the dressing as little as possible to the air.

When using specially woven combine pads and universal dressings ensure that the plain side of the dressing is in contact with the wound and the coloured line uppermost.

A triangular bandage, folded as a pad, makes a suitable improvised dressing for many wounds. Towels, clean linen, disposable baby napkins, handkerchiefs, even tissues can be used as dressings in an emergency.

Cover dressings and retain in position by whatever bandaging materials are available.

You should be able to distinguish between dressings, pads and padding.

Pads

Absorbent pad

Pads are layers of gauze or cloth that may be used over a dressing to increase the dressing's capacity to absorb fluids. A pad



10.2a-c Retaining a dressing in position by using a roller or folded triangular bandage

will help to spread the pressure from a bandage evenly over a dressing and therefore the wound area.

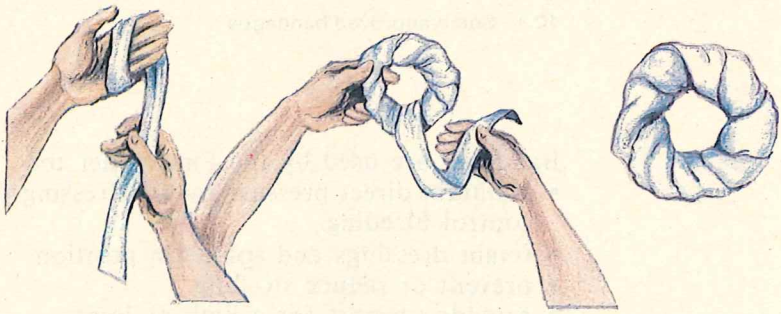
Pressure pad

Firm pads are applied over a dressing when additional local pressure is required to assist in control of bleeding. These can be improvised using any firm object such as a folded triangular bandage, an unwrapped roller bandage or firmly folded clothing.

For wounds with a special problem such as a protruding bone end or embedded foreign body, firm pads may be placed around the wound and held in place with a bandage to protect the wound, without actually pressing on it. These surrounding pads will assist in bleeding control when direct pressure is not possible, and hold still the edges of a dressing which has been 'tented' over a protruding object.

Ring pad

A ring pad is a special form of pressure pad. It may be made by passing one end of a narrow bandage once or twice around the fingers. Bring the other end of the bandage through the loop and continue to pass it through and through until the whole of the bandage is used and a firm ring is made.



10.3 Making a ring pad

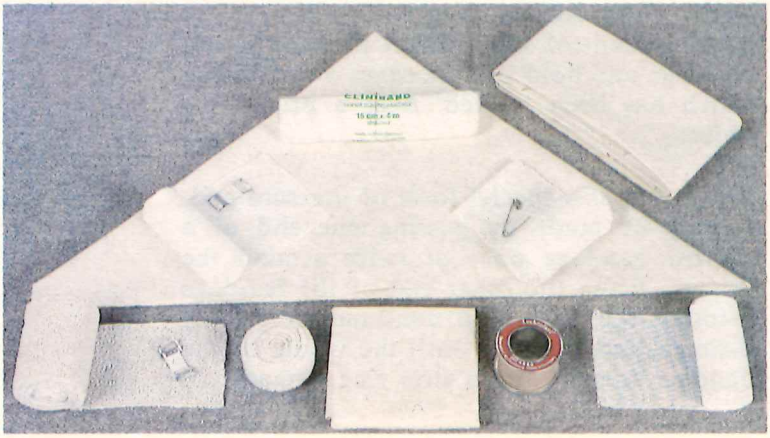
Padding

Padding can be improvised from any soft material, such as clothing or towels.
Padding is used to:

- protect skin surfaces, especially over bony points
- accommodate natural hollows and deformities of the body
- allow splints to fit snugly to the body and limbs.

Bandages

Prepared bandages are available commercially, in a variety of materials and types.



10.4 Some approved bandages

Bandages are used by the First Aider to:

- maintain direct pressure over a dressing to control bleeding
- retain dressings and splints in position
- prevent or reduce swelling
- provide support for a limb or joint
- restrict movement

- apply pressure/immobilisation for the management of certain bites and stings.

The conforming bandage is an acceptable first aid bandage. It has the property of conforming to the shape of the body, avoiding special bandaging techniques. It also applies firm but gentle pressure to the wound and assists with control of bleeding. The conforming bandage will also accommodate the swelling that occurs after soft tissue injury. Sometimes this type of bandage becomes tight if the limb is moved frequently, so you should check it regularly.

A compression bandage is used as a pressure/immobilisation method of management of certain bites and stings. The ideal compression bandage is a crepe or conforming bandage about 15 cm wide applied firmly enough to compress tissue, but not so firmly as to interfere with the blood supply to the limb below the bandage.

Gauze bandages are sometimes used to hold dressings in place, but are less satisfactory for the control of bleeding.

The triangular bandage is a useful multipurpose item, which may be folded in a variety of ways to serve as a dressing, padding, retaining bandage or as a sling.

In an emergency, bandages may be improvised by tearing a sheet or similar material into narrow strips. A stocking, pantihose or similar item may also be used.

Applying roller bandages

- use a firmly rolled bandage of the correct width
- stand or sit opposite the casualty and support the part to be bandaged
- position the part correctly before bandaging

- when bandaging near the armpit or groin, pad to prevent the surfaces of the skin touching
- hold the head of the bandage uppermost and apply the outer surface of the bandage to the part
- bandage from within outwards and from below upwards over the front of the limb
- unroll the bandage a few centimetres at a time, maintaining even pressure throughout
- when using a conforming bandage, slightly stretch each unfolded length before application; this will ensure firm and even pressure over the dressing and wound
- fix the bandage with a firm turn, allowing each successive turn to partly cover the previous turn by two-thirds of a width
- finish off with a straight turn, fold in the end and fasten with a safety pin or adhesive tape
- check that circulation to the part is not impaired.

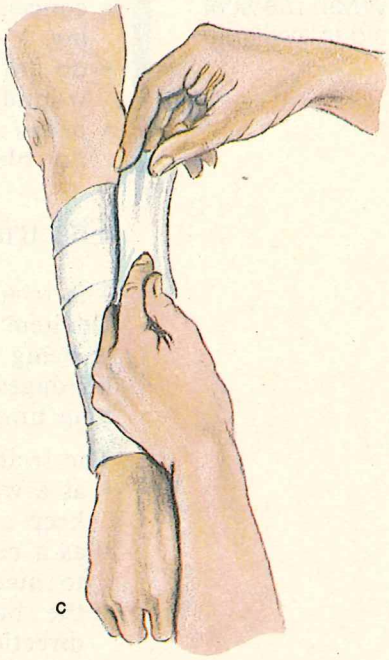


a

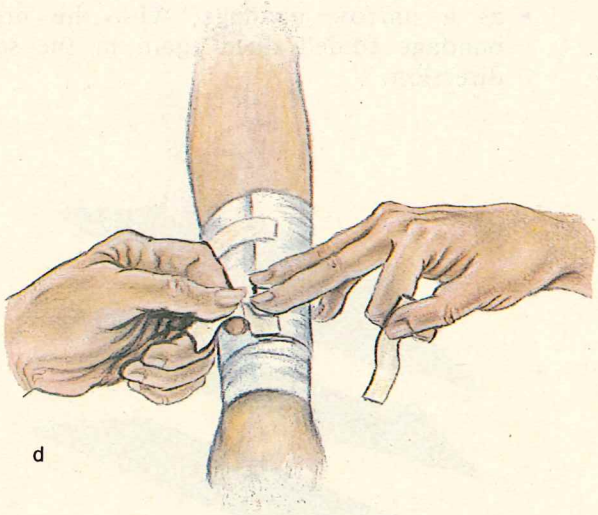
10.5a-d Applying a roller bandage



b



c



d

When medical aid is available

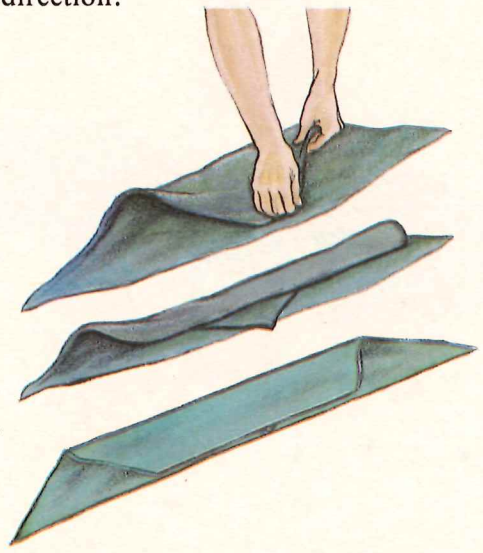
- concentrate on bandaging to control bleeding
- do not spend time meticulously bandaging wounds
- drape rather than bandage wounds that are not bleeding seriously.

The triangular bandage

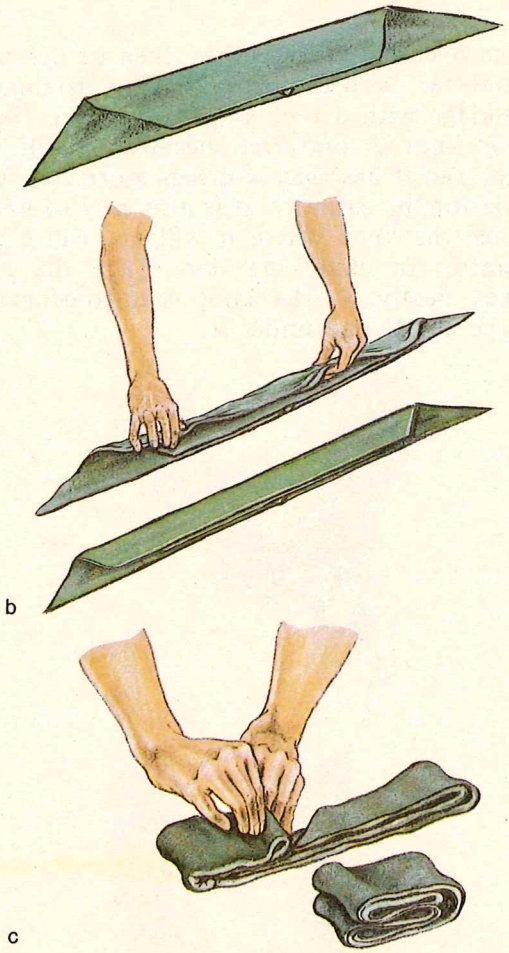
The triangular bandage is a traditional first aid item that is still widely used, though it is being replaced in first aid kits by roller bandages. Its adaptability will ensure, for a long time, its use by the First Aider.

The triangular bandage is used:

- as a whole cloth, open to its full extent to keep a large dressing in position
- as a broad bandage, with the point folded to meet the centre of the base and then the bandage folded again in the same direction
- as a narrow bandage, with the broad bandage folded once again in the same direction.



a

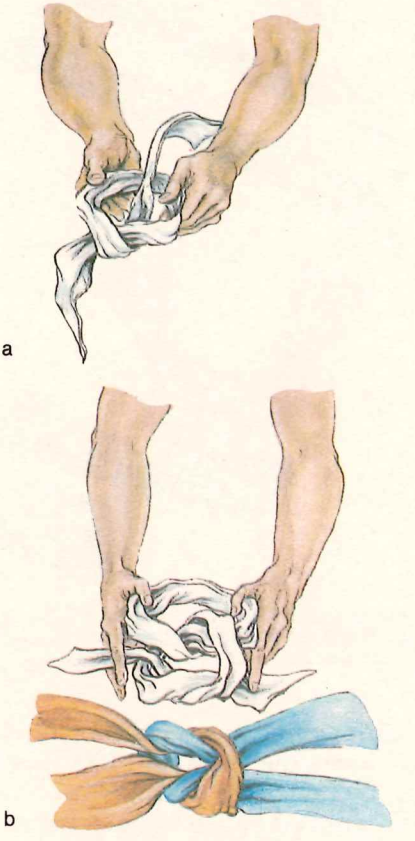


10.6a-c A triangular bandage in various folds: a broad bandage; a narrow bandage; a triangular bandage being folded for storage (also used as a pad)

Using a triangular bandage

When bandaging a wound, first place a dressing over the wound. The triangular bandage is folded in its narrow or broad form and applied so as to hold the dressing in place firmly. If a large wound is to be bandaged it may be necessary to lay several broad triangular bandages over the dressing,

each overlapping the other, then tie off each bandage. Secure the ends of a triangular bandage with a reef knot (see Figure 10.7). This knot is preferred because it will not slip, and it lies flat, which is more comfortable for the casualty; it is also easy to untie. Place the knot where it will not cause discomfort or chafe the skin. Tuck the ends away neatly. If the knot is uncomfortable place a soft pad under it.



10.7a-b Tying a reef knot

A triangular bandage does not stretch, so check the circulation beyond the bandage as this may be impaired when swelling occurs.

Symptoms and signs of interference with the circulation are:
- absent pulse below the bandage
- swelling
- a bluish tinge or pallor of the extremity
- numbness or tingling of the extremity
- pain.

If **any** of these signs appear, loosen the bandage. Check at intervals to see that the bandage has not become tight or loose.

When not in use the triangular bandage should be folded into a narrow bandage, with the ends turned over towards the middle.

Slings

Slings are only effective when the casualty is sitting or standing. Slings are used to:
- give support, elevation, and rest to an upper limb
- prevent the weight of the upper limb from pulling on or moving the chest, shoulder or neck
- help with the immobilisation of a rib fracture.

There are three slings in use in first aid:
- collar and cuff
- arm sling
- St John sling.

They have different functions and are used to treat different conditions.

Applying slings

The following are basic techniques that should be studied in conjunction with chapters on the control of bleeding, wound care,

and immobilisation of fractures (see Chapters 5, 7 and 8).

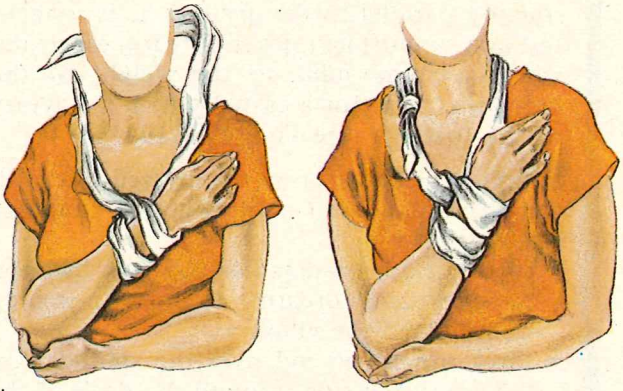
Collar and cuff sling

This supports the wrist in a position towards the neck, but allows the weight of the lower arm and elbow to hang unsupported. It is particularly useful for a casualty with a fracture of the upper arm (humerus). It allows gravity to pull the two parts of the broken bone into alignment (see Figure 10.8):

- pass a *clove hitch* over the hand and around the wrist with the knot of the clove hitch on the thumb side of the wrist
- flex the casualty's elbow and place the forearm across the chest with the fingers pointing towards the opposite shoulder
- pass the long end around the back of the neck
- tie the ends of the bandage in the hollow just above the collar-bone on either side.



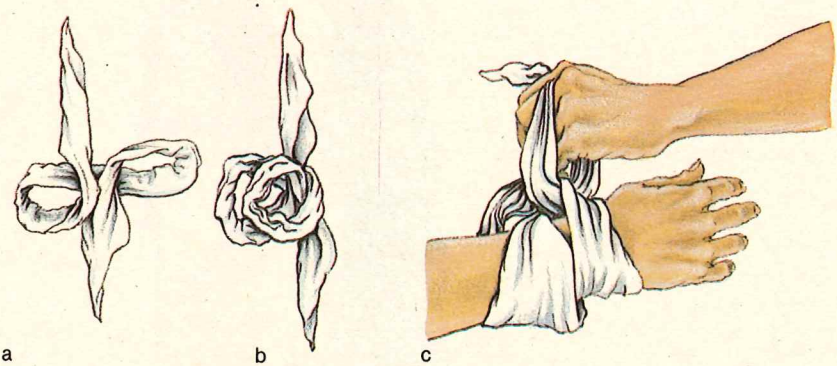
10.8a-c
A collar and cuff sling a



b c

10.8a-c A collar and cuff sling

To make a clove hitch, take a narrow bandage and make two loops, one towards your body and the other away from your body, leaving one end of the bandage longer than the other. Place the fingers of each hand under each loop, and bring together.



a b c

10.9a-c Making a clove hitch

Arm sling

This supports the forearm in a position roughly parallel to the ground. It is used to rest and support an injured forearm especially where a splint adds to the weight of the limb. It is used for a casualty with a fracture of the forearm (see Figure 10.10).

Support the forearm on the injured side with the wrist and hand a little higher than the elbow, then:

- place an open triangular bandage between the chest and forearm, its point stretching well beyond the elbow
- carry the upper end over the shoulder on the uninjured side, around the back of the neck to the front of the injured side
- still supporting the forearm, carry the lower end of the bandage up over the hand and forearm and tie off in front of the hollow above the collar-bone
- bring the point forward and secure to the front of the bandage with a safety pin or tape.



a

10.10a-c An arm sling



b



c

10.10a-c An arm sling

When the arm sling has been applied, the base of the bandage should be at the base of the little finger nail so that all finger nails are exposed for observation. To check for circulation, apply pressure to a finger nail. When this pressure is removed the nail should return to normal colour. If the circulation is impeded proceed as follows:

- alter the position of the hand
- adjust the bandage or sling.

St John sling

This supports the elbow, and maintains the hand in elevation resting comfortably on the shoulder of the uninjured side. The elbow is pushed up, which prevents the weight of the arm pulling on an injured shoulder or collar bone (see Figure 10.11).

In shoulder injuries the St John sling may be used to provide support without causing pressure to the shoulder or upper chest region:

- place the casualty's upper arm naturally by the side with the elbow flexed, and the forearm across the chest, the fingers pointing to the opposite shoulder
- place an open triangular bandage over the forearm and hand, its point towards the elbow and the upper side parallel to the forearm with its upper end over the shoulder and the base hanging down
- while facing the casualty, hold the hand and the bandage over the shoulder, with one hand, by tucking your thumb under the wrist, carrying the bandage with it
- pass your other hand with palm facing towards you under the lower end of the bandage hanging down; with a slight pull on the bandage, carry it under the elbow of the casualty's flexed arm, around the back and over the shoulder on the uninjured side
- gently adjust the height of the sling and tie the ends in the hollow above the collarbone on the uninjured side; (if the bandage has been correctly positioned there is a short end and a long end to tie the knot)
- tuck the point firmly in between the forearm and the bandage
- turn the fold so formed backward over the lower part of the upper arm and secure in front with a safety pin pointing downward
- check the circulation.



10.11a-d A St John sling

Improvised slings

Slings may be improvised in many ways:

- turn up the lower edges of the jacket and pin to the clothing
- pin the sleeve to the clothing
- pass the hand inside the buttoned jacket
- use a scarf, belt, tie, etc.



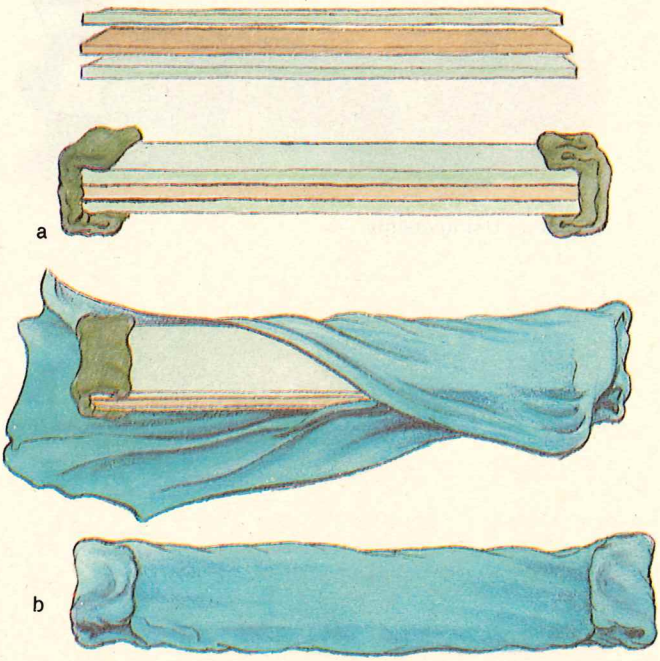
10.12a-d Improvised slings

Splints

Splints are any suitable material that is long, wide and firm enough to protect wounds, give rigid support to a fracture, or immobilise the joints above and below a fracture (see Chapters 8 and 16). Splints are also used to immobilise limbs when required, such as with snake bite (see Chapter 23). The most suitable type of splint is the prepared wooden splint that is well padded with soft padding or foam plastic. However, splints can be improvised from any suitable material, such as cardboard or newspaper.

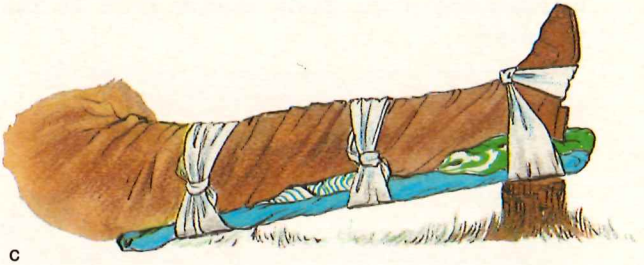
Using splints

- have the splint long enough to extend past the joints on either side of the fracture
- **ensure that the splint is well padded, especially over bony points such as the ankle**



10.13a-c Using splints

- place padding between a splint and natural hollows such as the back of the knees
- do not place bandages over the fracture site, unless using the roller bandage technique or to cover a wound
- place bandages above and below the fracture site and at each end of the splint so that the joints above and below the fracture are immobilised
- tie knots over the splint or on the uninjured side
- ensure that bandages are firm enough to prevent movement, but not so tight as to interfere with the circulation of the blood or cause pain
- check bandages **every 15 minutes,** for looseness or tightness.



c

10.13a-c Using splints

4

Injuries by body area

11

Head, face and jaw injuries

This chapter describes the management of injuries to the head, face and jaw. These injuries are potentially very serious as they may result in airway obstruction, serious wounds, bleeding, altered consciousness, brain injury and neck injury.

After studying this chapter you should be able to:

- identify and manage a casualty with one or more of the following:
  - jaw fracture
  - concussion
  - compression of the brain
  - fractured base of the skull
- apply the principles of management of the casualty with head, face or jaw injury.

Head injuries

The skull contains the brain and its surrounding fluid. It is of special importance in protecting the nervous system and the essential functions of the body. The skull, which encloses the brain, has a dome and a flat base. There is no room for anything else inside the skull cavity without compressing or damaging the brain.

If the skull is fractured, a depressed piece of bone may press on the brain. Blood, from a damaged blood vessel, escaping into the skull cavity, can build up pressure on the brain. Quite a minor blow to the head can occasionally cause this, but if the bleeding continues the increasing pressure may affect those parts of the brain that control vital functions of the body, for example level of consciousness, breathing, pulse rate, blood pressure. Unconsciousness and, finally, death can result. Note that the casualty may appear at first to be quite well and unconsciousness may not occur until some time after the accident.

Head injury is the third most common cause of death after cancer and disease of the heart and blood vessels.

Warning — Head injuries

No head injury should be disregarded or treated lightly. Every casualty who has had even a mild head injury must be observed thoroughly to detect any complications. The casualty who has been unconscious for even a moment must always be advised to seek medical aid. A return to unconsciousness is a sign of serious and immediate danger.

Typical causes of head injury include:

- vehicular, especially motor-cycle, accidents
- a blow to the head
- a fall in which the head is struck

- landing heavily on the feet
- diving into shallow water
- contact sports.

Care should be taken to avoid unnecessary risks at home, work and play and protective head gear should be worn if there is danger, for example when:
- working on a building site
- horse riding
- motor-cycle riding
- playing cricket
- cycling
- playing rugby football.

Head injury may result in damage to:
- the skull
- the brain
- the neck
- soft tissues, including the scalp and face
- bones of the face and jaw
- teeth and the tongue
- the sensory organs, that is, eyes, ears and nose (see Chapter 12).



Assessment of the casualty

- DRABC

History

- obtain a history of the incident from the casualty and/or bystanders; a blow to the head — even minor — should alert you to the possibility of a head injury. Loss of consciousness may be witnessed, or the casualty may seem dazed.

Symptoms

Some or all of the following:
- headache
- nausea
- loss of memory (especially of the event)
- blurring of vision
- weakness on one side of the body.

Signs

Some of the following:

- altered or abnormal responses to commands and touch
- wounds to the scalp or to the face
- bleeding from the nose, ear or into the whites of the eyes
- bruising around the eyes
- clear fluid escaping from the nose or ear
- excited or restless behaviour
- incoherent speech
- noisy breathing, like snoring
- twitching of limbs or convulsions
- congestion of the face
- vomiting
- pupils becoming unequal in size or dilated.

Management of head injuries

In all types of head injury, certain general principles of management will apply.

General principles of care

In all cases the casualty suffering a head injury should be managed as though unconscious (see Chapter 4). Even if conscious it is wise for the casualty to be kept in the coma position so that bleeding or discharge from the nose, mouth, or ears will drain away. An open airway is essential at all times. If there is serious facial damage or wounds to the tongue and inside of the mouth it may be necessary to keep the airway open with your fingers until medical aid arrives. Breathing must be continually monitored and you must be prepared to breathe for the casualty if this becomes necessary (see Chapter 3).

Warning

Remember the possibility of a fracture of the bones of the neck, and of injury to the spinal cord.

- place in the coma position (Figure 11.1)
- support the head and neck during movement with great care
- point the face slightly downwards to clear and maintain the airway
- if the face is badly injured use fingers to keep the airway open and to maintain drainage of blood, vomit, mucus etc.
- remove dentures or dislodged natural teeth; keep these safely (see Chapter 25).

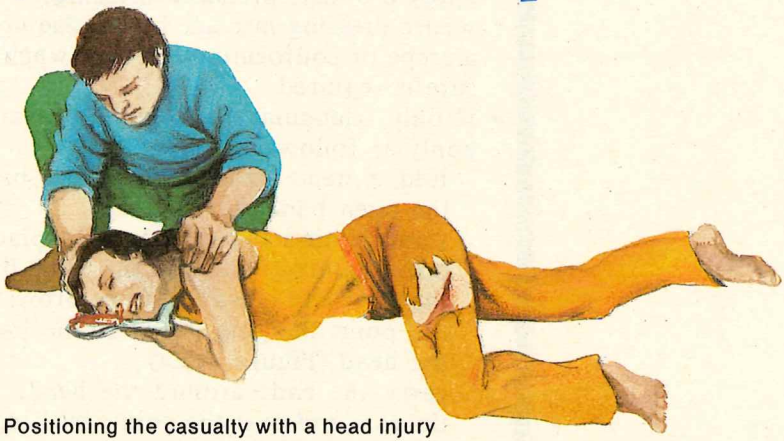
If unconscious with breathing and pulse present

- perform EAR or CPR.

If breathing or circulation fails

- control external bleeding but do not apply direct pressure over obvious or possible skull fractures
- use a ring pad to apply pressure **around** a wound (see Figure 7.5)
- if blood or fluid comes from the ear apply a sterile dressing and secure lightly in position
- if other injuries permit, lay the casualty on his side with the head inclined to the injured side to allow blood and fluid escaping from the ear to drain away.

If bleeding



11.1 Positioning the casualty with a head injury

If the casualty is restless and/or if the jaw is clenched

- do not restrain a restless casualty, but protect from further injury and keep the casualty on his side to ensure drainage of the airway
- do not force the jaw open, but put the head in backward tilt to allow blood and discharge to drain from the side of the mouth.

If the casualty is conscious and does not appear to be seriously injured

- apply bulky, sterile (or clean) dressing to any bleeding area
- secure with a bandage
- control bleeding from lacerations of the tongue, cheek and lips by compression between the thumb and index finger
- lightly cover any eye injury with a sterile or clean pad
- **if safe to do so,** sit the casualty up and loosen clothing about the neck
- if consciousness deteriorates place the casualty in the coma position.

Use of dressings and scalp bandage

- control any bleeding, preferably by pressing the sides of the wound together
- fold any loose tissue back in place
- apply a bulky, prepared dressing
- secure dressing in place by bandaging. Use a crepe or conforming bandage when pressure is required
- if only triangular bandages are available, apply as follows:
  - fold a hem inwards along the base of the open bandage
  - stand behind the casualty and place the open bandage so that the hem lies on the forehead close to the eyebrows, with the point hanging down at the back of the head (Figure 11.2a)
  - carry the ends around the head, above the ears and over the point, crossing near the base of the skull



a b

11.2a-b Applying a scalp bandage

– bring them forward and tie them in a knot at the forehead
– steady the casualty's head with one hand and with the other draw the point of the bandage downwards towards the back of the neck
– turn it up and pin it to the bandage on the top of the head (see Figure 11.2b).

Concussion

Concussion is the word used to describe the altered state of consciousness, often only brief, which is caused by a blow to the head. This is usually followed by loss of memory for events after and/or before the injury. Nausea, vomiting and dizziness are common. Pulse and breathing are frequently abnormal. Concussion results from the rapid acceleration or deceleration which is caused by a blow.

Manage as for head injury.

Compression

Blood escaping from a broken blood vessel inside the skull cavity may accumulate and press down on the brain tissue. This may result in a loss of consciousness, with noisy

breathing, convulsions and altered pupils, for example the pupils may become unequal in size or may be dilated and not react to light. The casualty may 'recover' and then lapse back into unconsciousness.

This is a serious condition needing medical aid urgently.

Manage as for head injury.

Fractured base of the skull

This may occur in severe head injuries. It is usually recognised by the observation of bleeding from one or both ears. The eye lids may be discoloured by blood accumulating inside the tissue, giving a 'black eye' appearance.

Manage as for head injury, taking great care to avoid undue movement of the casualty's head and neck when placing in the coma position.

Jaw injuries

Symptoms of jaw fracture

- pain at the site
- inability to chew.

Signs of jaw fracture

- tenderness at the site
- swelling
- deformity
- misalignment of jaw and teeth
- drooling of saliva.

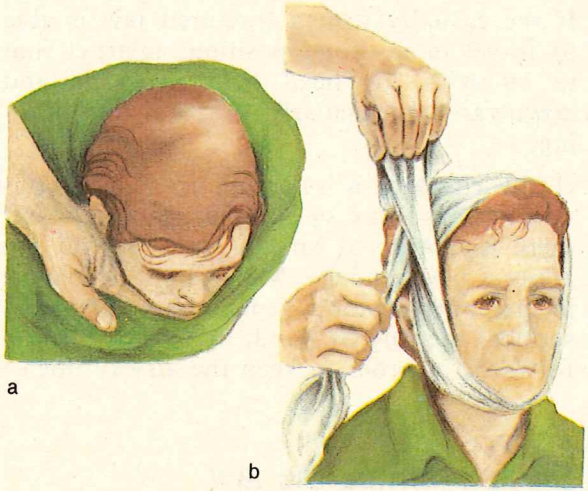


Management of jaw fractures

- DRABC
- support with a jaw bandage, provided that:
  - the casualty is conscious
  - there is no danger of swelling
  - the casualty is not in shock

– the casualty is not or does not feel like vomiting
– the casualty's discomfort is not increased.

To apply a jaw bandage:
- sit the casualty down and instruct him to lean forward
- support the lower jaw with the palm of your hand (Figure 11.3a)
- gently move the lower jaw up to the upper jaw
- pass the centre of a narrow bandage beneath the chin and carry both ends upwards on either side of the face (Figure 11.3b)
- continue the vertical run of the bandage on the injured side, over the head and under the run on the uninjured side



a b

11.3a-d Applying a jaw bandage

- cross the ends immediately at eye level
- carry the short end around the forehead, above the eyebrows to the injured side of the head (Figure 11.3c)
- carry the long end around the back of the head
- tie off the bandage on the injured side (Figure 11.3d).



11.3a-d Applying a jaw bandage

If the casualty with a fractured jaw is able to travel in a sitting position, instruct him to sit with his head held forwards and downwards, particularly if there is free bleeding.

If the casualty is suffering from shock, is unconscious, has swelling or nausea, or if there is danger of airway blockage, do **not** apply a jaw bandage. Manage and transport in the coma position. It may be necessary to support the jaw by hand, or to pull the jaw forward, in order to keep the airway open.

Dislocation of the jaw

Symptoms

- inability to close the mouth
- pain in front of the ear.

Signs

- tenderness over the joint
- a fixed lower jaw, with an open mouth
- drooling of saliva.

Management of dislocation of the jaw

- remove any dentures
- support the lower jaw as for a fracture, if this makes the casualty more comfortable
- do not try to close the casualty's mouth.

Bleeding from the gums

This may follow:
- teeth extraction
- a blow to the mouth.

Management of bleeding from the gums

- instruct the casualty to keep the tongue clear of the socket
- do not attempt to remove the clot in the socket by rinsing
- place a firm pad of gauze over the socket and instruct the casualty to bite firmly onto it
- if the bleeding continues, seek medical or dental aid.

Tooth injuries

This usually follows a blow to the mouth.

Management of tooth injuries

A tooth may be loosened or may be knocked out completely.

A knocked-out tooth

- save a knocked-out permanent tooth; it may be replaced
- cleanse the tooth, preferably by having the casualty suck it in his mouth; otherwise wash in saliva or milk (at room temperature or refrigerator temperature, not warm) — washing gently under a tap is a last resort

- replace the tooth in the mouth in its original position
- hold in place for 2 minutes, then mould a piece of aluminium foil or milk bottle cap over it and two neighbouring teeth on each side; this acts as a temporary splint and is especially necessary if the tooth will not remain in its proper place unaided
- when moulded with the fingers, have the casualty bite firmly onto this splint for added stability
- if the tooth has been in contact with soil or dirt advise the casualty to have an anti-tetanus injection (from a doctor) if not currently immunised
- advise the casualty to see a dentist as soon as possible after the incident.

If the tooth is not replaced:

- place the tooth in the casualty's mouth to keep moist or keep it moist by storage in the casualty's saliva or in milk
- seek dental aid immediately; this is more urgent than if the tooth is replaced.

Note: Quick action increases the chance of successful replacement. If the tooth is replaced within minutes, there is a 90 per cent chance of success. Even if replaced some hours after, the tooth can often last for several years. Baby (first) teeth should not be replaced.

A loosened tooth

If the loosened tooth is out of line, and it will be some time before dental aid is available, straighten the tooth, and splint it with foil or a milk bottle cap.

An inexpensive and neat dental splint can be made with kitchen aluminium foil, about 5 or 10 cm wide, folded on itself to form

several layers. This gives rigidity similar to that of a milk bottle cap. This aluminium foil splint is the best immediate help for loosened or partly displaced teeth once they are realigned. If the injury occurs while playing sport, the casualty should not continue the game, as the splint can become an airway hazard if it is dislodged.



11.4 Splinting a tooth

Fractured nose

See Chapter 25.

12

Eye, ear, nose and throat conditions

This chapter discusses illnesses and injuries of the organs of sight, hearing, smell and speech. The loss of any of these senses results in a very severe disability.

The First Aider must do everything possible to protect these organs for the casualty. Care must also be taken to avoid any action that might increase the injury already sustained.

After studying this chapter you should be able to:

- apply the principles of management of the casualty with injuries to the eyes, ears, nose or throat
- identify and manage a casualty with such an injury
- prevent further damage to these organs.

Learn these words before studying this chapter:

Corrosive	destroying gradually
Evert	to turn inside outwards
Irrigate	to wash with a constant stream of water.

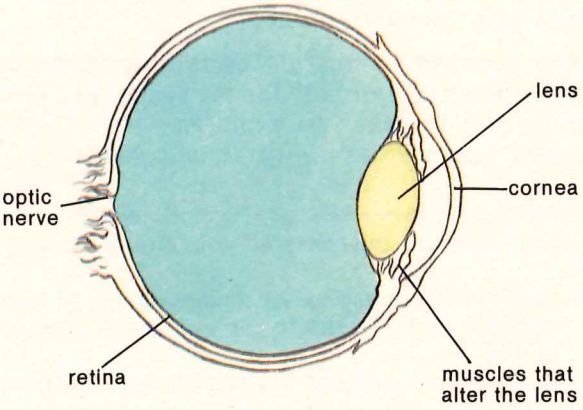
The eyes

The eye, by receiving light, transmits sensations to the brain. We are then able to see the world around us.

The casualty with an eye injury may be worried and distressed because almost every eye injury carries the threat of permanent damage or even blindness.

Warning

The eye is particularly susceptible to infection. Whenever practicable, wash your hands thoroughly before inspecting or treating eye injuries, to reduce this risk.



12.1 The structure of the eye

Eye injuries are caused by:

- foreign bodies lodging in the eye
- heat
- penetrating objects
- direct blows
- burns from chemicals
- smoke.

Foreign bodies in the eye

The most common foreign bodies to lodge in the eye are loose lashes, insects, particles of grit, metal and glass.

Assessment of the casualty

- look for any foreign bodies in the casualty's eye by examining the eye and its surroundings.

History

- ask the casualty what happened
- look around for any obvious cause, for example grindstone, shattered glass, etc.

Symptoms

- pain in the eye, particularly on looking at light
- irritation and/or soreness
- inability to open the eye.

Signs

- tears or weeping of the eye
- spasm or twitching of the eyelids
- redness of the eye
- sensitivity to light.

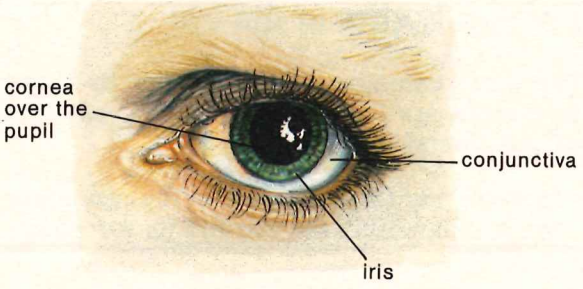
Warning

- warn the casualty not to rub the eye, as this may aggravate the injury
- never try to remove a foreign body from the window of the eye (the cornea — see Figure 12.2)
- never try to remove any object embedded in the eye
- if the foreign body moves away from the cornea, it is safe to remove it.

Management of foreign bodies in the eye

For embedded foreign bodies or penetrating wounds to the eye:

- lay the casualty on a stretcher, if available
- pad **both** eyes, making sure that the dressing does not press on the injured eye by placing thick pads under the dressing, above and below the eye.



12.2 The eye from the front

Small loose foreign bodies are often washed out by tears. If not:

- get a wisp of cotton wool or the corner of a clean handkerchief moistened with cold water
- sit the casualty in a good light — a light source to the side of the eyeball makes the foreign body easier to see.

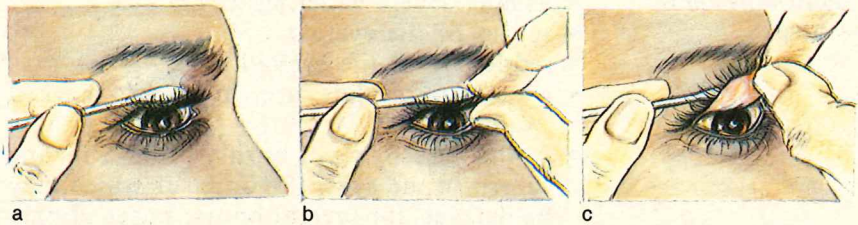
Warning

If the injury is thought to be severe, do not examine the eye, as this may lead to the contents of the eye being squeezed out through any cut in the eyeball.

Examining the eye

- examine the lower lid:
  - instruct the casualty to look up
  - gently draw the lower lid downwards and away from the eyeball to expose the foreign body, and, if seen, remove with cotton wool or a handkerchief corner
- examine the upper lid:
  - instruct the casualty to look down then gently grasp the eyelashes of the upper lid
  - pull the upper lid downwards and forwards over the lower lid; this may dislodge the foreign body, if it does not, then
  - irrigate the eye with a gentle stream of clean water

- evert the upper lid:
  - place a smooth matchstick or stem of a cotton applicator at the base of the upper lid (Figure 12.3a)
  - press it gently backwards, then
  - instruct the casualty to look downwards
  - take hold of the lashes of the upper lid and pull up and over the matchstick or applicator stem and so evert the eyelid (Figures 12.3b,c)
  - if the foreign body cannot be wiped away from the under surface of the eyelid, send the casualty to medical aid.



a b c

12.3a-c Everting the upper lid

Burns to the eye

These may be due to:
- chemicals
- heat
- arc flash.

Chemical burns

These are often caused by corrosive chemicals:
- acids
- caustics, for example strong alkalis such as caustic soda, lime, etc.

Heat burns

Heat burns are often the result of naked flame or radiated heat.

Flash burns

Most often, flash burns are work-related injuries caused by both eyes being exposed

to the light from arc welding while unprotected.

During an eclipse of the sun burns to the back of the eye (the retina) can occur if the eclipse is observed without using adequate screening.

Assessment of the casualty

Obtain a history of the incident and look for the following symptoms and signs.

History

- seek the possible cause by questioning the casualty or bystanders to find out what happened.

Symptoms and signs

- usually severe watering of the eyes
- spasm of the eyelids
- reddening of the eyeball
- when the eyelids are involved, marked swelling
- in the case of flash burns, often a feeling of grit in the eyes, the onset of which may be delayed for several hours; onset of pain may also be delayed.

Management of burns to the eye

Warning

In the case of corrosive burns to the eyes, **immediate** action is necessary to prevent further damage.

Corrosive or heat burns

- open the eyelids with your fingers
- irrigate the eye freely and continuously with cold flowing water for about 20 minutes, ensuring that you irrigate under the eyelids
- place an eye-pad or light clean dressing over both eyes
- seek medical aid.

Flash burns

- cover the affected eyes with eye pads or clean material
- seek medical aid.

To irrigate the eye

- instruct the casualty to incline the head to the affected side with the neck extended
- hold eyelids apart with the thumb and index finger of one hand; this is easier if the casualty tries to open the other eye
- using tap water, gently pour a stream of water into the inner corner of the eye
- continue irrigation for 20 minutes or until medical aid arrives.



12.4 Irrigating the eye

Wounds or crush injuries to the eye

Wounds or crush injuries can occur when the eye socket is struck a blow by a fist, or some other fast moving object, such as a squash ball.

Warning

If the injury is thought to be severe, **do not examine the eye,** as this may lead to the contents of the eye being squeezed out through any cut in the eyeball.

Management of wounds to the eye

- reassure the casualty and help him to lie on his back and rest completely
- place a dressing over both eyes and lightly secure it; ensure there is no pressure on the injured eye
- arrange immediate transport to medical aid
- transport the casualty, on a stretcher if possible, quietly and gently
- instruct the casualty not to move his eyes.

Smoke in the eyes

Smoke is very irritating to the eyes.

Symptoms

- pain.

Signs

- profuse watering
- reddening
- spasm of the eyelids.

Management of smoke in the eyes

- instruct the casualty not to rub the eyes
- irrigate the eyes freely with cold tap water, sterile water or normal saline (salt solution) if available.

Warning

If using water or saline that has been sterilised and stored in a sealed container, discard the remainder of the fluid (once the container has been opened and partly used). It may have become infected.

Bloodshot eye

Sometimes the eye becomes 'bloodshot'. This is usually due to a burst blood vessel as a result of:

- a blow to the head (see Chapter 11)
- violent coughing or sneezing.

It can also occur to people who suffer from diabetes. If the casualty complains of blurred or reddish vision seek medical aid.

Contact lenses

You must always be aware that a casualty may be wearing contact lenses.

The contact lens may protect the cornea (window) of the eye from foreign bodies, but if a small foreign body, liquid, or gaseous contamination should find its way between the contact lens and the cornea, severe damage to the cornea may result.

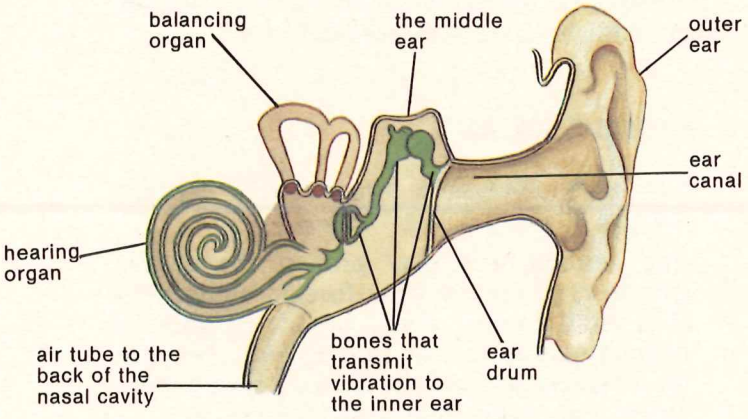
If possible, the casualty should remove the contact lens before the eye is treated. This is particularly important in the case of chemical burns. Adequate irrigation makes removal easier. You **must not** attempt to remove the contact lens for the casualty — this is a skilled task and there is a risk of further injury to the eye, especially the cornea, if this is done improperly.

The ears

As well as enabling us to hear sound, the ears are also important in helping us to keep our balance. Because of these functions, injuries to the ears are serious.

Bleeding from the ear sometimes follows a blow on the head, or a fall. It may indicate:

- a fracture through the base of the skull (see Chapter 11)
- other serious injury requiring prompt medical attention.



12.5 Section illustration of the ear

Management of bleeding from the ears

- **do not** plug the ear canal
- **do not** put in drops of any kind
- allow fluid to drain freely
- place the casualty in the coma position with the affected ear downwards, even if the casualty is conscious
- place a clean pad between the ear and the ground
- seek medical aid urgently.



12.6 Bleeding from the ear

Rupture of the ear drum

The ear drum is a fine membrane stretched across the channel between the outer and middle ears. It is an essential link in the chain that transmits sound to the brain. If the ear drum is ruptured the casualty has diminished hearing in that ear.

The ear drum may be ruptured by the blast of a powerful explosion, scuba diving, pressure changes in flying, a blow to the ear, an object inserted into the ear, or an infection.

Assessment of the casualty

- inspect the ear for evidence of injury
- make a simple assessment of hearing loss, if the casualty is conscious.

History

- ask the casualty and/or bystanders for information about the incident.

Symptoms

- pain in the ear
- deafness.

Signs

- blood or fluid escaping from the ear.

Management of the ruptured ear drum

- reassure the casualty
- seek medical aid
- if bleeding, manage as above.

Foreign bodies in the ear

Any small object can become lodged in the outer ear canal; examples include a:

- pin
- broken matchstick
- bead
- small insect.

Assessment of the casualty

Inspect the ear to see what is lodged there and how deeply it is placed. **Do not probe the ear.**

History

- ask the casualty or bystanders for information about the incident.

Management of foreign bodies in the ear

On no account should you attempt to remove a foreign body from the ear canal (except for floating out an insect, see below). Interference of this kind may well cause lacerations and/or perforation of the ear drum. The casualty should seek medical aid.

Insect in the ear canal

The buzzing of an insect that has crawled into the ear can be very distressing. To relieve the problem:

- drop a little **warm** water or vegetable oil into the ear canal
- if the insect does not float out, leave removal to medical aid.

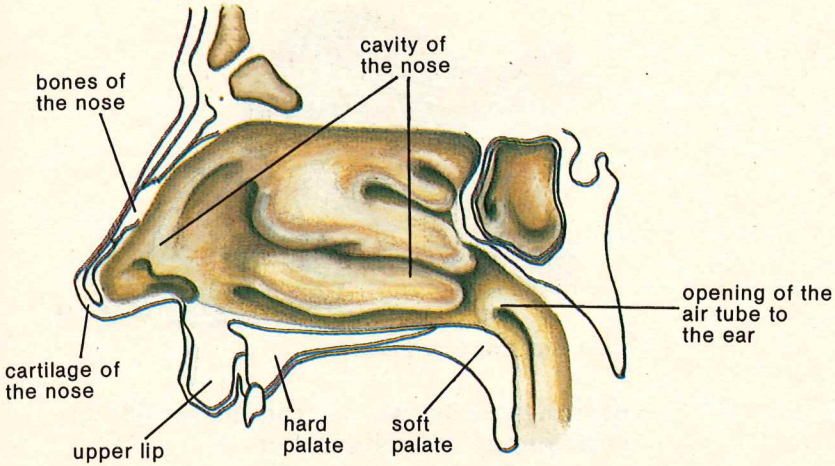


12.7 Removing an insect from the ear canal

The nose

Besides providing the sense of smell, the nose is also part of the airway.

Foreign bodies may be inserted in the nose by a child. The objects are likely to be peas, beans, marbles, cotton, etc.



12.8 Section illustration of the nose

Assessment of the casualty

You can find out what is wrong by looking in the child's nose and by asking what happened.

Management of foreign bodies in the nose

Removal may be difficult and, as a general rule, it is best left to a doctor.

However, if the object is in the lower part of the nose and the child is able to understand instructions, it may be cleared by having the child breathe in through his mouth and blow out through his nose.

- if this is ineffective or the child does not understand the instruction, seek medical aid
- as long as the nose remains obstructed tell the child to breathe through the mouth.

Bleeding from the nose

The casualty may have received a blow to the nose or may suffer from high blood pressure, or bleeding may start spontaneously or from excessive blowing of the nose.



12.9 Bleeding from the nose

Bleeding usually occurs from just inside the nose, on the central partition.

Management of bleeding from the nose

- instruct the casualty **not** to blow the nose
- instruct the casualty to breathe through the mouth
- have the casualty apply finger and thumb pressure on the flaps of the nostrils for at least 10 minutes
- sit the casualty up with the head slightly forward
- loosen all tight clothing around the neck, chest and waist
- keep the casualty cool with a supply of fresh air
- place cold wet towels on the neck and forehead.

Broken nose

See Chapter 25.

The throat

The throat is a vital part of the airway so anything that injures the throat can interfere with breathing. Death can result.

This subject will be discussed in Chapter 17.

13

Spinal injuries

This chapter is about managing a casualty with a suspected spinal injury. Spinal injuries should always be regarded as serious. They require very careful management. Badly handled, the casualty can suffer total paralysis below the site of injury if the incident has not already caused this.

After studying this chapter you should be able to:

- recognise the symptoms and signs of a spinal injury
- manage a casualty with a suspected spinal injury
- describe the dangers of incorrect handling of a casualty with a suspected spinal injury.

Learn these words before studying this chapter:

Disc	fibroelastic tissue between two vertebrae
Spinal cord	bundle of nervous tissue in the centre of the spine
Vertebrae	(singular vertebra) the individual bones that make up the spine.

The spinal column consists of 33 bones, each called a vertebra. They form a protective canal for the spinal cord. Discs of fibroelastic tissue separate the vertebrae and allow some movement between them, as well as acting as shock absorbers.

The spinal cord is an extension of the brain and comprises a large number of nerve fibres. Damage to the cord can result in loss of power and sensation in all parts of the body below the injury. If the injury is high in the neck the resulting paralysis will affect breathing and circulation. Death may result.

Displaced or ruptured discs, or bone fragments that pinch the spinal cord, may cause temporary damage. If the cord is partially or completely cut, permanent damage results.

An injury to the spinal column, that is, the vertebrae and discs, may also result in spinal cord damage, but this is not necessarily so.

However, **twisting or bending an injured spinal column may:**

- worsen cord damage caused at the time of the initial injury
- damage the cord, even though it was not damaged initially.

Always suspect neck injury following head injury.

Common causes of spinal injuries

These may be the result of direct force such as a blow to the back, or indirect force, for example a neck injury following a severe blow to the head. Injuries to the spine, both direct and indirect, are commonly caused by:

- a sudden halt in motor car accidents, or the car being hit from the rear ('whiplash' injury)
- being flung from a vehicle
- heavy falls from a height onto the heels or buttocks
- heavy objects falling onto the casualty's back
- surfing accidents
- diving into shallow water
- skiing accidents (all types).



DRABC

Assessment of the casualty

History

- question the casualty or bystanders about the incident; some incidents, for example front/rear end vehicle collision, have a high potential for spinal injury.

Symptoms

- pain at or below the site of injury
- altered sensation (e.g. tingling)
- loss of power and/or feeling below the site of the injury.

Signs of injuries to the spine

- tenderness over the injury site
- deformity of the neck or spine (*Note:* this should only be felt for if the spine can be examined without moving the casualty. It is found rarely, and is difficult to detect)

Signs of injuries to the spinal cord

- loss of bladder and bowel control
- breathing difficulty may be due to paralysis of the chest muscles. Paradoxical breathing may be present
- signs of shock (due to a loss of 'tone' of blood vessels following injury to the spinal nerves).

Management of spinal injuries

Injury to the spine should be suspected in **all** unconscious casualties. **Handle gently** and **only if necessary.**

If the casualty is unconscious:

- place in the coma position, **ensuring adequate support of the head and neck during movement.**

If the casualty is conscious:

- reassure
- loosen tight clothing
- do **not** move the casualty unless this is essential because of danger
- unless circumstances make it necessary, leave lifting, loading and transportation to a qualified person, such as an ambulance officer.

For special precautions for the transport of spinal injuries, see Chapter 30.

If a neck injury is suspected:

- support the head and neck by hand until other support can be arranged; this is especially important if the casualty is found in a sitting position, as when trapped in a motor car



13.1 An improvised cervical collar

- apply a cervical collar if available, otherwise improvise, using a folded towel, newspaper or other bulky dressing around the neck (Figure 13.1).



13.2 A flotation board for a casualty of a diving accident

When a diving accident has occurred:

- use a flotation or surf board, if handy, to support the casualty before removing from the water (Figure 13.2)
- leave the casualty on the board until a doctor or other qualified person has examined him and decided what to do.

14

Chest injuries

This chapter describes the management of various injuries that can occur to the chest. Because the chest contains and protects the heart, large blood vessels and lungs, injuries to this area can be life-threatening.

After studying this chapter you should be able to:

- identify the various types of chest injury
- describe the risks to the casualty of severe damage to the chest wall
- manage a casualty with a chest injury.

Learn these words before studying this chapter:

Diaphragm	muscular partition between the chest and the abdomen
Sputum	mucus from the lungs, bronchi and throat, that is ejected through the mouth.

The chest is made up of the ribs and breastbone, which, with their attached muscles, form a protective cage. Inside this cage are the heart, lungs and major blood vessels. The chest cavity is separated from the abdominal cavity by a sheet of muscle called the *diaphragm*.

Chest injuries range from a simple bruising of the chest with slight pain or discomfort on breathing, to life-threatening injury to the vital organs, and can seriously affect breathing and circulation.

Types of chest injury include:

- leaking of air and/or blood in the chest space
- contusion or bruising of the lung
- fractured ribs
- flail chest
- penetrating chest wound
- lung injury, for example bleeding, collapse of the lung.

Chest injuries can be caused by:

- blows, for example steering wheel impact
- falls
- crushing
- stabbing
- gunshot
- blast.

The majority of chest injuries result from motor accidents. The best protection from these injuries is the wearing of properly fitting seat belts.

Assessment of the casualty

The nature of the accident will guide you. Pay particular attention to any casualty, injured in an accident, who has breathing difficulty. Otherwise:

- DRABC.



- at accidents, look for any likely evidence of chest injury, for example a buckled steering wheel.

History

Fractured ribs

A rib fracture may be closed and uncomplicated or ribs may be forced into, and damage, the lungs (see Figure 14.1). This may lead to blood, air, or both collecting in the chest space.



14.1 A rib fracture damaging the lung

- pain at the site of injury, possibly becoming worse as the casualty breathes and coughs
- sometimes difficulty in breathing.

Symptoms

Signs

- difficulty in breathing shown by the casualty, who may support the injured side of the chest with his arm or hand
- possibly, short rapid and gasping breathing
- tenderness at the site of the injury
- sometimes frothy bloodstained sputum.

Management of rib fractures

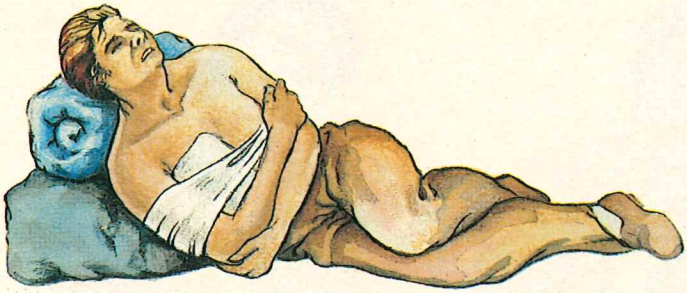
The aim is to support breathing and prevent further injury:

- if conscious, place the casualty in a comfortable position, normally half-sitting with the injured side down (Figure 14.2a)
- encourage the casualty to breathe with short breaths using the diaphragm
- gently place ample padding over the injured area
- apply one or two broad bandages according to the size of the casualty, securing the arm and padding to the chest on the injured side, to help reduce movement of the broken ribs and to reduce pain (Figure 14.2b)
- tie off in front on the uninjured side
- if bandages increase discomfort, loosen or remove them
- immobilise the arm to the chest wall, using a St John sling or collar and cuff sling (Figure 14.2c).

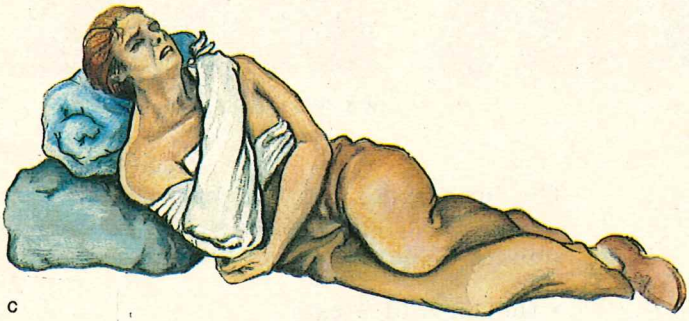


a

14.2a-c Management of fractured ribs



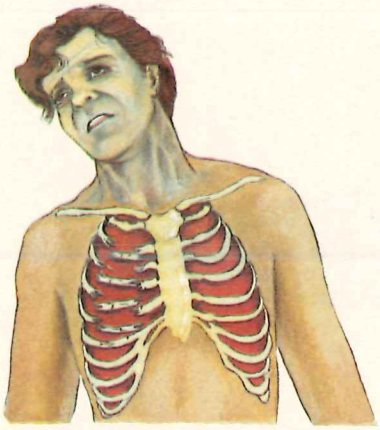
b



c

Flail chest

This term describes an injury in which several ribs are broken, each in more than one place, and in such a way that part of the rib cage becomes loose (see Figure 14.3). This may result from a blow to the chest, for example violent contact with the steering wheel and column of a motor car. This loose or flail part will not move in or out with the rest of the rib cage when the casualty breathes. Instead, it moves in the opposite direction when he breathes (see Figure 14.4). This is called *paradoxical breathing.*



14.3 Flail chest



14.4 Flail section movement

The lung under the flail part of the chest cannot function properly, reducing the amount of oxygen it can take in.

Symptoms

- shortness of breath
- chest pain.

Signs

Some or all of the following:

- severe breathing difficulty
- gasping — 'air hunger'
- bluish colour to the lips, increasing
- difficulty in speaking
- flail section moving in a direction opposite to that of natural breathing
- breathing difficulty increasing with time
- unconsciousness developing.



Management of flail chest

- DRABC
- maintain a clear and open airway
- if conscious, place the casualty in a comfortable position, normally half-sitting with the injured side down (see Figure 14.2a)
- loosen tight clothing
- splint the flail part of the chest by placing

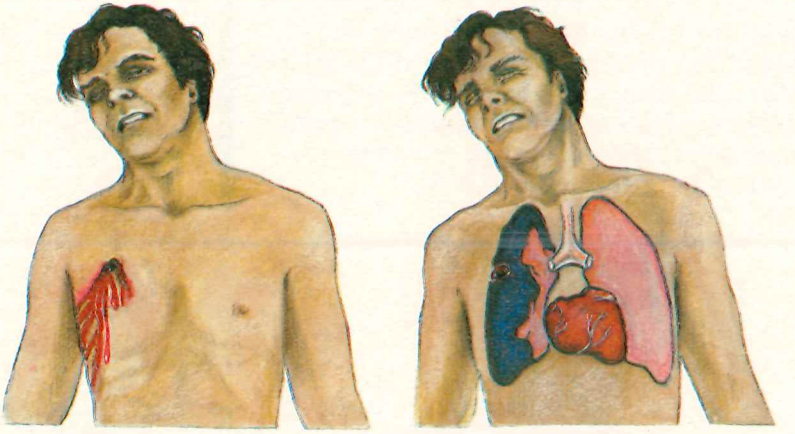
a large bulky dressing over the flail area, with a firm bandage (see Figure 14.5)
- splint the chest with the arm on the injured side; the arm must be bent at the elbow, fingers pointing to the opposite shoulder and securely bandaged to the chest
- if breathing fails, start EAR.



14.5 Management of flail chest

Penetrating chest wounds

An open chest injury may result in air being sucked into the chest cavity (into the space between the chest wall and the lungs, and not into the lungs themselves) during inspiration, and forced out of the chest cavity during expiration. There may be a 'sucking noise'. As air moves into the chest cavity it causes collapse of the lung on the injured side. Often, associated bleeding results in blood accumulating between the collapsed lung and the chest wall.



a b

14.6a-b A penetrating chest wound

Symptoms

- pain at the site of injury
- shortness of breath, increasing.

Signs may include

- the presence of a wound, or blood on clothing
- bluish colour of the lips, increasing
- breathing difficulty increasing
- sucking noise
- unconsciousness developing
- possibly crepitus (a dry, crackling feeling), due to air in the tissues of the neck or chest wall.

Management of chest wounds

The aim is to prevent air from entering the chest and to encourage air trapped within the chest to be expelled:

- if conscious, place the casualty in a comfortable position, normally half-sitting with the injured side down
- expose the wound

- place your hand over the wound until an airtight dressing is available — plastic sheet, a plastic bag or aluminium foil are ideal materials for such a dressing
- apply the airtight dressing to the wound and tape down the top and both sides but do **not** tape the bottom edge; this acts as a one-way valve, allowing air to escape from the chest cavity but not to enter (Figure 14.7).



14.7 Management of a penetrating chest wound

If an airtight dressing and adhesive tape are not available:

- place an ordinary sterile (or clean) dressing over the wound and bandage or hold in place
- if the casualty's respirations become worse or distress increases, remove the dressing
- it may be necessary to assist the casualty's respiration with EAR.

15

Injuries and emergencies of the abdomen and pelvis

This chapter deals with injuries to the abdomen, the lower back and the pelvis. Prompt and effective first aid can prevent serious consequences.

After studying this chapter you should be able to:

- identify and describe injuries or emergencies of the abdomen and pelvis
- describe why these injuries and emergencies can be serious for the casualty
- manage the casualty with injury or an emergency of the abdomen or pelvis.

Learn these words before studying this chapter:

Ovarian	belonging to the ovary, which is the female sex gland in which the ova (eggs) are formed
Pelvis	the bone structure that forms the lowest part of the trunk.

The abdomen is bounded above by the *diaphragm,* and below by the *pelvis,* behind by the *spine* and in front and at the sides by the muscles of the abdomen. It contains a number of important organs, including the *stomach,* the small and large *intestine,* the *liver, pancreas, spleen* and *kidneys.*

The lower portion of the abdomen is often referred to as the pelvic cavity. It contains the urinary *bladder, reproductive organs* and *rectum.*

Some organs in the upper abdomen are solid. If injured they may bleed profusely into the abdominal cavity. They are the spleen, liver, and pancreas. Other organs like the bowel are hollow. Injury to the hollow organs will result in spilling of contents into the abdominal cavity. This will cause serious inflammation, that is, peritonitis. **Injury to the abdomen requires prompt medical and surgical attention.**

As a result of internal bleeding, pain or inflammation, shock (see Chapter 6) is often a serious complication of injuries and emergencies of the abdomen and pelvis.

Injuries of the abdomen

Injuries to the abdomen can be caused by:

- road crashes
- sports injuries
- blunt objects
- crushing by a heavy weight
- sharp instruments such as knives
- heavy falls
- swallowed foreign bodies.

Assessment of the casualty

Try to find out the cause of the injury, by taking a history

History

- Obtain the history of the incident from the casualty and/or bystanders, to help you to assess the likely nature of injuries or illness.

Symptoms

- pain at the injury site
- nausea.

Signs

Some of the following, depending on the area affected:

- pallor
- grunting breathing
- evidence of the injury (e.g. bruising or stab wound)
- vomiting
- marked tenderness over the abdomen
- rigidity of the abdominal wall (muscles have contracted to protect the area)
- blood in the urine
- escape of blood from the anus or reproductive organs
- protrusion of intestines (uncommon, but serious)
- onset of shock (see Chapter 6).



Management of injuries of the abdomen

- DRABC
- rest the casualty, loosen clothing around the neck, chest and waist, ensure that the casualty is lying on the back with the head and shoulders slightly raised and a blanket placed under the knees to relax the abdominal muscles (Figure 15.1)
- provide reassurance
- **give nothing to eat or drink,** but if the casualty complains of thirst, moisten his lips
- seek medical aid urgently
- cover protruded intestines with a large non-stick sterile dressing or aluminium foil. If not available use sterile saline packs or dressings soaked with **clean** water. Do not use a dry dressing as it will adhere to the bowel.



15.1 Management of an abdominal injury

Management of internal abdominal bleeding

See Chapter 5.

Swallowed foreign body

Pins and other small objects, such as coins or buttons, can be accidentally swallowed. Small objects need not cause alarm unless there is respiratory distress.

- do not give fluids or food by mouth
- seek medical aid.

Emergencies of the abdomen

Many diseases of the abdominal and pelvic organs have a sudden onset and need emergency treatment. The commonest of these are:

- gastro-enteritis due to an infection of the bowel
- inflammation of the appendix
- crisis in gastric ulcers and gall bladder disease

- blockage of the bowel
- pain due to the presence of kidney or gall bladder stones
- liver diseases
- rupture of a pregnancy in the tubes
- diseases of the ovaries.

Symptoms

- pain in the abdomen or lower back
- nausea.

Signs

- vomiting
- tenderness in the abdomen
- rapid breathing and pulse
- rigidity of abdominal muscles
- possibly, high temperature
- possibly, swelling of the abdomen
- onset of shock (see Chapter 6).



Management of emergencies of the abdomen

- DRABC
- rest the casualty, loosen clothing around the neck, chest and waist, ensure that the casualty is lying on the back with the head and shoulders slighty raised and a blanket placed under the knees to relax the abdominal muscles (Figure 15.1)
- provide reassurance
- **give nothing to eat or drink,** but if the casualty complains of thirst, moisten his lips
- seek medical aid urgently.

Crush injury of the lower back

This occurs when a casualty has been crushed or trapped under falling masonry, machinery or some other heavy object. It usually involves soft tissues. The kidneys may be injured and sometimes bones may be fractured, so you should always suspect possible spinal injury (see Chapter 13).

Symptoms

There may be:
- pain at the site of injury
- numbness or tingling of the legs
- inability to move the legs, and paralysis.

Signs

- onset of shock (see Chapter 6)
- redness or swelling at the site of injury
- bruising or bleeding from soft tissue injury
- blood in the urine if the kidneys or bladder are injured
- sometimes inability to urinate.



Management of crush injuries of the back

- DRABC
- lay the casualty on the back with head down and legs raised if possible
- warn the casualty not to move
- turn the casualty's head to one side (Figure 15.2)
- keep the casualty comfortably warm but do not overheat
- if the casualty complains of thirst moisten his lips but **do not give anything to drink**
- seek medical aid urgently
- if the casualty becomes unconscious place him in the coma position and monitor:
  - **A**irway
  - **B**reathing
  - **C**irculation until medical aid arrives.



15.2 Management of a crush injury to the lower back

Injuries of the pelvis

These are usually caused by direct crush injury in the pelvic area or by indirect force as can occur in a motor vehicle accident. An example of this would be when, in a front end collision, the engine of the car forces the floor and firewall violently against the casualty's feet. Indirect force is applied through the legs and hip joints to the pelvis.

Fracture of the pelvic bones may result in injury to the bladder and urinary passages. One or both sides of the pelvis may be fractured. Severe internal bleeding may result.

Symptoms

- pain in the region of the hips or groin, increasing with movement
- internal pain, suggesting bladder injury
- inability to stand.

Signs

Some or all of the following:

- marked tenderness
- irregularity of the pelvic bones (rarely)
- possibly, bruising in the groin or, in the male, in the scrotum
- onset of shock (see Chapter 6).



Management of injuries of the pelvis

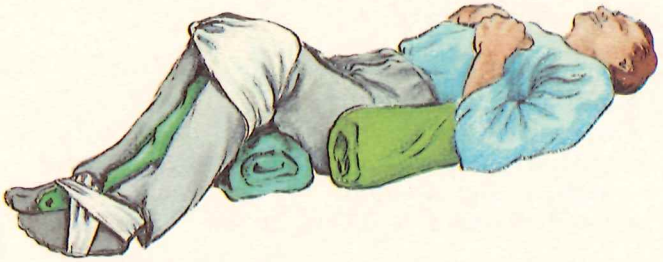
- DRABC
- place the casualty flat on the back with the knees slightly bent and supported by a folded blanket, or in a position of comfort (Figure 15.3)
- immobilise on a stretcher or firm support
- remove the contents of nearby pockets
- instruct the casualty not to pass urine (there may be a strong desire to do so)
- seek medical aid urgently
- reassure the casualty.



15.3 A casualty with a pelvic injury awaiting medical assistance

If circumstances are likely to result in delay, or there is a need to transport the casualty, in addition to the above:

- place soft padding between the knees, legs and ankles
- apply a narrow bandage, figure of eight, around feet and ankles
- apply a broad bandage around the knees
- support the pelvis on either side with rolled up blankets or other material (Figure 15.4).



15.4 A casualty with a pelvic injury prepared for transport

Emergencies of the pelvic organs

These may result from:

- retention of urine
- in the female, miscarriage or rupture of a pregnancy in the tubes
- ovarian diseases.

Retention of urine

This occurs when the bladder outlet is blocked or the bladder is paralysed.

Symptoms

- pain in the front of the pelvis
- extreme desire to pass urine.

Signs

- possibly, a large swelling in the lower abdomen.

Management of retention of urine

- lay the casualty on the back with the legs raised and a blanket under the knees
- seek medical aid urgently.

Emergencies of the female reproductive organs

These may result from:
- miscarriage
- heavy uterine bleeding ('flooding').

Symptoms

There may be:
- pain in the lower abdomen and groin
- bleeding from the vagina.

Signs

Some or all of the following:
- tenderness in the lower abdomen on one or both sides
- shock developing, from loss of blood.

Management of emergencies of the female reproductive organs

- lay the casualty on her back with her legs raised
- seek medical aid urgently.

Injury of male reproductive organs

The testicles are prone to injury, particularly from assault and sporting incidents.

Symptoms

- excruciating pain
- nausea.

Signs

- 'doubling up' with guarding of the injured area
- swelling
- bruising
- tenderness
- vomiting.

Management of injury of the testicles



- DRABC
- rest and reassure the casualty
- lay the casualty on his back, with knees slightly bent and supported by a folded blanket, or in a position of comfort
- instruct the casualty not to pass urine
- seek medical aid.

16

Limb injuries

This chapter is about the practical management of injuries of the limbs in order to minimise discomfort for the casualty and to prevent further damage to the injured part.

After studying this chapter you should be able to:

- identify and describe an injury of any of the limbs of the human body
- manage the casualty with an injured limb.

The nature of injuries of the limbs and the principles of management are covered in Chapters 8 and 10. These principles should be applied together with specific management for the specific injuries now described. However, if the circumstances do not allow the use of the methods described, you must be able to improvise adequate immobilisation.

Fractures of the upper limb

Fractures of the collar-bone (clavicle)

The collar-bone, also called the clavicle, gives support to the shoulder area. It may be fractured as a result of direct force, or more commonly from indirect force, for example as a result of a fall on the outstretched hand or on the point of the shoulder.

Symptoms

- pain at the site of the injury
- loss of function.

Signs

The following signs may be observed:

- the casualty supporting his arm at the elbow and inclining his head toward the injured side, which relieves pain and muscle tension
- sometimes, an unusually 'square' appearance of the shoulder
- deformity of the collar-bone may be easy to see.

Management of collar-bone fractures

- support the arm on the injured side in a St John sling (for alternative method of immobilisation [figure-of-eight bandage] see Chapter 31)
- seek medical aid.



16.1 A patient with a fracture of the collar-bone

Fractures of the shoulder-blade (scapula)

The shoulder-blade, also called the scapula, is a large flat bone not easily fractured. Because the injury results in back pain or pain adjacent to the spinal area, it is best to assume a spinal injury and treat accordingly.

Fractures of the upper arm (humerus)

The single bone of the upper arm is called the humerus. A fracture of the upper arm can occur anywhere along the shaft of the bone. If it is near the elbow it may be especially serious as the nerves and blood vessels may be compressed, with a loss of circulation in the forearm and hand.



16.2 Management of fractures of the collar-bone

Symptoms

- pain at the site of injury
- loss of function.

Signs

The following signs may be observed:

- swelling at the site of injury
- the casualty supporting the injured arm below the fracture, in an attempt to reduce pain.

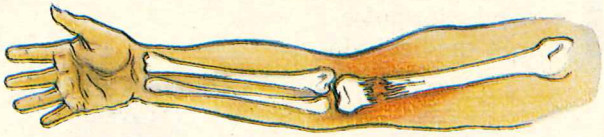
Management of upper arm fractures

Management will depend on the site of the fracture.

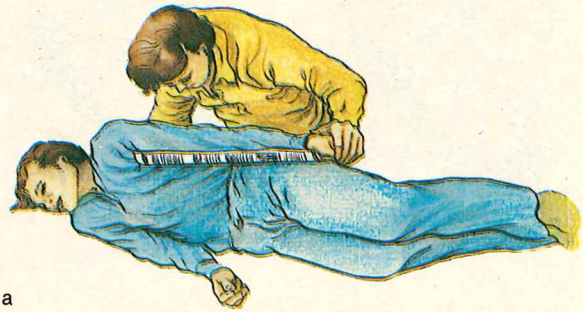
When the injury is close to, or at, the elbow

- lay the casualty down, supporting the injured area while moving the casualty
- check the pulse at the wrist and note the colour of the skin of the hand and fingers
- gently place the injured limb in the most comfortable position for the casualty with the elbow remaining in the position it has adopted
- before moving, immobilise the arm firmly to the body with broad bandages:

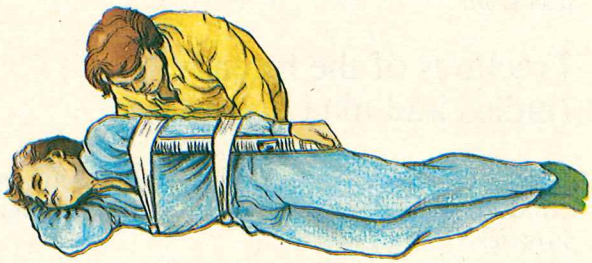
  - around the upper arm and body above the fracture site
  - around the forearm and body
- tie off the bandages in front on the uninjured side of the body
- seek medical aid urgently
- continually check the pulse at the wrist, and the colour and temperature of the skin of the hand.



16.3 A fracture of the upper arm (close to the elbow)



a

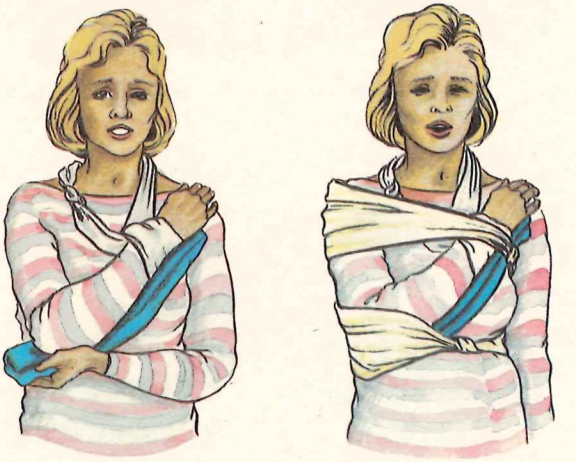


b

16.4a-b Management of a fracture of the upper arm (close to the elbow)

When the injury is mid-shaft, not close to the elbow

- apply a collar and cuff sling
- place soft padding between the elbow area and the chest
- immobilise the arm with two broad bandages (or narrow ones for a small person):
  – one above the fracture, over the arm and around the chest
  – the other below the fracture
- tie off the bandages in front on the **uninjured** side
- check the pulse
- seek medical aid.



a b

16.5a-b Management of a fracture of the upper arm (mid-shaft)

Fractures of the forearm (radius and ulna bones)

Fractures of the forearm occur commonly in children and result from falls and similar injuries.

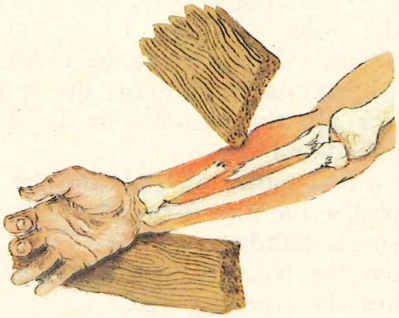
Symptoms

- pain at the site of the injury
- loss of power.

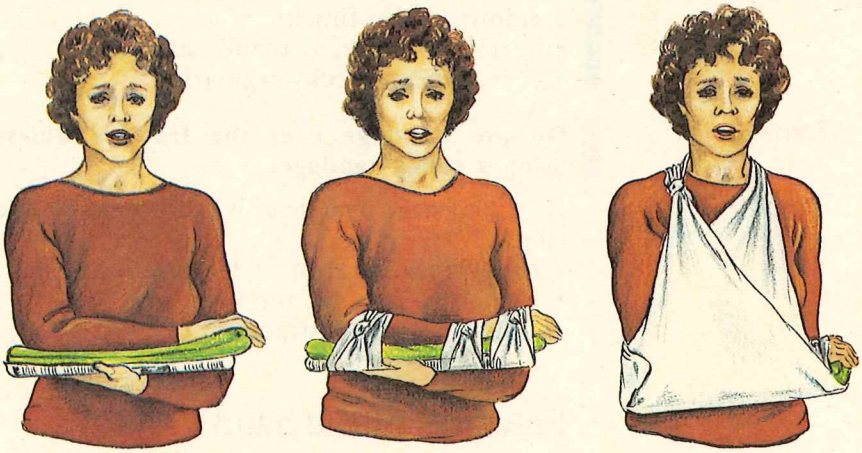
Signs

The following signs may be observed:

- often deformity, if both forearm bones are fractured
- the casualty supporting the fractured forearm with the other arm, to lessen pain.



16.6 A fracture of the forearm



a b c

16.7a-c Splinting a forearm fracture

Management of forearm fractures

If the fracture is **not** adjacent to the elbow

- improvise a splint by folding a newspaper, cardboard, or magazine, or by using a piece of flat wood or other firm material
- ensure that the splint extends from the elbow to the fingers
- pad the splint
- gently place the splint to the forearm and ask a bystander to support the splint and arm, or ask the casualty to do this with his other hand
- place a pad under the palm of the hand
- immobilise the limb firmly to the splint by applying a bandage:
  – above the fracture, below the elbow,
  – below the fracture, and
  – to secure the splint to the wrist and hand
- tie off the bandages in the most comfortable position
- apply an arm sling
- seek medical aid
- check the circulation by observing the colour of the fingers
- check the pulse, if readily accessible
- repeat these checks regularly.

Warning

Do not bandage over the fracture unless using a roller bandage.

If a forearm fracture **is** adjacent to the elbow:

- immobilise the arm in the position found
- check the pulse at the wrist
- seek medical aid urgently.

Fractures of the hand

Fractures of the hand and fingers, although painful, usually require only minimal immobilisation. Some injuries may be complicated by soft tissue damage.

Symptoms

- pain at the site of injury.

Signs

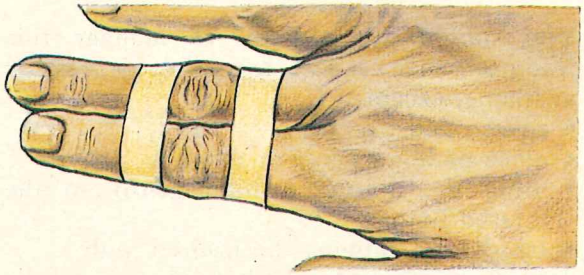
- swelling and deformity
- bleeding, if there is a wound.

Management of hand fractures

- apply a St John sling
- place soft padding between the forearm and hand, and the chest
- further support the upper limb with a broad bandage over the arm and forearm
- tie off in front on the uninjured side
- check the pulse at the wrist.

Management of finger or thumb fractures

- with fractures of the finger, strap the injured finger to the adjacent finger
- immobilise a fractured thumb in the most comfortable position
- support in a St John sling.



16.8 A fracture of the finger

Fractures of the lower limb

Fractures of the thigh (femur)

The upper leg is supported by a single long bone, the femur. It is a very strong bone, surrounded by powerful muscle. It is accompanied by several large arteries, veins and

nerves. Due to its abundant blood supply, and the abundant blood supply of adjacent tissues, a fracture of the thigh is accompanied by serious blood loss, which may be life-threatening. This will be aggravated if the fracture is open.

Symptoms

- severe pain at the site of the injury
- loss of power in the limb.

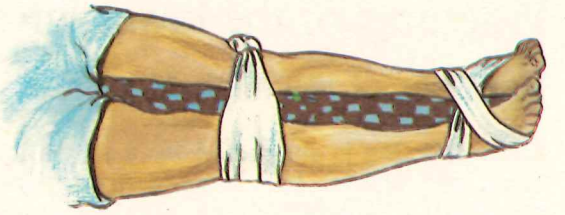
Signs

- gross tenderness at the site of the injury
- deformity over the fracture site
- swelling due to the large amount of internal bleeding that takes place — although this may not be obvious
- outward rotation of the foot of the injured leg may occur
- marked shortening of the injured leg, commonly present
- shock (see Chapter 6).

Management of fractures of the thigh

You should not attempt to manage this fracture when expert assistance is readily available, except to:

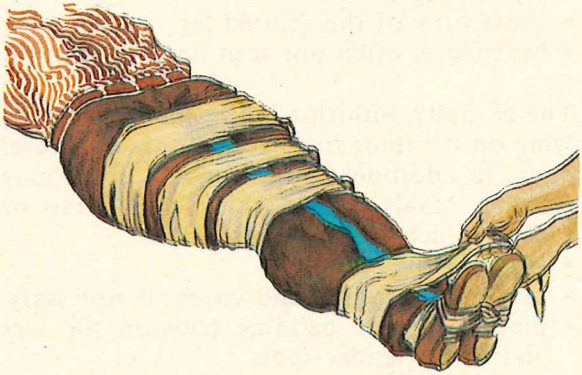
- cover open wounds
- place padding between the legs
- bring the uninjured limb **gently** to the injured limb
- steady and support the injured limb
- apply a figure-of-eight bandage around the ankles and feet
- apply a broad bandage around the knees, and tie on the uninjured side.



16.9 Management of a fracture of the thigh

If expert assistance is likely to be delayed or if isolation makes it necessary for you to transport the casualty:

- bring the uninjured limb gently near to the injured limb
- place a well-padded splint between the legs
- place one hand under the heel and the other around the toes of the injured limb
- gently draw down to apply traction to the foot, while rotating the leg to a position as nearly normal as possible against the splint
- apply a narrow bandage as a figure-of-eight around the ankles and feet; **(do not let go until the figure-of-eight bandage is applied and the limb is secured by a helper, this requires two First Aiders)**
- pass bandages under the casualty in the following order:
  - the thighs above the fracture
  - the thighs below the fracture
  - both knees
  - between the knees and the ankles
- tie these bandages on the uninjured side
- check the circulation of both limbs (note the colour and temperature of the skin and feet).



16.10 Management of a fracture of the thigh using a splint

Fractured neck of the thigh bone

A fractured neck of the thigh bone usually occurs in the elderly (more often in women). It is frequently caused by a fall on to the hip. Sometimes the fracture is caused by normal activity on aged or diseased bone. It may be mistaken for a badly bruised hip. An elderly person who, after a fall or minor injury, complains of pain in the region of the hip and some loss of limb movement, should be considered to have a fracture of the neck of the thigh bone, provided that there is no evidence of injury to the shaft of the bone. Sometimes the head of the bone collapses and impacts on the neck, and the casualty may continue to walk, even though a serious injury is present.

Symptoms

- pain in the region of the hip, the thigh, or the knee
- pain on moving the limb
- loss of power in the limb.

Signs

- tenderness over the hip
- often, outward rotation of the foot of the injured leg
- shortening of the injured leg
- bruising is often not seen until later.

Management of fractured neck of the thigh bone

The casualty with this injury may have been lying on the floor for several hours or several days. In addition to the fracture, there may also be scalds to the skin from urine or faeces, which will need attention.

- reassure the casualty
- make comfortable and cover, if necessary
- place adequate padding between the legs and under tender spots
- gently support the injured limb in a natural position and apply a:

  - figure-of-eight bandage at the ankles
  - broad bandage at the knees
- seek medical aid.

Fracture of the knee cap (patella)

The knee cap, protects the knee joint. Violent muscular action, for example slipping on a stair, may snap the bone in two. The knee cap may also be fractured or displaced by a direct blow.

Symptoms

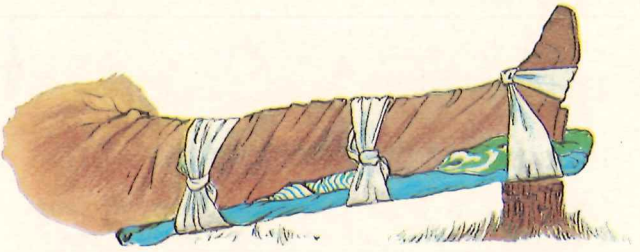
- pain over the knee cap, aggravated by movement
- loss of power at the knee with inability to completely straighten the leg at the knee.

Signs

- tenderness over the knee cap
- swelling over the front of the knee
- sometimes a gap can be felt at the front of the knee
- sometimes a displaced knee cap can be felt.

Management of knee cap fractures

- lay the casualty down on his back with head and shoulders raised
- raise the leg about 30 centimetres and support it in the most comfortable position
- do not attempt to straighten the knee
- if the limb can be splinted without increasing discomfort, then
  - apply a pressure bandage to surround the knee joint (figure-of-eight crepe or conforming bandage)
  - apply a splint along the back of the limb from buttock to beyond the heel
  - ensure that the splint is adequately padded, particularly under the natural hollows of the knee and ankle
  - secure the limb to the splint by a figure-of-eight bandage around the ankle and foot, broad bandage around the thigh, and broad bandage around the lower leg



16.11 Management of a fracture of the knee

- keep the injured limb supported and raised
- seek medical aid.

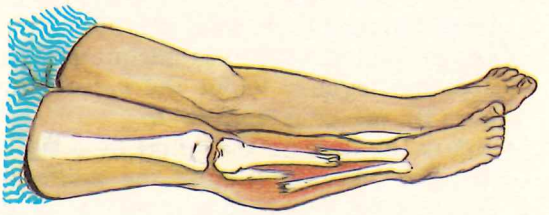
Note: The knee cap will need to be covered to treat any wound, but it should be **surrounded** and not covered by the pressure bandage.

Fractures of the lower leg (tibia and fibula)

The shin bone, also called the tibia, is a very strong bone, but lies close to the surface of the lower leg. Therefore, a fracture of the shin bone often results in an open fracture, with loss of blood and the risk of infection. The small bone alongside is called the fibula. It almost always fractures simultaneously with the shin bone.

Symptoms

- pain at the site of injury
- inability to walk.



16.12 Fracture of the lower leg

Signs

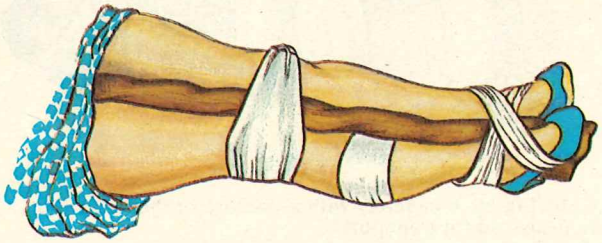
- shortening of the injured leg
- deformity in the injured leg
- swelling at the site of the injury.
- outward rotation of the foot of the injured leg
- open fracture with protruding bone and bleeding.

Management of lower leg fractures

When one leg is injured

Management may need to include transporting the casualty if expert assistance is not available.

- control bleeding and cover wounds
- place padding between the legs
- bring the uninjured limb to the injured limb
- steady and support the injured limb
- apply a figure-of-eight bandage around the ankles and feet
- apply a broad bandage around the knees, and tie on the uninjured side.



16.13 Management of a fracture of the lower leg with wound covered

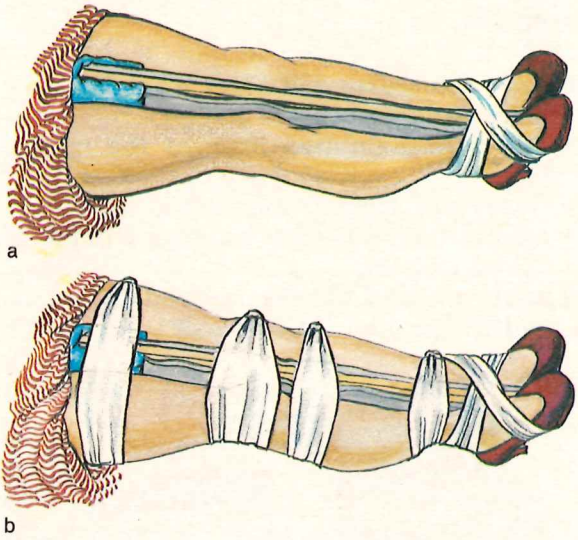
If expert assistance is likely to be delayed or if isolation makes it necessary for you to transport the casualty:

- control bleeding and cover wounds
- place a well padded splint between the legs from the thighs to the ankles, and additional soft padding between the thighs, knees and ankles

- apply a figure-of-eight bandage around the ankles and feet
- apply a broad bandage around the thighs, at the knees, and above and below the fracture

or

- if available, use a full leg air splint in place of the above procedure (see Chapter 31)
- seek medical aid.



a

b

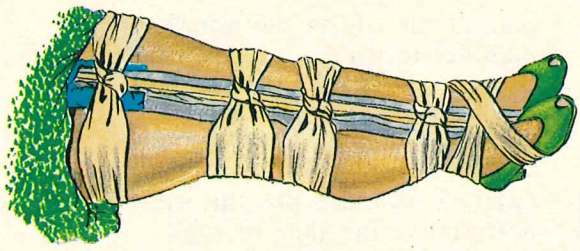
16.14a-b A casualty with a fracture of the lower leg, prepared for transport

When both legs are injured

- follow the principle of immobilising the limb joints, that is, ankles, thighs, knees and above and below the fracture sites
- tie the knots between the legs, and not directly over either leg. (See Fig. 16.15)

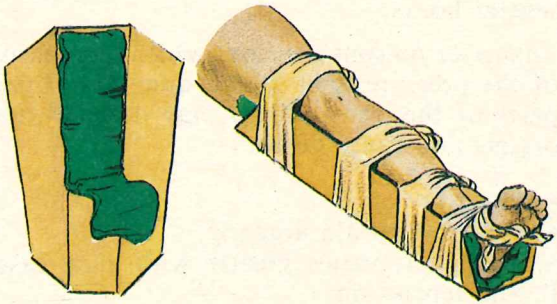
Cardboard splints

A length of cardboard, or two lengths in the case of both legs being fractured, folded as illustrated, may be used to support and splint



16.15 A casualty with a fracture of both legs, prepared for transport

a fractured leg. Tie the cardboard to the limb with a figure-of-eight bandage about the foot and ankle, a broad bandage as close to the top end of the splint as possible, and a broad bandage above and below the fracture. To improve comfort, pad the cardboard, for example with a towel.



a b

16.16a-b Cardboard splints

Fractures of the foot and toes

These injuries commonly occur when a heavy weight is dropped on the foot, or the foot is crushed. They may also be caused by severe twisting or turning.

Symptoms

- pain at the site of the injury
- inability to walk.

Signs

- tenderness
- swelling.

Management of foot fractures

- unless a wound is present or suspected, do not remove the shoe or sock
- rest the foot on a pillow, in an elevated position
- seek medical aid.

Crushed limbs

Injuries may occur in which a casualty is pinned by a heavy object bearing on a limb, such as a leg. That part of the limb beyond the point of pressure may have suffered severe oxygen loss due to interruption of the blood circulation. This is especially dangerous if the casualty has been trapped for several hours.

Toxins or poisons develop, which, on release of the pressure, will spread quickly to other parts of the body and so may damage vital organs and cause death.



Management of crushed limbs

- DRABC
- seek medical aid urgently.

Management varies greatly with each case. It will depend on:

- nature of the injury
- site of the injury
- length of time the casualty has been trapped
- availability of rescue equipment
- availability of medical aid.

It is vital that medical advice be obtained as quickly as possible, preferably before the pressure is released, so long as this is not unduly delayed.

After removing the pressure from the limb:
- immobilise with a splint
- elevate the limb
- apply ice packs
- manage the other injuries.

See Chapter 7.

Management of amputated parts

Dislocations

Dislocations are injuries in which the bones of a joint are pushed out of normal contact with each other.

See Chapter 8.

General management

Finger dislocations

No attempt should be made to reduce these.

- immobilise and support by strapping the injured finger to the adjacent finger
- support in a St John sling
- refer the casualty to medical aid.

Management of finger dislocations

Shoulder dislocations

- support the shoulder and arm in the position of least discomfort
- apply ice packs
- seek medical aid.

Management of shoulder dislocations

Knee cap dislocations

Management

- manage as fractured knee cap (see above).

Jaw dislocations

See Chapter 11.

5

Care of the acutely ill

17

Breathing disorders

Breathing disorders may cause a reduction in the amount of oxygen reaching the body cells. This can result in damage to the brain and other vital organs, and may lead to death.

After studying this chapter you should be able to:

- describe the causes of breathing disorders in a casualty
- recognise the breathing disorder being suffered by a casualty
- manage the casualty with a breathing disorder until medical aid arrives.

Learn these words before studying this chapter:

Larynx	the voice box
Spasm	sudden, involuntary contraction of muscle or muscles.

This chapter must be studied in conjuction with Chapter 2 ('The human body') and Chapter 3 ('The ABC of resuscitation').

Breathing is essential to maintain life, as it is the means of providing the oxygen necessary for organs and tissues to live and function. Air breathed in through the mouth and nose contains oxygen, which the lungs exchange for carbon dioxide from the blood. Air containing this waste gas is then breathed out, while the vital oxygen is carried to the organs and tissues of the body by the circulating blood.



The maintenance of breathing takes priority over all other first aid procedures. At all times remember DRABC.

A special area in the brain controls the rate, depth and rhythm of breathing. You must observe and record the rate and depth of breathing and report these to the ambulance officer or doctor who takes over management of the casualty. **Noisy breathing, including snoring and gurgling, always means an obstructed or partially obstructed airway. This must be attended to at once.**

The brain also controls the heartbeat. If the heartbeat is irregular or slow, lack of oxygen may occur because the circulation is not functioning at full capacity.

Lack of oxygen can result from:

- drowning
- spasm of the larynx
- strangulation
- hanging
- choking
- swelling of the tissues within or around the throat
- asthma

- chest injuries — flail chest or sucking wound (see Chapter 14)
- paralysis of the chest muscles
- suffocation by toxic fumes or gases (including carbon monoxide)
- electric shock
- heart conditions (see Chapter 18)
- conditions of the central nervous system:
  - head injury (see Chapter 11)
  - lowered activity of the special area in the brain that controls breathing; this may be caused by drugs, injury or disease (see Chapters 11, 19, 20, 21).

Lack of oxygen which if not corrected can lead to brain cell damage, may result in:
- an altered level of consciousness
- absent breathing
- absent pulse
- death.



Assessment of the casualty

- DRABC

History

The circumstances in which the casualty is found will indicate the nature of the incident. If conscious, the casualty may be able to give further information. You will usually have to rely on bystanders for a description of the incident.

Symptoms

There may be:
- shortness of breath
- painful breathing
- dizziness.

Signs

Some or all of the following:
- breathing:
  - increased in rate
  - increased in depth
  - laboured

  – wheezing
  – noisy with frothing at the mouth
- blueness of the face, lips, ears and nail beds
- gasping speech
- swollen veins of the head and neck
- reddening of the whites of the eyes
- confusion and restlessness
- loss of consciousness, followed by cessation of breathing and/or pulse.

The above symptoms and signs are common to most breathing disorders. Additional symptoms and signs may be present with specific conditions.

Specific breathing disorders

Some special breathing disorders are described below.

Drowning

Drowning is preventable!

People should learn to swim and should know:
- safety rules for boating (see Chapter 29)
- safety rules for swimming pools (see Chapter 29)
- basic life saving and rescue techniques (see Chapter 29).

Special problems in resuscitation of the near-drowned

The most important single consequence of near-drowning is interruption to the oxygen

supply to the brain. The availability of early rescue and resuscitation are the major factors in survival.

Possible sequence of events in near-drowning

- total immersion of the face and/or body in liquid
- breath holding, the length varying with:
  - health
  - previous exercise
  - panic
  - water temperature
- eventually vigorous breathing efforts, leading to:
  - water in the upper airway
  - laryngeal spasm
  - vigorous coughing
- swallowing of air and water leading to vomiting
- more vigorous breathing effort, even during unconsciousness, leading to:
  - relaxation of laryngeal spasm, with water and vomitus entering the lungs
  - in a small number, laryngeal spasm.

Note: It is important to clear water and vomitus before starting EAR.

Special problems influencing rescue and resuscitation

Resuscitation of victims of near-drowning requires understanding of several particular features.

Deep water

EAR should be started provided that safety is not jeopardised. Resuscitation in deep water needs flotation aid.

Swimming ability of the rescuer

No person should attempt a rescue beyond his swimming ability.

Vomiting and regurgitation

Clear the airway (see Chapter 3). Even conscious victims after a 'near miss' may vomit copiously.

Late deterioration

Quite often, the casualty deteriorates after apparently successful rescue. Consciousness may be lost, breathing may stop and the heart may stop. **Careful observation of the casualty is essential.** Delayed lung complications following immersion are very common. Seek medical aid urgently.

Which immersion victims to send to hospital?

- hospital admission is essential for:
  - any victim who has lost consciousness even for a brief period
  - any victim who has required resuscitation
- in other cases, hospital admission may not be necessary if, after 10 to 15 minutes of careful observation while being warmed with blankets, the victim has all of the following:
  - full consciousness and is awake and alert
  - no cough
  - normal rate of breathing
  - normal pulse rate
  - normal colour
  - no shivering
  - normal body temperature.

Warning

The casualty must not be allowed to drive and must be advised to seek medical aid if cough, breathlessness or fever develop.

Signs associated with drowning

- cessation of breathing
- bluish face and lips
- possibly, a fine, foam-like froth exuding from the mouth and nostrils
- possibly, no pulse.

Management of the drowning casualty

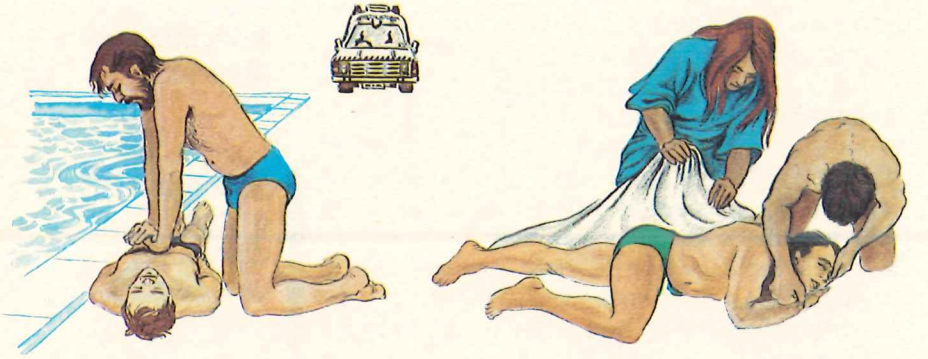
Every second is precious! But beware of attempting a rescue if you are untrained. Do not become a casualty yourself.

- check the airway and clear it if necessary
- begin mouth-to-nose resuscitation in the water (if possible) and while wading ashore (Figure 17.1)



17.1 EAR: mouth-to-nose while wading ashore

- once ashore, check the airway again
- resume EAR
- check the pulse — if absent, begin CPR
- continue until breathing and heart action start spontaneously or until medical aid arrives
- if the casualty starts to breathe and is unconscious, place in the coma position
- keep the casualty warm
- regularly observe and record the pulse and breathing rates until medical aid arrives.



a b

17.2a-b Management of a drowning casualty

Spasm of the larynx

Water, in contact with the larynx, sometimes causes violent spasm, closing the larynx. This prevents air or water from entering the lungs. Water is swallowed. Between 10 and 15 per cent of drowning cases suffer from spasm of the larynx.

Management of spasm of the larynx

- EAR, or
- CPR if the pulse is absent.

Choking

This is common to all age groups and may be due to spasm of the larynx or blockage of the airway. **Choking is preventable.** Choking is most commonly caused by:

- the sudden laughing or crying of a child who has an object in the mouth
- a child running and stumbling with an object in the mouth
- inadequate chewing of food
- swallowing splinters of bone
- inhaling while eating.

Additional signs of choking

The casualty may be conscious or unconscious. There may be:
- a fit of coughing
- violent and alarming attempts at breathing
- clutching the throat
- increasing blueness of the face, neck, lips, ears, and nail beds.

Followed by:
- loss of consciousness
- breathing failure.

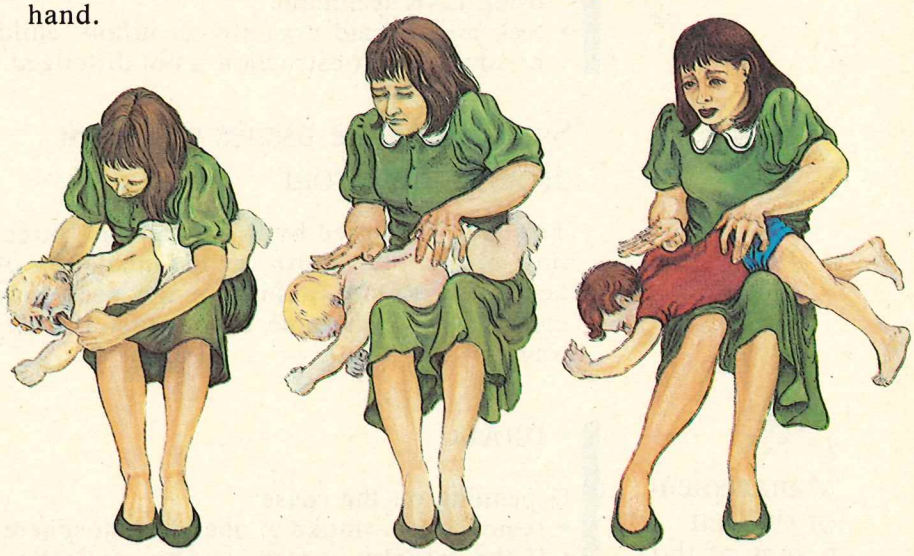
Management of choking

- check the airway and remove any visible obstruction.

- if the obstruction is not visible:

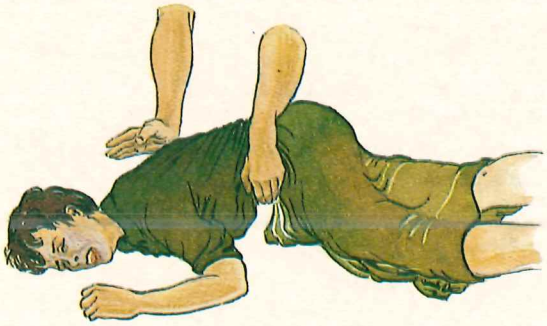
Low in the throat

In the case of an infant or child:
- hold by the legs or across your lap with its head down
- give three or four sharp smacks between the shoulder-blades, with the heel of one hand.



a b c

17.3a-c Management of a choking infant and child



17.4 Management of a choking adult

In the case of an adult:
- place the head low (lying, if possible)
- strike the casualty three or four sharp blows between the shoulder-blades.

- if these measures do not dislodge the obstruction, try to blow air past, by gently using EAR technique
- seek medical aid urgently for infant, child or adult if the obstruction is not dislodged.

Swelling of the tissues within or around the throat

This may be caused by injury, allergy, infection, stings, bites, burns or the inhalation of hot gases. Rapid swelling in the neck may compress the windpipe or obstruct the airway.



Management of swollen tissues of the throat

- DRABC

Depending on the cause:
- remove from smoke or allergic atmosphere
- if the casualty is carrying any medication for this condition, e.g. for a known allergy,

it should be given at once. If the medication is not identified for this purpose (by the patient, a relative, or the label) it should not be given
- treat any bite or sting (see Chapter 23).

Then:
- sit the casualty upright
- loosen constrictive clothing around the neck and chest
- ensure adequate fresh air
- apply ice packs to the throat
- seek medical aid urgently
- try to give EAR if breathing ceases.



17.5 Management of swollen tissues of the throat

Asthma

This is a breathing problem in which the casualty has great difficulty in breathing out. It is caused by a spasm of the small air passages in the lungs, accumulation of *mucus*

and swelling of the tissues. The casualty is distressed and suffers gasping, wheezing breathing, which continues for some time.



17.6 Management of an asthma attack

Management of an asthma attack

- sit the casualty upright or leaning over a table or pillow
- reassure the casualty
- provide adequate fresh air
- if the casualty is carrying any medication for this condition, it should be given at once. If the medication is not identified for this purpose (by the patient, a relative, or the label) it should not be given
- seek medical aid.

Strangulation and hanging

This is a condition in which some material is placed around the throat tightly enough to block the airway.

Management of strangulation

- cut and remove any material constricting the throat
- check the pulse
- if breathing does not begin, start EAR, or, if there is no pulse, start CPR
- seek medical aid.

Hanging

Hanging is similar to strangulation except that the weight of the body is supported by the constriction around the neck.

Management of the hanged casualty

- grasp the lower limbs and take the weight of the casualty's body to allow the constriction to loosen
- free the neck by loosening or cutting the noose or other constriction
- then manage as for strangulation.

Chest injuries causing breathing problems

See Chapter 14, 'Chest injuries', especially:

- flail chest
- penetrating chest wound.

Overbreathing

This is one of the commonest breathing disorders met by First Aiders. It is often caused by excitement, hysteria or other emotion. The casualty feels that he cannot get

sufficient air, and breathes more and more deeply. The level of carbon dioxide in the body becomes less than normal which gives rise to much of the unpleasant sensation.

Symptoms

- a feeling of choking, suffocation and a need to breathe deeply
- anxiety
- pins and needles in hands, feet and face

Signs

- in severe cases, the hands may be bent at the wrist, with the fingers straight, and thumb against the fingers. This is caused by muscular spasm.

Management of over-breathing

- firm reassurance
- encourage the casualty to take slow regular breaths
- instruct the casualty to breathe in and out of a paper bag until the symptoms disappear.

See Chapter 22 for the management of the emotionally disturbed person.

18

Heart conditions

This chapter is about one of the most common causes of death and incapacity in Australia — heart problems. Prompt effective first aid can improve the chances of survival of the casualty and may help to reduce the period of illness.

After studying this chapter you should be able to:

- describe the three most common heart conditions likely to be seen by the First Aider
- recognise when a casualty is suffering from a heart condition
- manage a casualty with a heart condition.

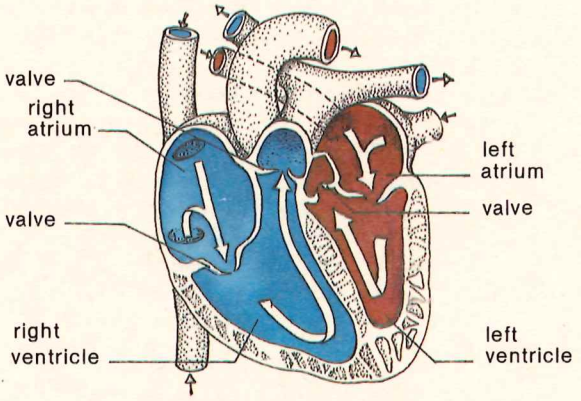
Learn these words before studying this chapter:

Angina pectoris	a heart condition in which there is an acute pain in the chest, usually caused by interference with the supply of oxygen to the heart, brought on by exercise or anxiety
Cardiac arrest	sudden stoppage of effective heart action
Cholesterol	fatty substance deposited by the blood in the arteries

Coronary arteries	arteries that carry the blood supply to the heart muscles
Coronary occlusion	a heart condition in which a clot, or narrowing of the artery wall, blocks the blood flow in the coronary arteries
Ventricular fibrillation	a condition in which the contractions of the heart muscle are not coordinated, but, instead, the heart quivers or twitches and therefore does not pump blood.

The heart

The heart is about the size and shape of a clenched fist. It is located in the centre of the chest, behind and partly to the left side of the lower half of the breastbone. The heart is the pump of the circulatory system. It pumps blood to all parts of the body.



18.1 The heart

In the adult at rest, the heart beats between 60 and 80 times a minute, though this rate does vary from person to person according to age and fitness. The heart speeds up when the body is exercising, for example when walking, running, climbing, lifting, or even when a person is anxious, stressed or ill.

The heart is mostly made of strong muscle tissue, which receives its own blood supply through a specific set of blood vessels called the coronary arteries. Disease of the coronary arteries results in heart conditions.

Disease of the coronary arteries

With increasing age it is common for the arteries of the body, including those of the heart, to become narrower and less flexible. This condition is called hardening of the arteries and is usually associated with high blood pressure. In addition, cholesterol (a fatty substance) can cause narrowing of the arteries by building up on the inner walls. Both conditions reduce the blood supply to the heart.

Smoking, a diet with excess of fat and salt, and being overweight, also contribute to disease of the coronary arteries.

Doctors advise that heart problems may be prevented by:
- not smoking
- eating foods less rich in fat and salt
- not eating to excess
- adequate exercise.

Angina pectoris

If the coronary arteries are narrowed by

disease, the heart muscle may not get enough additional blood when exercise, anxiety or other situations create an increased demand for oxygen. This condition, called coronary insufficiency, may lead to the heart being stressed and symptoms of chest pain and shortness of breath. The symptoms normally pass when the casualty rests. To describe this condition, doctors commonly use the Latin term 'angina pectoris' for chest pain, that is, angina (pain) pectoris (of the chest or pectoral muscles) or, simply, angina.

Angina is the most common of heart conditions.

Assessment of the casualty

The following symptoms and signs may indicate angina.

Symptoms

- chest pain, often radiating up the neck and down the left arm, which **usually disappears with rest**
- shortness of breath.

Signs

- pale cold clammy skin.

Management of angina pectoris

- if the casualty is conscious, sit him up
- encourage total rest and provide reassurance
- loosen tight clothing around the neck, chest and waist
- if the casualty carries tablets for angina, place one under the casualty's tongue or inside the cheek
- if the pain or discomfort persists for longer than 10 minutes after rest it may indicate a coronary occlusion; treat as such (see p. 289)
- angina sufferers do not normally need to go to hospital or see a doctor after an attack, provided they respond within 10 minutes to rest and/or medication.

If the casualty is unconscious but breathing, place in the coma position. Seek medical aid urgently.

Coronary occlusion –'heart attack'

Blood does not normally clot within the blood vessels, but when it is pumped through arteries made narrow and rough by disease the resulting turbulence and damage to blood cells may result in the formation of blood clots. Blood clots may form anywhere; a clot blocks or 'occludes' the blood flow. This can occur in the coronary arteries, and is called coronary occlusion. If the occlusion is complete, blood ceases to flow to the heart muscle beyond the occlusion. The affected heart muscle is deprived of food and oxygen, and dies.

Like angina, the symptoms of coronary occlusion normally include chest pain, often described as severe and vice-like. Sometimes casualties complain of discomfort rather than pain, and describe a pressing feeling. Unfortunately, this discomfort may be mistaken for indigestion.

Symptoms

- pain or discomfort in the centre of the chest; the pain is sometimes severe and radiates to either arm, or the neck and jaw
- anxiety or apprehension
- nausea
- shortness of breath.

Signs

- sometimes immediate collapse leading to cardiac arrest
- pale cold clammy skin
- vomiting
- possibly an irregular pulse
- confusion or distress
- onset of shock.

Management of coronary occlusion



DRABC
If breathing, but unconscious:
- place the casualty in the coma position
- seek medical aid urgently.

If the pulse is weak and rapid, place the casualty in the coma position unless the casualty is more comfortable sitting up.

Coronary occlusion victims need urgent medical aid, preferably where special facilities exist, and should be sent by ambulance to the nearest hospital that has a coronary care facility.

Ventricular fibrillation or sudden death

The heart is a complex organ, with regular contractions that create the pumping action; the contractions result from automatic stimulation of the heart muscle. If, following an occlusion or other cause, the muscle or the nerve pathways of the heart are damaged, the heart rhythm may be upset. In severe cases the pumping chambers of the heart — the ventricles — may not contract at all, but just quiver and twitch. This condition is called ventricular fibrillation and is common after an occlusion. Ventricular fibrillation is rapidly fatal because when the heart is fibrillating it is not pumping blood.

Ventricular fibrillation is not recognisable as such by the First Aider, but is identified as *sudden death,* that is:
- rapid loss of consciousness
- absent breathing
- absent pluse.

- CPR

Management of ventricular fibrillation

Heart failure

Sometimes, following a coronary occlusion or disease, or with advanced age, the heart muscle, particularly the left ventricle (the part of the heart that pumps blood around the whole body), may become inefficient. The output from the heart may then decrease, and blood may back-up and cause congestion in the body and lungs.

Symptoms and signs

Heart failure, often called congestive cardiac failure, is recognised by some or all of the following:

- onset of acute shortness of breath, with or without chest pain
- noisy, gurgly breathing
- sometimes frothy, bloodstained sputum
- a rapid, weak pulse
- a swollen neck and congested neck veins
- swollen legs and ankles
- bluish lips and extremities.

Management of heart failure

If the casualty has symptoms and signs of heart failure:

- sit the casualty up
- loosen any restrictions about the neck, chest and waist
- ensure plenty of fresh air
- reassure
- seek medical aid urgently.

If the casualty is unconscious, place in the coma position.

19

Brain illness and disorders of the nervous system

The brain is part of the nervous system, which controls all the functions of the body. This chapter is about managing problems that arise when brain illness or related disorders occur.

After studying this chapter you should be able to:

- describe some important illnesses or disorders that may affect the brain
- recognise the symptoms and signs of brain illness or related disorders
- demonstrate the first aid management of brain illness or related disorders.

Learn these words before studying this chapter:

Hormone	a substance, produced in one organ, that causes activity in another part of the body
Hypo	as used in this chapter, an abbreviation for a diabetic condition resulting from low blood sugar (hypoglycaemia)

Insulin	a hormone that controls the use of sugar in the body and is produced in the pancreas
Pancreas	a gland that produces insulin as well as alkaline digestive matter
Seizures	violent muscular contraction and relaxation (convulsions).

The brain is part of the nervous system, which also includes the spinal cord and nerves which pass to and from all parts of the body (see Chapter 2).

Brain illness and disorders may be caused by
- loss of blood supply to the brain
- a burst blood vessel on or within the brain
- too much or not enough blood sugar
- chemical imbalance in the brain
- brain injury or irritation
- infection and high fever
- alcohol, poisons, (see Chapter 20)
- drug abuse (see Chapter 21).

General principles of management

The general principles of management outlined in Chapter 1 apply regardless of the cause of brain illness or disorder.

If the casualty is having seizures or is restless:
- do not attempt to restrain
- protect the casualty from injury, for example remove adjacent objects or pad them with a pillow or blanket.

Also:
- reassure the casualty
- place the casualty in the most comfortable position and keep comfortable
- assess the problem:
  - observe the surroundings and the casualty
  - take a history, paying particular attention to pre-existing illness, for example high blood pressure, diabetes, epilepsy, heart conditions

- seek medical aid
- remain with the casualty until medical aid arrives.

Stroke

Stroke is caused by bleeding from a burst blood vessel within the brain, or by a blood clot within a blood vessel that supplies the brain. If a blood vessel bursts, the brain may become compressed by the accumulation of blood between the brain and skull. If a blood clot forms within a blood vessel supplying the brain, the portion of brain supplied beyond the blood clot will receive no blood and may die. This will affect the body functions controlled by that part of the brain.

Stroke often occurs in elderly people suffering from high blood pressure but may also occur in the young.

Assessment of the casualty

The following symptoms and signs suggest that the casualty has suffered a stroke.

Symptoms

- often a severe headache
- inability to swallow or difficulty in swallowing
- loss of movement and sensation in one or more limbs, usually on one side of the body.

Signs

- an altered level of consciousness
- slurred or garbled speech
- often a flushed face
- seizures, possibly
- a full or pounding pulse
- inequality in the size of the pupils
- possibly, head and eyes turned to one side
- muscle weakness
- paralysis of one side of the face and body.



19.1 Management of a stroke victim

Management of a stroke victim

If the casualty is unconscious:
- place in the coma position
- seek medical aid urgently.

If the casualty is conscious:
- reassure the casualty
- support the head and shoulders on pillows
- loosen tight clothing
- keep the casualty comfortable
- maintain body temperature
- wipe away secretions from the mouth
- remain with the casualty until medical aid arrives.

Diabetes

Diabetes is a condition caused by a disorder of the *pancreas,* which is a large organ situated behind the stomach. One part of the pancreas has special cells that produce a hormone called *insulin.* If these cells produce insufficient or no insulin, the body cannot use sugar properly as its main fuel, with the

result that the blood sugar level becomes too high. This condition is called diabetes. Abnormal levels of blood sugar may seriously affect brain cells. If the condition is not treated, the diabetic may eventually lapse into a coma and die. The diabetic needs to have a medically controlled diet and may require regular injections of insulin or to take insulin-like tablets.

Low blood sugar — 'hypo'

If a diabetic injects too much insulin or does not eat enough food containing sugar he or she may suffer from a life-threatening condition due to low blood sugar. The diabetic refers to this as a 'hypo'.

Assessment of the casualty

When a casualty has a 'hypo', the brain becomes affected, causing the following characteristic symptoms and signs, which develop rapidly.

Symptoms

- giddiness
- weakness.

Signs

- pallor
- profuse sweating
- rapid pulse
- mental confusion — often aggressive behaviour, with a possible appearance of being drunk
- unconsciousness and, if untreated, death.

Additionally, to help others to recognise the condition, many diabetics wear or carry:
- a Medical Alert bracelet or pendant, inscribed with the word 'diabetic'
- a medical warning card.

A diabetic may also have glucose or sugar in the pocket or handbag.

Management of the casualty with low blood sugar



If the casualty is unconscious:
- DRABC
- seek medical aid urgently
- give nothing by mouth.

If the casualty is conscious and co-operative:
- give sugar, glucose, or a drink liberally sweetened with sugar (many soft drinks or cordials are ideal, but do not give a diabetic-type cordial or soft drink as these contain **no** sugar).
- loosen tight clothing
- seek medical aid.

Sugar should be given every 15 minutes until medical aid arrives or the casualty recovers. Recovery after taking sugar is often quite dramatic. This is because the sugar rapidly raises the blood sugar level, restoring the brain function and other organ functions to a normal level.

Warning

If the casualty is violent or aggressive, avoid confrontation and seek medical aid urgently. Offering sugar or sugar-containing drinks is normally impossible in this circumstance.

High blood sugar — diabetic coma

Diabetic coma is a condition likely to occur when a diabetic does not take enough insulin, and has too much sugar in the blood. The condition is less common than a 'hypo' and is unlikely to be seen by the First Aider, as the onset is more gradual and the diabetic normally seeks medical aid before the condition becomes serious.

Assessment of the casualty

Symptoms and signs of a diabetic coma usually develop gradually.

Symptoms

In the early stages there is:
- excessive thirst
- frequent need to urinate,

followed later by:
- drowsiness.

Signs

- hot dry skin
- a rapid pulse
- a smell of acetone on the breath (a fruity, musty smell like nail polish remover).

Management of the casualty with high blood sugar



If the casualty is unconscious:
- DRABC
- seek medical aid urgently.

If the casualty is conscious:
- allow the casualty to self-administer insulin if this is prescribed
- seek medical aid.

Warning

The First Aider must **never** attempt to administer insulin on behalf of the casualty. A doctor will decide, by testing the casualty's blood sugar level, if this is the correct action to take. Administering insulin to a casualty with a low blood sugar level may be fatal.

Epileptic seizures

These are caused by a disturbance of the brain function, for example by a chemical imbalance within the brain, from irritation of the brain caused by a previous injury, or, often, from an unknown cause.

Assessment of the casualty

An epileptic seizure usually shows a characteristic pattern of events.

Symptoms

None available while seizures are taking place.

Signs

With major epileptic seizures the following occur in sequence:

- the seizure often starts with a 'cry' as air is forced out through the vocal cords, which are in spasm
- the casualty falls to the ground, sometimes injuring himself, and lies rigid for some seconds with back arched and jaws clenched
- the face and neck become congested and bluish because the breath is held
- jerking spasmodic movements of the muscles start and the colour improves as breathing starts again
- froth, sometimes bloodstained, comes from the mouth
- the casualty may bite the tongue
- there may be loss of bladder and bowel control
- the casualty regains consciousness but often remains confused for several minutes
- the casualty feels exhausted and may fall into a deep sleep
- on regaining consciousness, the casualty may be unaware of what happened or what is being done.

Management of an epileptic seizure



- DRABC
- protect the casualty from injury, but do not restrict movements
- if possible, remove false teeth and place them in a secure place, but do not try to prise the mouth open
- do not force hard objects into the casualty's mouth
- if the casualty falls asleep, do not disturb but continue to check ABC
- place the casualty in the coma position as soon as possible
- treat any injuries resulting from a fall to the ground or from the seizure
- seek medical aid.

Note: If the casualty regains consciousness and does not wish to seek medical aid, and is identified as an epileptic, it is usual to respect the wishes of the casualty. However, check that the casualty is fully conscious. If the casualty is injured or distressed, or the cause is uncertain, then gently advise that medical aid is necessary.

Sometimes the casualty experiences a fit of non-epileptic origin. This includes the psycho-neurotic fit, or hysteria, which is discussed in Chapter 22.

Seizures (convulsions) in infants and young children

An epileptic-type seizure may occur in infants and young children. This normally occurs after the age of 10 months and before the age of 4 years. It is often associated with a high body temperature resulting from infection, for example any of the childhood diseases, colds, etc.

The episode may be very frightening to the parents of the child, so be prepared to reassure them while the child is being treated.

Assessment of the casualty

You will need to depend on your observation of the following signs.

Signs

- stiffness and rigidity of the body
- twitching of the limbs
- possibly, arching of the head and back
- rolling of the eyes
- congestion of the face and neck
- blueness of the face and lips.

Management of a seizure in a child

- ensure a clear airway — if necessary turn the infant or child head down to help this process
- remove all clothing
- if the casualty feels hot, sponge down with water that is slightly below body temperature (test with your elbow)
- fan the wet child with a newspaper or magazine to speed up cooling
- when the child has ceased convulsing and the body temperature has been reduced, cover the child lightly
- reassure the parents
- seek medical aid.



19.2 Management of a seizure in a child

Fainting

Fainting is a temporary disturbance of the nervous control of the blood vessels. Those that supply the large organs widen (dilate), with pooling of the blood. Insufficient blood reaches the brain, particularly if the casualty is standing. The casualty may lose consciousness temporarily. Consciousness is normally



19.3 Management of a fainting casualty

restored when the casualty's body collapses into a position that brings the head into line with the rest of the body. This position overcomes the effect of gravity, and thus the blood supply to the brain is restored to a level sufficient for normal functioning.

Fainting may result from:

- nervous shock, for example bad news, a horrifying sight, or even good news
- some injury, often minor
- standing still for a long time, particularly in a hot stuffy room or on parade
- sudden postural change, for example standing up after sitting or crouching.

Assessment of the casualty

Assess by the following symptoms and signs, having first observed any evidence of the cause.

Symptoms

- giddiness
- blurred vision
- weakness
- a 'hot and cold' feeling.

Signs

- **temporary** loss of consciousness
- yawning
- a **slow** weak pulse
- pale, cold, clammy skin.

Management of a fainting casualty

- position the casualty lying down, with the legs raised, head and body flat
- loosen tight clothing
- ensure the casualty is not 'crowded' and has a liberal supply of fresh air
- check for injury or illness
- after recovery, let the casualty rest for some minutes before moving.

Warning

The casualty should recover spontaneously. If this does not happen the casualty may not have fainted, but may have a more serious condition, for example a heart condition, diabetes, or stroke.

20

Poisoning

Poisons are substances that upset the function of cells, impair health or destroy life.

They may be taken into the body accidentally or deliberately.

The First Aider must know what to do, and act quickly to deal with the poisoning.

After studying this chapter you should be able to:

- recognise the possibility of poisoning
- identify the likely route of entry of the poison into the body
- take immediate steps to minimise the effects
- manage the poisoned casualty appropriately.

Learn this word before studying this chapter:

Ciguatera food poisoning that sometimes results from eating tropical reef fish.

A poison is any substance that, when taken into the body, may be harmful to the normal functions of the body.

They may enter the body by:
- the mouth — swallowed poison
- the lungs — inhaled poison
- the skin:
  - absorbed poison
  - injected poison.

Poisons may be solid, liquid or gaseous. They may be found in food, medications, household substances and industrial products.

Prevention

Many poisonings are accidental and thus avoidable.

You must know the following safety rules:
- when attempting to help a casualty, do not become a victim yourself
- do not leave poisons or medicines within reach of children; keep in a locked cupboard
- destroy unwanted medicines and poisons
- use properly labelled, childproof containers for medicines and poisons
- never put poisons or medications into drink bottles
- beware of poisonous fumes or gases in enclosed spaces.

Effects of poisons

The effects of poisons vary according to the substance and the amount. The effects may be immediate or delayed.

As a rule, the poisons that act most rapidly are those that are injected into the body.

Those that act most slowly are usually those that are absorbed through the skin.



Assessment of the casualty

- DRABC.

History

- check with the casualty, if possible, to find out what happened
- obtain as much information as possible from bystanders
- observe the casualty and surroundings for evidence of the cause and type of poison, for example any fumes or odours, empty bottles or pill containers or suicide notes
- all containers and suicide notes should be sent with the casualty to hospital
- the names of substances taken should be recorded. The Poisons Information Centre will need them if they are to advise on management.

Symptoms

Some or all or none of the following:

- abdominal pain
- nausea
- drowsiness
- burning pains, from the mouth to the stomach
- breathing difficulty
- tight chest
- headache
- ringing in the ears
- blurred vision.

Signs

Some or all or none of the following:

- a smell of fumes
- odours on the breath
- bite or injection marks, with or without local swelling
- contamination of the skin
- vomiting
- change of skin colour, with blueness of the lips
- burns around and inside the mouth, and burns to the tongue.

General principles of management of poisoning

The management discussed in this chapter is in the form of general principles. Detailed information for the emergency treatment of more specific poisons can be obtained by telephoning the nearest Poisons Information Centre. The telephone numbers are listed at the end of this chapter for each Australian State or Territory. They can also be found on the inside cover of any Australian Telecom Directory. Information and help is also generally available from the Emergency Department of your nearest public hospital.



Management will depend on whether the casualty is conscious or not.

When the casualty is unconscious:
- DRABC
- seek medical aid urgently
- monitor breathing continuously and, if it becomes very shallow or ceases, do EAR and monitor the pulse. If the pulse ceases, begin CPR.

Note: Alcohol may increase the effect of many poisons on the brain, particularly those that depress breathing.

When the casualty is conscious but unco-operative:
- initially offer to listen to the casualty but do not give advice
- if the casualty 'unburdens', seek to give aid and treat as for a conscious and co-operative casualty
- if the casualty remains unco-operative, seek medical aid urgently.

Management of swallowed poisons

- depends on the nature of substance(s) swallowed
- a list of non-toxic substances that are commonly swallowed is included at the end of this book (Appendix A)
- always seek medical aid urgently.

When the casualty is conscious and co-operative, determine whether the poison taken is:

- *a corrosive substance,* for example one that burns tissue, such as acids and alkalis; examples are phenol, battery acid, oven cleaner, toilet cleaner, strong disinfectant
- *a petroleum based product,* for example kerosene, petrol, diesel oil, turpentine
- *a medicinal or general substance,* for example medicine taken by mouth, and substances other than corrosive or petroleum based products, for example contaminated food, poisonous plant seeds, mushrooms, washing-up liquid, oil of eucalypt, oil of wintergreen.

Having determined the substance, begin management according to the substance type.

For a swallowed corrosive substance

- do **not** induce vomiting (vomiting will increase the corrosive effect)
- give as much water or milk as the casualty can drink, but in small amounts at a time
- seek medical aid urgently.

For a swallowed petroleum based product

- do **not** induce vomiting (vomiting will increase the risk of the substance being inhaled and may severely damage the lung tissue)
- wipe the substance away from the mouth and face
- give nothing to drink
- keep the casualty comfortable
- seek medical aid urgently.

For a swallowed medicinal or general substance

- induce vomiting by:
  - giving Syrup of Ipecacuanha to drink (following the instructions on the bottle)
  - stimulating the back of the casualty's throat with your fingers if Syrup of Ipecacuanha unavailable.

Do **not** give salt or soapy water to drink
- keep the casualty comfortable
- keep a sample of vomitus for medical analysis, placing about 100 millilitres in a jar or tumbler and then covering
- seek medical aid urgently.

For a swallowed unknown substance

- do **not** induce vomiting
- seek medical aid urgently.

Where there is a smell of 'bitter almonds' (cyanide)

- seek medical aid urgently
- place the casualty in the coma position
- if breathing stops do **not** attempt EAR as direct mouth to mouth contact may result in poisoning of yourself.

Management of inhaled poisons



When the casualty is unconscious

- DRABC — take special care not to be the next victim
- call the Fire Brigade if the atmosphere is contaminated with, for example, smoke, escaping gases, ammonia, etc.
- move the casualty into fresh air and place in the coma position
- seek medical aid urgently
- monitor breathing continuously and, if it becomes very shallow or ceases, supplement with EAR; check the pulse and if absent do CPR.

Note: Some inhaled substances, for example pressure pack propellant, may cause cardiac arrest.

When the casualty is conscious

- if necessary, move the casualty to fresh air, taking special care not to be the next victim yourself
- loosen tight clothing

- if the casualty has breathing difficulty, a tight chest, coughing or signs of intoxication, seek medical aid urgently.

Management of absorbed poisons

Many of the incidents involving poisons absorbed through the skin are the result of the careless use of agricultural and horticultural chemicals, for example weedicides, pesticides, etc.

- have the casualty remove all clothing and shower the skin clean
- observe the casualty for any symptoms and signs of poisoning; if observed and if at all in doubt, seek medical aid
- ensure that removed clothes are laundered separately from uncontaminated clothing.

Food poisoning from eating tropical fish

Some fish caught in Australian tropical waters contain a poison called ciguatoxin. This poison does not alter the appearance of the fish, and cooking does not offer protection. If an infected fish is eaten, poisoning usually results.

Symptoms

- numbness and tingling of the hands and around the mouth
- altered sensation to cold
- diarrhoea
- pain in the joints, muscles and abdomen.

Signs

- profuse sweating.

Management of ciguatera

- give plenty of liquids to drink, but nothing containing alcohol
- seek medical aid urgently.

Poison Information Centres

(Principal centres in each State and Territory)

	STD Code	Telephone
Australian Capital Territory Royal Canberra Hospital	062	43 2154
New South Wales Royal Alexandra Hospital for Children	02	51 0466
Northern Territory Darwin Hospital	089	20 7211
Queensland Brisbane Royal Children's Hospital	07	253 8233
South Australia Adelaide Children's Hospital	08	267 4999
Tasmania Royal Hobart Hospital	002	38 8485
Victoria Royal Children's Hospital	03	345 5522
Western Australia Princess Margaret Hospital for Children	09	382 8222

Keep this information updated, using your local telephone directory.

21

The abuse of drugs

The abuse of drugs, either deliberate or accidental, can result in a life-threatening situation. This chapter informs the First Aider about the prevention, effects and management of some common abuses of drugs.

After studying this chapter you should be able to:

- define a drug
- define common forms of drug abuse
- describe prevention of drug abuse
- recognise the effects of drug abuse
- manage a casualty suffering from drug abuse.

Drugs are substances that exert a special effect on cells or tissues, or on the body as a whole. They may be extracted from plants or animals or made from chemicals. Some drugs are very useful and are prescribed to relieve pain, promote recovery, and maintain a state of health. Other drugs have no known beneficial use. All drugs are harmful when abused.

Drug abuse may be accidental, for example a confused elderly person taking too much of a drug, or accidentally taking the wrong drug.

Drug abuse may be deliberate, for example to attract attention to oneself, to commit suicide, or for social reasons.

Side effects of drug abuse

'Side effects' is the term used for unintended effects of taking a drug. These are generally not serious, usually representing a special sensitivity of the patient to a normal action of the drug. But in some cases the effect may be life-threatening, for example when penicillin is injected into a patient sensitive to it. Sometimes two or more drugs taken together may have an unintended effect; this may also happen when a drug is taken with alcohol.

Accidental drug abuse

Causes

Elderly people may be confused and take multiple doses of their prescribed medicine without realising that they have done so. The risk of such an accident is increased if:

- a repeat prescription is dispensed and the new supply of drugs opened before the current supply is used up
- containers are changed
- medication is improperly labelled.

Young children are at risk because they may:
- mistake medication for lollies or cordial
- experiment with drugs not knowing the risks.

Prevention

- store drugs in a safe, childproof container or cupboard (enquire from your State branch of the National Safety Council of Australia about such safe storage)
- only administer prescription drugs to the person named on the script
- before leaving the chemist shop make sure that the instructions are understood; before using **read the label**
- do not drink alcohol when taking drugs — this may exaggerate their effect or cause other side effects
- do not store drugs for future use. Get a new prescription, when needed. Unused drugs should be disposed of properly. Return them to a hospital or pharmacy. They may be burnt or flushed down the toilet — but not unless there is main drainage. Drugs may damage a septic tank system.
- if caring for elderly patients at home, dispense correct quantities of tablets, pills, or liquids — do not leave the containers on the patient's bedside cupboard or dressing table
- if taking young children to stay with an elderly relative, ensure that medicines, and other hazardous substances, are locked up out of harm's way.

Effects and recognition

The effects of toxicity from accidental drug abuse will depend on the substance or combination of substances taken and the individual tolerance and reaction of the casualty. Refer to Chapter 20 for assessment of the casualty and management of toxic effects.

Deliberate drug abuse

'Cry for help' or suicide attempt

Studies show that in most reported cases of attempted suicide the attempt is not serious but takes the form of a 'cry for help' from an emotionally disturbed person. However, you must treat each case as being a serious suicide attempt and follow the management principles outlined in Chapter 20.

Social use of drugs

This is the most common form of drug abuse. In these cases the immediate pleasure of intoxication appears to be more 'rewarding' than the social alternatives available at the time, even if the reward is short-lived and followed by unpleasant consequences. In addition to the pleasurable sensations, drug taking may temporarily provide:

- escape from tension
- peer-group imitation and approval
- risk-taking excitement.

For these reasons, people with very disturbed lives may become 'addicted' psychologically and difficult to treat, even if the substance used does not cause any known physical addiction.

Many different substances are used to induce intoxication:

- alcohol, which is by far the most common
- prescription drugs, including sedatives, tranquilisers, antihistamines, appetite suppressants, stimulants (amphetamines) and some cough mixtures and pain killers
- non-prescription drugs, including opiates (such as morphine and heroin), synthetic opiates (such as pethidine, methadone), marihuana or marihuana resin — cannabis, cocaine, hallucinogens (such as mescaline etc.), and some plant seeds and fungi
- inhaled volatile solvents, including petrol, thinners, glue, ether.

Many of these drugs decrease social restraint. This may allow aggressive, even violent, behaviour to emerge.

The dangers are the:

- direct effects of the drug
- the social effects.

The direct effects may be:

- immediate and life-threatening:
  - severely depressed breathing
  - unconsciousness
  - low blood pressure
  - irregular heartbeats
  - vomiting and inhalation of vomitus
- delayed:
  - damage to the kidneys, liver, lungs, brain
  - infections including hepatitis
  - addiction
  - withdrawal effects including seizures and acute confusion.

The social effects may include:

- accidents of all kinds, for example drowning, road accident
- antisocial behaviour, aggression, violence, theft to maintain the habit

- family disruption
- problems at work, for example absenteeism, reduced efficiency.

Refer to Chapter 20 for assessment of the casualty and the management of toxic effects.

Prevention and help

Each Australian State or Territory Health Commission publishes information and maintains counselling and treatment services for the victims of all forms of drug abuse (see your local Telecom telephone directory, or ask the Emergency Department of your local public hospital.

22

Emotional disturbance and mental illness

An altered emotional state may appear as an acute illness affecting the casualty's physical and mental health. This chapter is about emotional disturbance and mental illness and how such states are managed by the First Aider before medical aid arrives.

After studying this chapter you should be able to:

- recognise a casualty with obvious emotional disturbance
- recognise and manage the state of emotional reaction
- define the difference between a neurotic and psychotic state
- manage a casualty who is in an acute neurotic or psychotic state.

Learn these words before studying this chapter:

Hallucination	belief in sights and sounds that are imaginary
Hysteria	emotional outburst
Neurotic	describes a condition in which a person imagines or magnifies symptoms
Psychotic	describes a condition of severe mental illness.

You may encounter a casualty whose behaviour, conversation, or emotional state varies from the normal.

You must take care to:
- recognise that there is some emotional disturbance
- prevent the condition from becoming worse
- seek expert medical aid and not attempt to intervene where the casualty is uncooperative, dangerous, or self-destructive.

Emotional disturbance

Recognition of emotional disturbance

Emotional disturbance refers to any action by the casualty that is:
- uncontrolled
- self-destructive
- violent to other people or objects.

It also refers to states in which the casualty may:
- be suffering from an emotional outburst (hysteria)
- have false beliefs (e.g. that someone is trying to poison or harm him or her)
- hear sounds and see objects not present (hallucinations)
- be confused and disoriented as to place, time, and other events
- be depressed and anxious
- be withdrawn, unable to communicate
- be obsessive in behaviour.

Emotional reaction

This is the most common form of emotional

disturbance. It is a normal reaction in most circumstances but the extent of emotional reaction, that is, its depth and duration, may lead to the casualty becoming extremely distressed.

Its causes include:
- pain and injury
- fright, after an incident
- distress after an accident or loss of property
- grief over death or injury
- stress in response to a personal problem
- excitement, for example in teenagers at a 'Pop Concert'.

Prevention

Emotional reaction is a normal reaction for any casualty who has been involved in psychological shock, such as that caused by the injury or death of a relative or friend, or an accident or fright. You must anticipate an emotional reaction following such an incident, and should offer reassurance and a concerned, quiet, helpful attitude until the casualty is assisted by medical aid.

Assessment of the casualty

Make an initial assessment from the history of the incident.

History

- observe the scene and the casualty, noting:
  - any physical signs of outburst, for example smashed objects
  - distressing sights, for example an accident scene, a victim
  - a letter, or some other form of communication giving bad or unexpected news
- check with bystanders, relatives and the casualty to find out what has happened.

Symptoms

- palpitations
- pins and needles in fingers and toes.

Signs

- rapid shallow breathing
- crying
- shouting, screaming and thrashing about
- epileptic-like seizure (but the casualty never loses control of the bladder or becomes injured).

Management of the emotionally disturbed person

- remove the casualty from the situation
- sit or lay the casualty down
- reassure the casualty, with a calm, firm, and friendly manner
- if the casualty is breathing in a rapid and shallow manner, instruct him to breathe slowly
- if the rapid shallow breathing is accompanied by pins and needles and spasms in the fingers and toes, instruct the casualty to breathe in and out of a paper bag until the symptoms disappear (see Chapter 17 — overbreathing)
- check for injury
- observe and record the:
  - state of awareness
  - respiration
  - pulse rate
- if the symptoms do not quickly subside and/or there are injuries, seek medical aid
- if the symptoms subside quickly and there are no injuries, medical aid is not necessary, but do not leave the casualty until in the care of a responsible adult.

Mental illness

Neurotic illness

A neurotic casualty is suffering from a nervous or emotional disorder but remains mentally in contact with reality.

Assessment of the casualty

Try to make an assessment from the following symptoms and signs.

Symptoms

- headaches
- indigestion
- shakiness
- impaired memory
- exaggerated complaints of an illness or injury.

Signs

The casualty appears:
- tense
- agitated
- depressed
- withdrawn.

Management of the neurotic casualty

- reassure the casualty and handle gently, but be positive and firm
- be a sympathetic listener
- advise the casualty to seek medical aid; if the problem appears to be acute, seek medical aid.

Psychotic illness

Psychotic casualties have a severe disorder of the mind, often associated with a loss of contact with reality. They can be self-destructive, violent and homicidal. Some drugs can produce psychotic symptoms in a normal individual.

Assessment of the casualty

Your assessment will depend mainly on observation of the scene and the casualty.

History

- observe the scene and the casualty, noting:
  - any physical signs of disturbance, for example the casualty wielding a knife, scissors, etc.
  - any damage to objects
  - statements by the casualty, for example 'I am being poisoned', 'They are tapping my telephone' and other accusations of

persecution (sometimes the statements are convincing)
– whether the casualty appears to communicate with absent voices, or shows other signs of hallucination.

Signs

- extreme agitation or excitement.

Management of the psychotic casualty

- take care not to be injured during violent reaction
- seek medical aid urgently
- if the casualty is violent to self or others, send for police also
- provide tactful handling and persuasion until medical aid arrives
- remove discreetly all objects that could be used for attack or suicide
- **never leave the casualty** before medical aid arrives
- sometimes you may need to use physical restraint but restrict this to casualties who:
  – become actively suicidal
  – are dangerous to others
- never apply excessive force; in most cases physical force should be left to the police.

23

Bites and stings

Australian snakes, spiders and marine animals are among the most venomous known to man. This chapter is about preventing bites and stings and how the First Aider should manage a casualty who has been bitten or stung.

In some people, especially the young, the elderly and infirm, or those allergic to the venom of some bites or stings, there may be a rapid life-threatening reaction to such a bite or sting.

After studying this chapter you should be able to:

- describe the precautions needed to avoid being bitten or stung
- describe some of the animals that are dangerous
- manage a casualty who has been bitten or stung.

Learn these words before studying this chapter:

Allergic	sensitive to some substance, such as bee venom
Antivenom	a substance used to neutralise the poison (venom) of a poisonous animal
Envenomation	poisoning from bites, stings or penetrating wounds of a poisonous creature
Venom	a poison normally from a snake, insect or other animal or marine creature.

Bites from reptiles and spiders

Snakes

Snakes are not normally aggressive and tend only to bite when they are threatened or mishandled. Some snakes, for example the carpet snake, are not venomous. Others, for example the brown snake, tiger snake and the taipan, are very poisonous.

Preventing snake bite

- leave snakes alone and do not collect snakes
- in snake infested country, wear stout shoes, walk-socks and jeans or similar clothing; the fangs of a snake will normally not penetrate such clothing
- do not wear sandals or thongs or walk in bare feet in places where snakes could be present
- do not put your hands in hollow logs, under piles of wood, or in rubbish
- be noisy when walking in the bush
- look carefully when walking through thick grass
- use a torch around camps or farm houses at night
- keep sheds free of mice
- cut grass short around houses and in school playgrounds.

Assessment of the casualty

The casualty will normally display a strong emotional reaction. It is important to reassure and keep the casualty as still as possible. Most snake bites occur on the limbs, with 75 per cent of reported cases being on the lower limbs.

Be more concerned about the casualty than about identifying the snake. Unconsciousness and breathing failure may occur. This may

develop much more quickly if the casualty is a child.

Take seriously any information or complaint that a person, particularly a child, has been bitten.

Symptoms

These do not appear immediately, but from about 15 minutes to 2 hours after the casualty has been bitten. Symptoms include:

- headache
- double vision
- drowsiness
- nausea
- pain or tightness in the chest or abdomen
- giddiness or faintness
- diarrhoea.

Signs

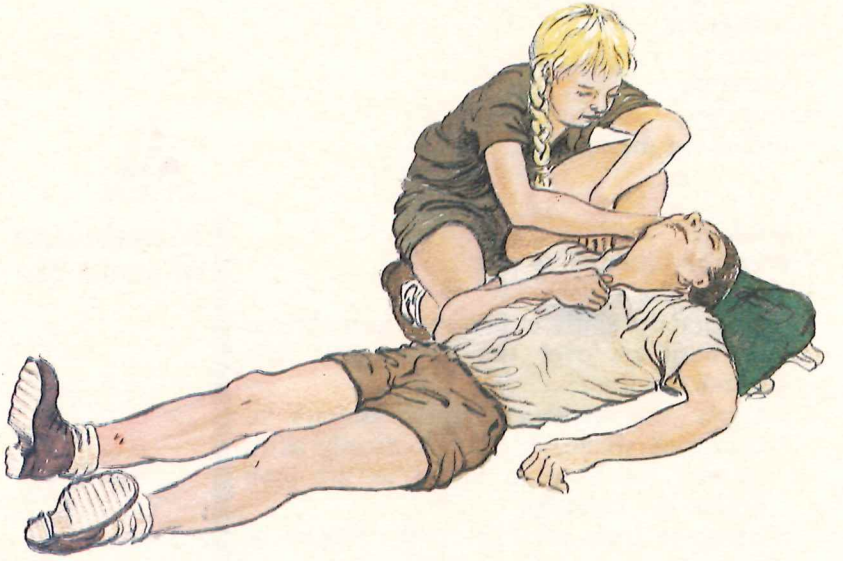
- usually two puncture marks about 1 centimetre apart at the site of the bite, although sometimes there may only be fang scratches on the skin
- swelling of the bitten area
- reddening
- bruising
- sweating
- vomiting
- breathing difficulties.



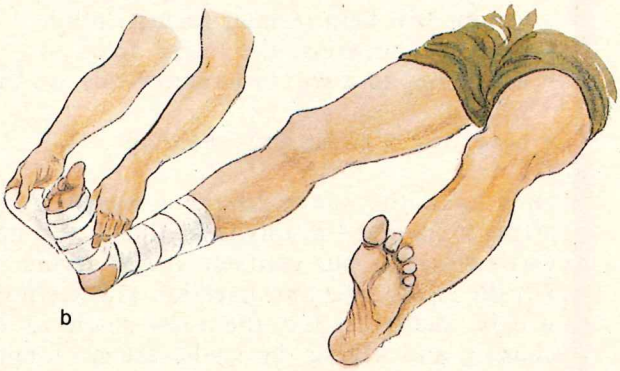
Management of snake bite

- DRABC
- keep the casualty at rest
- reassure the victim
- immediately apply a pressure immobilisation bandage over the bitten area and around the limb:
  - apply the bandage firmly enough to compress tissue, but not so firmly as to restrict the flow of blood to the limb below the bandage
  - bandage from the bite to the fingers or toes, then up to the armpit or groin
  - bandage as much of the limb as possible

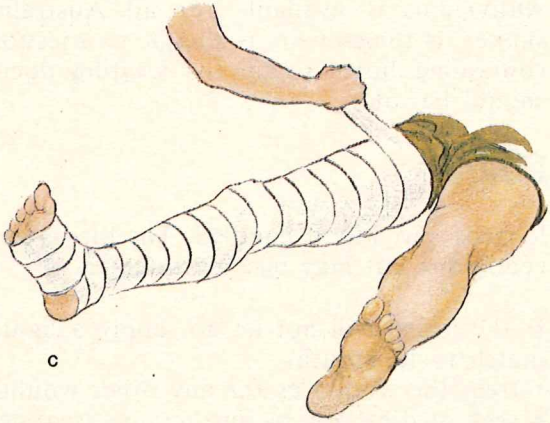
  - preferably use a crepe or conforming bandage, about 15 cm wide, but if this is not available improvise using pantyhose, strips of torn clothing, or material
- place a splint along the bandaged limb, bandaging the splint to the limb, with a second bandage
- do not remove the splint or bandages, once applied
- if the bite is on the upper limb, the arm should be immobilised in an arm sling
- seek medical aid urgently — it is better to wait for the arrival of an ambulance rather than to move the casualty and drive to help, but isolation and other circumstances will determine what is done
- periodically observe and record the pulse and breathing
- carry out EAR/CPR if breathing or circulation fails.



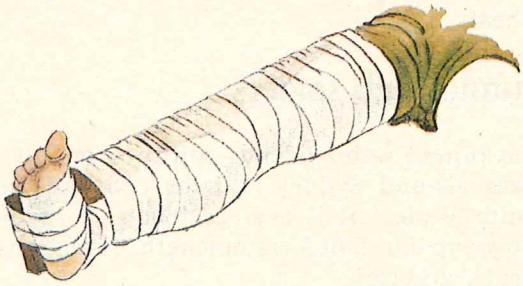
a



b



c



d

23.1a-d Management of snake bite

Warning

- **never** wash the venom off the skin as the venom will help in later identification
- **never** cut or excise the bitten area
- **never** try to suck the venom out of the wound
- **never** use a constrictive bandage.

Only take the snake to the hospital if no effort is involved in this task, that is, do not waste time, or put yourself at risk trying to kill the snake. Venom detection kits are now widely available and the risks involved in chasing and killing the snake are no longer justified.

Antivenom is available for all Australian snakes. If the casualty is allergic to injections containing horse serum the treating doctor should be told.

Lizards

Lizards may bite if handled. The bite is non-venomous but may become infected.

Management of lizard bite

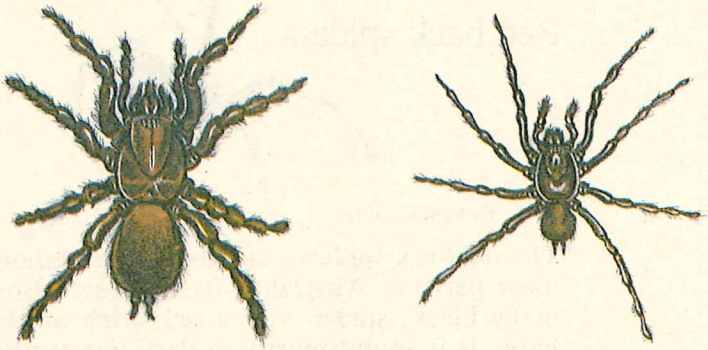
If the lizard will not let go, apply a lighted match to its mouth.

- treat the wound as for any other wound
- seek medical aid, as anti-tetanus treatment is necessary and the bite is often slow to heal.

Funnel web spiders

The funnel web spider is confined mainly to areas around Sydney and the coast of New South Wales. It is a large black or reddish brown spider, 2 or 3 cm in length. It inhabits:

- rock crevices
- burrows
- post holes
- underneath houses.



23.2 Male and female funnel web spiders

One variety is found in trees and shrubs.

Preventing funnel web spider bite

- show children pictures of the spider and then tell them to leave spiders like that alone
- if living in areas known to be infested, take precautions to clean out obvious habitats.

Symptoms

- initially, intense pain at the site of the bite
- nausea and abdominal pain
- breathing difficulty
- numbness
- muscular weakness.

Signs

- profuse sweating
- copious salivary and bronchial secretions:
  - saliva from the mouth
  - noisy breathing and coughing up of secretions
- weeping from the eyes
- cold skin and shivering.

Note: The bitten area is not tender.

Management of funnel web spider bite

Manage as for snake bite. An antivenom is available.

Red back spiders



23.3 Redback spider

The red back spider is distributed throughout most parts of Australia. It is a small, normally black, spider with a red stripe on the back. It is found mostly in dark unattended spots, for example under eaves, in old tyres, in garden sheds, etc. Its venom works slowly and an effective antivenom is available.

Preventing red back spider bite

- clean out habitats and treat the area with a suitable pesticide
- use gloves when handling old tyres, cleaning out sheds, or other tasks likely to involve contact with the red back spider.

Symptoms

- a sharp transient sting may occur but is not always felt
- pain at the site of the bite, which then becomes general
- nausea
- dizziness and sometimes faintness
- muscle weakness or spasm.

Signs

- sweating, sometimes profuse
- swelling and localised sweating around the bite
- a rapid pulse

Management of red back spider bite

- reassure the casualty
- apply a cold pack or compress over the bitten area but do not freeze or damage the unprotected skin
- seek medical aid; an antivenom is available.

Do not use a pressure-immobilisation bandage.

Bites and stings from other insects

Insect stings are painful but only life-threatening to a casualty who is allergic to the venom.

General management of insect stings



In all cases:
- wipe the area clean
- apply cold compresses.

In casualties with an allergic history or any signs of allergy, for example a rash, raised lumps on the skin, swelling of the throat, wheezing, treat as follows:
- DRABC
- apply a pressure bandage and immobilisation as for snake-bite
- seek medical aid urgently
- periodically observe and record the pulse and breathing
- if the casualty is carrying any medication for the allergy, it should be given at once. If the medication is not identified for this purpose (by the patient, a relative, or the label) it should not be given
- carry out EAR/CPR if breathing or circulation fails (see Chapter 17).

Bees

Bee stings are barbed and are usually left behind in the skin with the venom sac attached. To remove a bee sting, scrape it sideways with a finger nail or the side of a knife blade (see Figure 23.4). Pulling the sting out may cause further injection of venom from the sac attached to the sting.



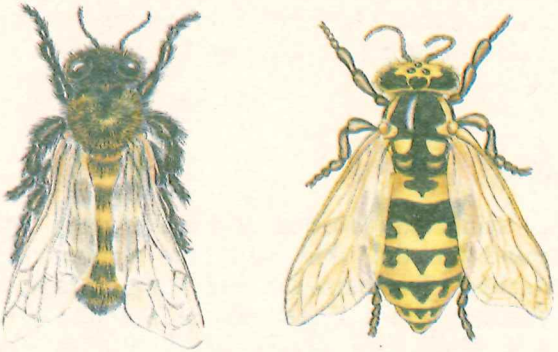
23.4 Removing a bee sting

Management of bee sting

Manage as under 'General management', above.

European wasps

These insects have only recently become a serious threat in some parts of Australia, notably Victoria and Tasmania. The wasp does not leave the sting behind in the skin, and therefore the wasp may sting several times. This may result in considerable pain.



a b

23.5a-b A honey bee and a European wasp

The European wasp is attracted to meat cooking (e.g. barbecues), sweet drinks and decaying food, etc. It sometimes gets inside a can of drink from where it can get into the mouth, stinging the inside of the mouth and throat. This most serious situation can result in swelling which may completely block the airway.



Management of European wasp sting

Manage as under 'General Management' as above.

Ticks

Ticks occur in most parts of Australia. However, the paralysis ticks occur mainly along coastal eastern Australia, from Queensland to northern Tasmania. Usually drab in colour, the unengorged tick is oval and flat. Engorged, it may become globular and about 0.5 cm in diameter. It may secrete itself in body crevices. The venom may cause paralysis, especially in small children. Many ticks, when they attack man, do not cause paralysis, but may cause local irritation or a skin nodule (granuloma).



23.6 A tick

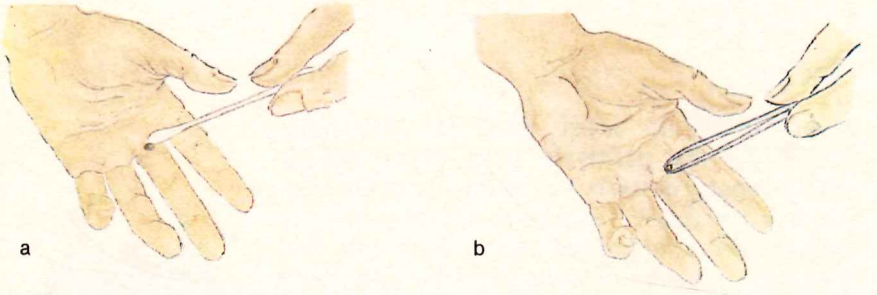
Symptoms and signs

- weakness of the face and upper eyelids, progressing to:
  - weakness of the upper limbs
  - weakness of the muscles of breathing.

Management of tick bite

- if possible, apply a drop of kerosene or turpentine to kill the tick (Figure 23.7a)

- if in the ear, seek medical aid
- remove the tick by sliding the open blades of a pair of small sharp scissors or tweezers, one each side of the tick, and lever the tick outwards, being careful not to leave the mouth parts in the skin (Figure 23.7b)
- do **not** grasp or squeeze the tick
- search carefully for other ticks, particularly in the hair, behind the ears and other body crevices
- if the effects of the toxin persist or if the casualty is a child, seek medical aid
- do not use pressure immobilisation.



23.7a-b Removing a tick

Note: The effects may continue for a few hours following the bite, after which the casualty usually recovers spontaneously. Antivenom is available.

Scorpions and centipedes

Stings or bites from scorpions and centipedes are very painful, but not normally dangerous.

Symptoms

- immediate intense burning pain
- throbbing and, later, numbness.

- apply a cold pack or compress over the affected area
- seek medical aid.

Management of scorpion or centipede bite

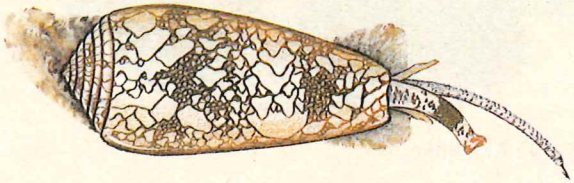
Stings from marine and fresh water creatures

Blue-ringed octopus and cone shell

The bite of the blue-ringed octopus (see Figure 23.8) and the sting of the cone shell (see Figure 23.9) are normally painless so the casualty may be unaware of the danger. In either case breathing may be severely affected or cease as the breathing muscles become paralysed.



23.8 Blue-ringed octopus



23.9 Cone shell

Symptoms

- within minutes, numbness of the lips and tongue.

Signs

- weakness of the breathing muscles, progressing to a failure of breathing.

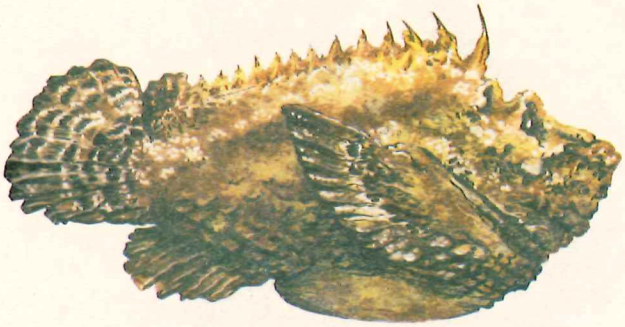
Management of octopus or cone shell bite



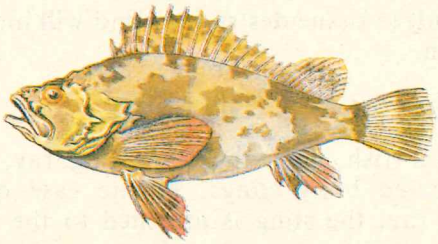
- reassure the casualty
- stay with the casualty, but send for medical aid urgently
- treat as for snake bite
- as breathing difficulty progresses, supplement the casualty's breathing with expired air resuscitation — eventually the casualty will depend for survival entirely on effective EAR performed by you
- do not discontinue EAR abruptly when medical aid arrives, but hand over the task smoothly, avoiding any interruption to the resuscitation.

Stonefish and bullrout

These are fish found in tropical inlets, rocky beaches and coral reefs. Bullrout is also found in brackish estuaries.



23.10 Stonefish



23.11 Bullrout

Prevention

- investigate before picking up a 'funny looking rock'
- use caution when walking on rocks at the seaside
- do not put a hand in rock crevices, and wear suitable footwear when wading in deep water or on mud flats.

Symptoms

- immediate intense pain at the site of the puncture
- spread of pain along the limb.

Signs

- sometimes, the presence of the stinging spine in the wound
- swelling
- grey or blue discolouration of the stung area
- sometimes, irrationality of the casualty due to intense pain
- sometimes sweating and shock.

Management of stonefish or bullrout sting

- place the stung hand or foot in hot water, being careful not to scald the casualty
- remove any foreign body
- seek medical aid urgently
- reassure the casualty
- observe breathing, and be prepared to supplement the casualty's own breathing with EAR should this be necessary
- do **not** apply pressure immobilisation to

restrict movement of venom as this will result in tissue destruction and will increase pain.

Sting ray and fish barbs

Several fish, including the sting ray, have concealed bony stings. In the case of the sting ray, the sting is attached to the whip-like tail. The sting can inflict a very painful wound, which may be life-threatening. Sting ray injuries normally occur to the feet and legs of persons wading in shallow water. Protective footwear should be worn, and the feet shuffled along.



23.12 Sting ray

Symptoms and signs

- immediate intense burning pain
- breathing difficulty, if the chest has been struck

Management of sting ray injury

- gently extract the barb if present
- bathe with hot water, being careful to test for tolerance temperature with an **uninjured** limb as the part stung may be partly anaesthetised from the toxin
- apply pressure immobilisation if general symptoms appear.

Jellyfish

Jellyfish are found in all Australian ocean

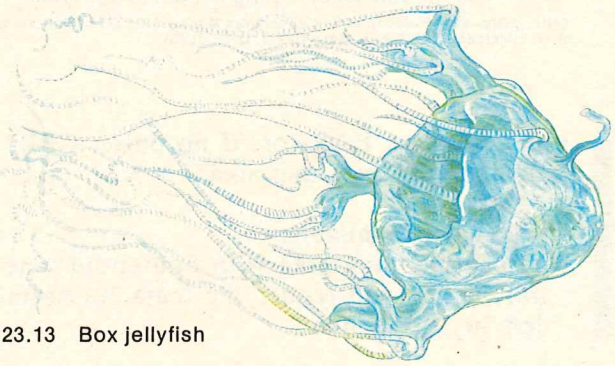
waters. The more dangerous species (the large box jellyfish) are normally found in tropical waters, that is, north of the Tropic of Capricorn.

Prevention

- obey the instructions of surf lifesavers, particularly if they request you to leave the water
- wear protective clothing if you enter the sea between October and May north of the Tropic of Capricorn. (Suitable clothing is a suit made from pantyhose, one pair worn over the legs and abdomen, another pair, with a small cut across the crotch, worn over the arms and chest.)
- at all times supervise children who are swimming
- enter the water slowly and do not run or dive in
- if any sting is felt, back out slowly
- never touch stinging tentacles with your hands
- carry 4 litres of household vinegar and broad conforming or crepe bandages whenever you go to a tropical Australian beach.

Major jellyfish stings

Extensive stinging, particularly from the box jelly fish (see Figure 23.13), may result in a



23.13 Box jellyfish

cessation of breathing and circulation within a few minutes.

Assessment of the casualty

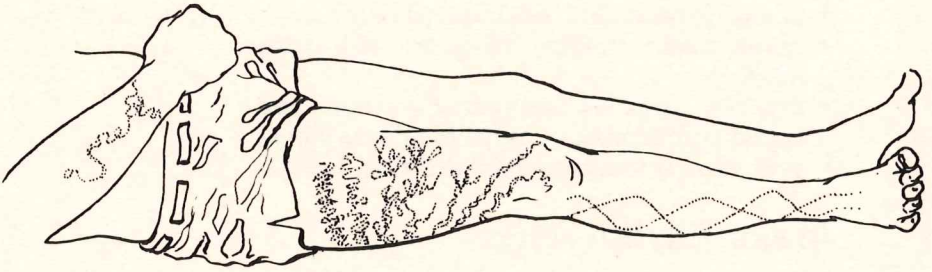
If rescuing a casualty from the water, take care not to be stung yourself.

Symptoms

- immediate intense pain.

Signs

- characteristic 'frosted ladder' pattern of the sting (see Figure 23.14) — tissue death occurs along the line of the sting after 24 to 48 hours
- irrationality of the casualty (movement must be restrained to lessen the rate of absorption of the venom)
- breathing difficulty; a possible cessation of breathing at any time.



23.14 The 'frosted ladder' sting pattern of a jellyfish
(After plate lxxvi, Poisonous and Venomous Marine Animals of the World, B.W. Halstead, U.S.G.P.O. Washington, D.C., 1965)

Management of major jellyfish sting



- if necessary, EAR (or, if no pulse, CPR)
- do not rub the stung area

If vinegar is available:

- flood the stung area with household vinegar, which will render the tentacles harmless in 30 seconds

- apply a firm compression bandage over the stung area after vinegar has been applied

If vinegar is not available do not use a substitute; instead:

- apply a firm single compression bandage around the limb above the sting, or as high as possible on the affected limb
- gently pick off any adherent tentacles with tweezers (not with your fingers) and then apply firm compression bandages over the stung area.

This is a poor alternative for the vinegar method but may be all that is possible.

- continually monitor breathing and circulation, and, if necessary, start CPR
- seek medical aid urgently.

Other jellyfish stings

Symptoms

- backache
- pain in the chest and abdomen
- nausea
- pain in the area stung.

Signs

- vomiting
- a lack of co-ordination in the limbs
- breathing difficulty, coming on 10 to 40 minutes after stinging
- visual evidence of stinging, for example weals, whip marks, localised area of goose pimples.

Management of other jellyfish sting

- reassure the casualty
- flood the stung area and adherent tentacles with household vinegar; if vinegar is not available gently pick off the tentacles with tweezers, but not your fingers

- apply ice water to the area, **after the vinegar,** to relieve pain
- do not rub the area with sand
- restrain the casualty's hands
- seek medical aid.

Management summary

Use pressure immobilisation for bites and stings of:

- snakes, land and sea
- box jellyfish
- blue ringed octopus
- cone shell
- funnel web spider
- insects (bees, wasps, ants, etc.) if the casualty is allergic to them.

Do **not** use pressure immobilisation for bites and stings of:

- red back spider
- stonefish and bullrout
- ticks.

Antivenom is available for bites and stings of:

- snakes, land and sea
- funnel web spider
- red back spider
- box jellyfish.

24

Overexposure to heat and cold

Overexposure to heat or cold may be very dangerous. This chapter is about the effects of overexposure, its prevention, and the management of the casualty.

After studying this chapter you should be able to:

- describe the symptoms and signs of overexposure to heat and cold
- manage a casualty suffering from the effects of overexposure
- explain how to prevent or guard against the environmental hazards of heat and cold.

Learn these words before studying this chapter:

Dehydration	the excessive loss of salt and water from the body
Hypothermia	the severe accidental cooling of the body.

Overexposure to heat

Overexposure to heat occurs when the body's temperature controlling mechanism cannot cope with the environment.

The temperature of the healthy human body is maintained within very small limits around 37°C. The body normally regulates its temperature by:

- evaporation of sweat from the skin
- increasing the blood flow to the skin
- evaporation of moisture from the lungs
- increasing the rate and depth of breathing to increase evaporation.

Body temperature is controlled by the heat regulating centre in the base of the brain.

Some casualties with high temperatures (up to 42°C or 43°C) may have pale, sweating skin, but remain lucid and do not appear to be ill, while others with lower temperatures (38°C or 39°C) may be unconscious, have dry flushed skin and appear to be more seriously ill. Failure to recognise and adequately treat either group may lead to serious illness or even death.

Excessive sweating and loss of salts may lead to dehydration and to painful cramps of the muscles.

Stages of overexposure to heat

People at work or play in hot or humid conditions, for example in a boiler room or in sunlight, or travelling in hot climates, are at risk from heat exposure. The following disorders may arise — they are listed in increasing order of severity:

- heat cramps
- heat exhaustion

- heat stroke.

Fair skinned people may suffer serious sunburn when exposed to strong sunlight (see Chapter 9).

General rules of prevention

- protect yourself from strong direct sunlight
- wear loose fitting porous clothing and a broad brimmed hat
- do not do heavy physical tasks in hot humid weather unless conditioned to the task and the environmental conditions
- drink water freely
- use salt liberally in cooking and on your food. Salt tablets are not advised
- avoid alcohol, as this increases urine output, and hence fluid loss
- you are more likely to have ill-effects from heat if
  - you are not used to the heat
  - you are not fit
  - you have been ill recently
  - you have been overindulging in alcohol.

Heat cramps

Assessment of the casualty

Make your assessment from the following symptoms and signs.

Symptoms

- painful muscle cramps of the limbs and abdomen, either while resting or exercising
- nausea
- tiredness, dizziness or weakness.

Signs

- contraction and shortening of the affected muscles; this commonly affects several groups of muscles simultaneously
- muscle twitching
- vomiting
- moist cool skin.

Management of heat cramps

- remove the casualty to a cool place, if possible
- have the casualty lie down
- replace lost fluid and body salt by giving water or lemonade to which is added glucose and ½ teaspoon of salt per litre; a commercial preparation may be used. If the casualty is nauseated encourage slow drinking
- apply ice packs to the cramped muscles
- gently stretch the muscles, but do not massage painful muscles
- warn the casualty that further exertion and exposure in the hot environment may lead to heat exhaustion and that he should rest or work in a cooler area and/or at a less physically demanding task.

Heat exhaustion

Heat exhaustion is due to an imbalance between heat gain and heat loss (more gain than loss). The young and the elderly are more at risk, because their heat regulating mechanism is more likely to break down under stress. It is a severe reaction to the loss of body fluid and salts and occurs earlier in dehydrated casualties and casualties unsuitably clad when working or exercising. Heat exhaustion occurs more frequently in hot, humid climates.

Prevention

The general rules of prevention apply (see Chapter 29).

Assessment of the casualty

The following symptoms and signs may be present.

Symptoms

- feeling hot, exhausted and weak, with a general feeling of being unwell, often accompanied by headache, which may have

persisted for some hours or days before the onset of symptoms
- thirst
- fatigue
- nausea
- loss of appetite
- giddiness and faintness
- stomach and muscle cramps
- shortness of breath
- muscular weakness
- lack of coordination.

Signs

- pale, cool and clammy skin
- profuse sweating
- rapid breathing and pulse
- possibly, confusion or irritability.

Management of heat exhaustion

- move the casualty to a cool place with circulating air, and lay him down
- loosen any tight clothing that the casualty is wearing, and remove any unnecessary garments
- sponge the body down with cold water, but do not overcool
- replace lost fluid and body salt (as for management of heat cramps)
- seek medical aid if the casualty:
  – vomits and cannot keep fluid down
  – does not recover promptly
- treat cramps as previously outlined.

Heat stroke

Heat stroke occurs when the heat regulating mechanism fails, that is the body is unable to cope with heat gain. It is not a common condition but is frequently fatal if not treated early enough. Cases of heat stroke include:
- infants left in closed cars on a hot day
- athletes attempting to run long distances in hot weather

- unfit workers not acclimatised to hot weather nor conditioned to heavy work; overweight alcoholics are especially at risk.

Prevention

In addition to the general rules of prevention:

- do not spend prolonged periods in a sauna
- do not leave infants or children in closed cars during hot weather
- cease working when affected by heat cramps or heat exhaustion and seek medical aid if the symptoms of heat exhaustion persist
- discourage organisers of 'fun runs' and similar athletic activity from conducting such activities during the hot summer months.

Assessment of the casualty

The following symptoms and signs may be present.

Symptoms

- headache
- nausea
- dizziness
- visual disturbances.

Signs

- often, irritability or mental confusion; possibly aggression
- altered mental state, which may progress to seizures and unconsciousness
- a rise in body temperature to 40°C or more
- a strong pounding and rapid pulse
- vomiting
- skin flushed, and usually dry.



Management of heat stroke

- DRABC
- if unconscious place the casualty in the coma position
- remove the casualty to a cool place
- loosen any tight clothing that the casualty is wearing, and remove any unnecessary garments

- douse the casualty's body with cold water or, alternatively, carefully rub crushed ice and water over the casualty's body
- apply cold packs or ice to the areas of large blood vessels, such as the neck, groin and armpits, to accelerate cooling
- if possible, cover the casualty's body with a wet sheet and fan him to increase air circulation
- continue these measures until the body feels cold to the touch, then stop cooling
- seek medical aid urgently
- when the casualty is fully conscious give fluids, for example water or lemonade to which is added glucose and salt (as for management of heat cramps); a commercial preparation may be used.

Overexposure to cold

Illness resulting from cold can occur in young, healthy, fit people following immersion or from windchill, due to heat loss being greater than heat gain. In Australia it is most commonly seen in those who are snowbound without protective clothing, however, it may easily occur in much less severe conditions.

Young children, babies and the elderly, unprotected in a cold environment, are always at risk, as are the unconscious and immobile or drugged persons who have become exhausted in similar temperature conditions. It can occur in lightly clad runners exposed to wind. It can also occur in divers in midsummer.

When the body temperature falls below 35°C serious problems associated with cold may occur, because the body's heat regulating mechanism fails to cope. The severity of the body's reaction to overexposure will vary with the casualty's age and physical condition.

The degree of overexposure to cold, depends on:
- clothing
- temperature
- wind speed
- period of exposure.

The above are called the windchill factors. The following will accelerate the condition:
- low atmospheric temperature
- wind, snow, rain
- fatigue
- anxiety
- hunger.

Humans suitably clad can tolerate very low temperatures if dry and there is no wind. The combination of cold rain and wind is much more dangerous. The casualty is often unaware of the onset of serious effects of cold.

Prevention

Correct clothing can help to avoid the effects of temperature, wind and damp. Following these guidelines is recommended when in a cold environment:
- wear warm inner clothing made from natural fibres such as pure wool
- wear wind and waterproof outer clothing
- have a minimum of four persons in your party
- ask locals about usual weather conditions if boating, skiing, or mountain climbing in an unfamiliar area
- listen to broadcast weather reports
- be sure that boat or other equipment is in good condition
- have adequate sleeping bags and covers
- eat adequate food before departure
- take with you adequate food and drink, not alcohol

- inform people of your departure and expected time of return
- if caught in bad weather take shelter early and watch for signs of cold exposure
- take steps to avoid more physical activity than is necessary when conditions are extremely cold.

Assessment of the casualty

The following symptoms and signs may be present but their onset may not be quickly recognised.

Symptoms

- a cold feeling and shivering (a protective mechanism to generate heat)
- excessive fatigue
- problems with vision
- faintness
- cramps and stumbling.

Signs

- increasing slowness of physical and mental responses
- shivering
- uncoordinated movement
- confusion
- slurred speech.



Management of mild to moderate overexposure to cold

- DRABC
- if the casualty is unconscious, place in the coma position
- protect the casualty and yourself from wind, rain and sleet and from cold, wet ground
- if possible, wrap the casualty in warm, dry clothing
- if possible, put the casualty in a warmed sleeping bag
- if the casualty is conscious give warm fluids to drink
- do not give alcohol
- place the casualty in a bath of water heated to about 37°C and raise the temperature of the bathwater slowly to about 45°C

- do not try to warm the casualty in front of a camp fire, as this may cause the blood vessels on the surface of the body to widen and cause further heat loss
- if a warm bath is not available, a companion stripped to underclothing and sharing the casualty's sleeping bag can help to warm the casualty's body
- seek medical aid if recovery is not prompt
- remain with the casualty until medical aid arrives.

Warning

All cases of prolonged exposure to cold are serious.

Severe accidental general body cooling

This condition is called *hypothermia.* It is a loss of the body's surface heat, which is followed by cooling of the deep tissues and organs. It is a dangerous condition.

Infants and the elderly are especially at risk because of relatively lower amounts of body fat, so cooling of deep tissue is more rapid. Hypothermia may occur in the infirm in unheated houses. Prolonged immersion in cold water is a common cause of this condition; alcohol, injury and drugs decrease the response of the temperature-regulating control in the brain.

Prevention

The general rules of prevention of the effects of cold and cold exposure apply.

Signs

- coldness to the touch
- a slow pulse
- slow and shallow breathing
- quietness and refusal of food in infants

- unconsciousness, especially in the elderly or infirm.

Note: Face, hands and feet may appear pink and healthy, but this is deceptive.



Management of hypothermia

- DRABC
- if the casualty is unconscious, place in the coma position
- remove to a warm dry place, if possible
- place the casualty between blankets so that the temperature can rise gradually
- if conscious, give warm sweet drinks
- give no alcohol
- a companion stripped to underclothing and sharing the casualty's sleeping bag can help to warm the casualty's body
- seek medical aid urgently
- remain with the casualty until medical aid arrives.

Warning

It is essential that, where there is deep cooling of the body, the warming process is slow. Any attempt to speed up the process by placing hot water bottles, electric blankets, etc. on or close to the casualty may lead to the surface blood vessels opening more widely, taking blood from deeper tissues. This in turn leads to shock. **Never** immerse these casualties in a warm bath.

Frostbite

Frostbite is a very serious cold injury resulting from local freezing of body tissue, normally in the toes, fingers, and other extremities. Deep frostbite may affect the blood supply to the limbs so badly that amputation may be necessary.

Prevention

- wear properly designed clothing, for example cold-weather boots, gloves, jackets, etc.
- limit outside exposure, particularly when cold weather is accompanied by wind and wet conditions
- ensure adequate protection of the ears and nose, especially when skiing.

Superficial frostbite

This is frostbite limited to the skin and superficial tissues.

Symptoms

- numbness and tingling in exposed areas.

Signs

- sudden whiteness of the skin
- a waxy appearance
- firmness to the touch
- painlessness until the area is rewarmed
- possible blistering.

Management of superficial frostbite

- remove the casualty to a warm dry place
- remove anything constricting the affected limb
- rewarm the area by body heat
- never rub or massage the frostbitten area
- never apply snow or cold water
- never rewarm the frostbitten area by direct heat
- cover any blisters with a dry sterile dressing
- give no alcohol
- seek medical aid.

Deep frostbite

Signs

In addition to the signs for superficial frostbite:

- the area affected is intensely white and completely hard to the touch
- it is painless.

Management of deep frostbite

- do not attempt to thaw
- keep the casualty dry and warm
- protect the injured area from further injury
- seek medical aid urgently.

Cold metal injury

Skin will adhere to extremely cold metal. Wearing gloves will prevent this type of injury to the hands.

Management of cold metal injury

- pour **warm** water over the stuck part and, when free, treat as for superficial frostbite.

Seek medical aid if there is:
- blistering
- any other evidence of tissue damage.

Immersion in cold water

Immersion in cold water can result in severe accidental cooling of the body. Even short periods in cold water can result in rapid body cooling. Deep reservoirs often have a layer of very cold water just beneath the surface at only a moderate distance from the shore, even in summertime.

Treat the casualty as for severe accidental cooling.

6

Specific areas of first aid

25

Sports injuries

With the great increase in leisure time and increasing sporting activity by all members of the community, sport related injuries are becoming more frequent.

After studying this chapter you should be able to:

- describe the common sports injuries
- manage the common sports injuries
- describe preventive measures to avoid injury.

Learn these words before studying this chapter:

Corked thigh	bruised thigh
Hamstrings	muscles on the back of the thigh
Quadriceps	muscles on the front of the thigh
Sinus	any of the eight cavities in the skull that are connected with the nasal cavity
Tendo-Achilles (Achilles tendon)	tendon of the calf muscles at the back of the ankle.

Most sports injuries are preventable if the athlete:

- trains adequately before competing
- is fit to perform the sport
- is playing at his own standard
- wears and uses correct equipment
- does not resume sport until he has fully recovered from a previous injury.

Adequate assessment and first aid management of sports injuries is necessary to ensure quick recovery. Many sports injuries are common to other accidents, and their management is similar. You should study this chapter in conjunction with other relevant sections dealing with these injuries.



Assessment of the casualty

- DRABC
- assess injuries as soon as they occur, **not** at the end of the event
- carefully assess the injury before moving the casualty away from the sporting area
- **never remove a casualty with a spinal injury from the field until medical aid arrives.**

General management of sports injuries

For the general principles of management, refer to Chapters 1, 7 and 8. For the general principles of management of limb injuries refer to Chapter 16.

R.I.C.E. refers to:

- (R) Rest the casualty and the injured part
- (I) Ice packs to the injured part, for 20 minutes on and 20 minutes off
- (C) Compression bandage
- (E) Elevation of the injured part.

This management is appropriate and useful in many injuries that occur during sports events. Strains, sprains and bruises, and many minor fractures will benefit from R.I.C.E.

Cramps, heat exhaustion, heat stroke

With the increasing popularity of 'fun runs' and other long-distance events, you will probably encounter more casualties suffering from heat related problems.

Warning

Whenever ice packs are to be used in managing sports injuries, do not apply ice directly to the skin. Ice packs should not be applied for periods longer than 20 minutes. A good rule is '20 minutes on — 20 minutes off'.

As far as possible the competitor should take precautions against the effects of direct sunlight. See Chapter 24 for the prevention and management of heat cramps, heat exhaustion and heat stroke.

If heat cramps, exhaustion or stroke do occur, manage as described in Chapter 24.

Abrasions

Abrasions are probably the most common of all sports injuries. Manage the abrasions as described in Chapter 7.

Head injuries

Head injuries are more likely to occur in body contact and vehicular sports, than in other kinds of sports.

General management of head injuries

- after any head injury observe the casualty carefully and ensure that he rests
- arrange for hospitalisation of the casualty if there is any loss of consciousness
- manage as in Chapter 11

- advise the casualty to return to sport on medical advice only.

Facial injuries



Facial injuries occur mostly in contact sports, especially where face guards are not worn. These injuries may involve the eyes, nose and teeth, and may include facial lacerations.

Management of a facial injury

- DRABC

If the casualty is unconscious:

- ensure that there is an adequate airway
- control bleeding and cleanse the wound
- apply the general principles of wound care.

Fractured nose

The bones in the nose may be broken, with accompanying bleeding. This injury commonly occurs in boxing, judo, karate, and body contact sports.

Management of a fractured nose

- manage as for a bleeding nose (see Chapter 12), although bleeding may be difficult to control
- seek medical aid urgently; early treatment may make reduction of the fracture easier.

Eye injuries

Eye injuries are common with squash and tennis. Wearing eye goggles is important, although this will not always provide complete protection.

Management of an eye injury

- manage as in Chapter 12
- if the casualty with an eye injury needs to be transported, for example from the playing field, this should be done gently, with the casualty lying flat

- refer the casualty to medical aid in as short a time as possible; all eye injuries are potentially serious.

Tooth injuries

Many contact sports can result in teeth being knocked out or loosened. Teeth can be protected by the use of a well-fitting mouth guard. This is particularly recommended in rugby, football and boxing.

See Chapter 11 for management of tooth injuries.

Spinal injuries

These are common in body contact sports such as football. They also occur in diving and when using aquatic equipment such as water slides etc.

Management of a spinal injury

- manage as in Chapter 13
- remove the casualty from the playing field with the greatest care (see also Chapter 30) if it is necessary
- if a Jordon frame or a scoop stretcher is available either of these can be used to move a casualty from the field (see Chapter 30).

Injuries of the soft tissues of the neck

These injuries are often associated with considerable bruising. Swelling can result in obstruction of the airway, leading to a lack of oxygen, unconsciousness and death (see Chapter 17).

Management of soft-tissue injuries of the neck



- DRABC
- if the casualty is conscious:
  - sit the casualty up
  - loosen clothing about the neck
  - apply ice packs to the neck
- observe carefully for airway problems or signs of internal bleeding; in either case seek medical aid urgently.

Shoulder injuries

Management of a shoulder injury

Manage all shoulder injuries as for fractures or dislocations (see Chapters 8 and 16):

- support the shoulder in a St John sling
- apply ice packs
- seek medical aid.

Injuries of the arms

Tennis elbow

As well as fractures and dislocations (see Chapters 8 and 16) the elbow is vulnerable to other injury in sport. The most common of these is tennis elbow, which is a strain of the muscles and tendons at the elbow. The condition occurs in many sports such as tennis, badminton, pole vaulting, javelin throwing, baseball and softball. It is a result of overstress from overuse, and may be chronic.

Symptoms

- pain over the bone at the side of the elbow joint, usually the outer side. Pain is made worse by contracting or stretching the muscles attached to that bony point.

Signs

- tenderness over the same part of the elbow.

Management of tennis elbow

- apply ice packs to the elbow
- rest the arm in an arm sling (see Chapter 10)
- seek medical aid.



25.1 Management of tennis elbow

Finger injuries

Injuries to the fingers occur in sport as a result of a blow or the finger being stretched out of normal position. They often occur in hard-ball sports like cricket, or in volleyball, football, basketball, as well as some body contact sports such as judo and karate.

Management of a dislocated finger joint

- immobilise and support by strapping the injured finger to the next finger, without reducing the dislocation
- refer the casualty to medical aid.

Mallet finger

This is a deformity of the finger due to a rupture of the tendon, or a chip fracture of the base of the end bone (Figure 25.2).



25.2 Mallet finger

Management of mallet finger

- immobilise and support with the finger splinted straight
- seek medical aid.

Contusion of finger and toe nails

This occurs under a finger or toe nail when blood collects beneath it, following a blow or crushing injury.

Symptoms

- pain and throbbing at the end of the finger.

Signs

- blood collecting beneath the nail
- heat around the injured area
- tenderness at the finger tip.

Management of a contused nail

- apply a cold compress
- seek medical aid, as it may be necessary to have pressure released from the nail.

Injuries of the trunk

Chest injuries

Rib cage (ribs and muscles) injuries are common. These occur in football and surf riding incidents and from a direct blow in any sport. Cramping in the muscles of the rib cage is called a 'stitch'.

Symptoms

- pain over the injured area
- cramping in the rib cage area
- sometimes, shoulder tip pain, which can be caused by injury to the abdominal organs below the diaphragm.

Signs

- breathing difficulty
- gasping attempts to breathe.

Management of a chest injury

- ask the casualty to carry out deep breathing and to rest
- soothe by local massage of the muscle
- if fractured ribs are suspected, treat as such (see p. 203, Chapter 14).

Winding

This is caused by a blow to the upper abdomen.

Symptoms

- gasping, ineffectual attempts to breathe.

Signs

The casualty:
- has a wide open mouth
- is trying to breathe, but his chest is not moving.

Management of winding

- lay the casualty in a comfortable position that assists breathing
- do not pump the legs or massage abdominal wall as this may cause further damage if serious injuries are present.

Abdominal injuries

Abdominal injuries are rare in sports, but can be caused by a blow to the abdomen and also by high-speed impacts, for example in wind or water surfing.

For management, see Chapters 3 and 15.

Warning

Always remember that the vital organs — spleen, liver and kidney — can be damaged; check for signs of internal bleeding. Any casualty with continuing abdominal pain must seek medical aid immediately.

Groin and testicle injuries

Groin injuries can occur from a direct blow or by overstretching of the muscles of the groin or upper thigh. Injury is associated with severe pain. The testicles may also be injured by a blow. The testicles should be protected in hard-ball games and body contact games.

Management of a groin injury

- apply ice packs or cold compresses to the area
- refer the casualty to medical aid.

Management of a groin strain

- apply ice packs
- have the casualty begin stretching exercises
- refer the casualty to medical aid.

Management of injury of the testicles

See Chapter 15.

Injuries of the legs

Knee injuries

Knee injuries are common in sport. Immediate first aid attention shortens recovery time and limits swelling.

Management of a knee injury

- R.I.C.E.
  - — rest the casualty
  - — apply ice packs
  - — apply a pressure bandage
  - — elevate the limb
- splint as for a fractured knee cap, where necessary
- seek medical aid urgently.



25.3 Management of a knee injury

Ankle sprains

These result in rupture of the fibres of the ligaments on either side of the joint. There is always a possibility of fracture of the bones that form the ankle; you will not usually be able to properly identify this fracture.

Symptoms

- pain in the ankle.

Signs

- tenderness in the area
- swelling
- bruising.

Management of ankle sprain

- R.I.C.E. (as above)
- manage as for a fracture of the lower leg (see Chapter 16)
- seek medical aid.

Muscle injuries

There are some general principles in the management of strains and other injuries of the muscles that will help to prevent swelling and promote recovery.

Management of a muscle injury

Refer to the management of strains etc. outlined in Chapter 8.

Prevent swelling of the injured part by:

- R.I.C.E. (as outlined above)



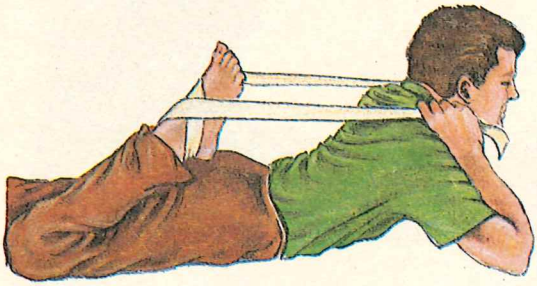
25.4 Bandaging for a muscle injury

Corked thigh

This injury is caused by a blow to the front or outer thigh muscles. It results in bleeding into the muscles. The injured area becomes tight and painful as the muscles contract.

Management of corked thigh

- R.I.C.E. (as above)
- stretch the muscle (Figure 25.5)
- seek medical aid.



25.5 Stretching muscle in a corked thigh

Muscle cramp

Cramps are spasm or abnormal contractions of muscles, caused by:

- overuse
- excessive jarring
- a small tear
- loss of body salts and fluids caused by excessive sweating
- poor blood supply to the area (e.g. because clothing is too tight).

Symptoms

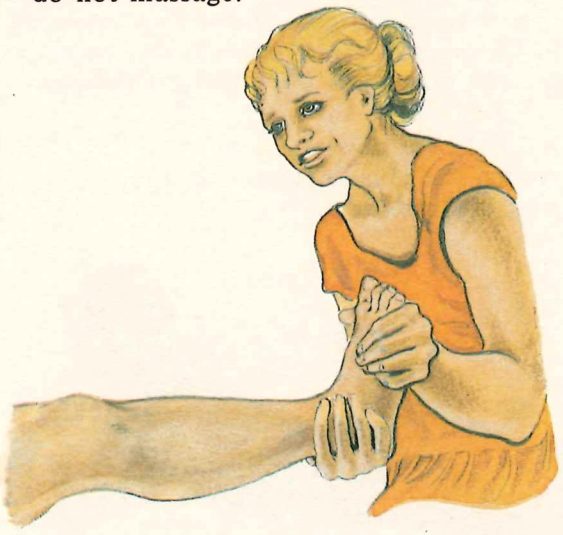
- pain
- inability to use the muscle.

Signs

- a stiffening of the muscle as it contracts and shortens.

Management of muscle cramp

- gently stretch the affected muscle fully
- apply ice packs
- do not massage.



25.6 Management of muscle cramp

Stress fractures

Repetitive overuse can cause a stress fracture in bones, which is a breakdown within the interior of the bone. Examination reveals pain and tenderness at the site. The most common site is the long bones of the foot (the so-called 'March' fracture).

Management of a stress fracture

- manage as for a fracture (see Chapter 16)
- seek medical aid.

Air pressure changes

These occur during scuba diving, and sky diving, and can result in injury. Injury can be prevented by adequate preparation, proper training and adherence to safety principles.
Air pressure changes can cause:

- rupture of the eardrum
- rupture of the air sacs of the lungs
- acute facial pain due to change of air pressure in the sinuses in the facial bones
- 'bends' — air bubbles being formed in the blood; this can produce serious injury and death.

Management is DRABC and seeking medical aid urgently.



26

Emergency childbirth

This chapter is about managing childbirth when medical aid is not immediately available.

After studying this chapter you should be able to:

- describe the management of a childbirth that occurs at a time and place where medical aid is not available.

Learn these words before studying this chapter:

Afterbirth	the placenta, cord and membranes expelled after delivery of the baby
Midwife	a person assisting at a birth
Perineum	the pelvic area between the genitals and the anus
Placenta	special tissue, attached to the mother's uterus, that nourishes the unborn baby
Umbilical cord	the cord attaching the baby to the placenta and the mother
Uterus	the womb
Vagina	the passage leading inwards from the external female genitalia.

You may be required to assist in childbirth when medical aid is not available. Remember that childbirth is a natural occurrence and you should allow the birth to occur naturally, with as little interference as possible. Unnecessary interference may seriously complicate the birth process.

Infection

Infection is a grave danger to both mother and baby. Therefore, it is essential that you take the following precautions to prevent or minimise the risk of infection:

- scrub your hands and nails thoroughly with warm water and soap
- allow your hands to dry in air
- repeat the procedure if your hands contact non-sterile material
- wear a mask — improvise with a clean handkerchief if nothing else is available.

Childbirth

Preparing for childbirth

- prepare a suitably clean surface for the mother to lie on, using:
  - a plastic sheet large enough to cover the width of the bed and extend from the mother's waist to below her knees
  - enough newspaper to cover the plastic sheet with several layers
  - a clean sheet to cover the newspaper
  - a spare sheet and extra newspaper to ensure that soiling (bowel movement) can be immediately and adequately covered and the area for the baby is kept as clean as possible
- sterile cord ties (string or linen tape 25 centimetres long, that has been boiled for 10 minutes, if possible)

- sterile scissors (to cut the cord, if necessary)
- sterile cotton wool swabs (to cleanse the baby's eyes)
- a blanket and sheet folded into three (top to bottom) to cover the top half of the mother's body
- suitable dressings (sterile) to pad the mother
- a bunny rug or nappy to wrap around the baby
- towels
- antiseptic.

The first stage — onset of labour

As this stage usually lasts from 6 to 24 hours, there is time to prepare for the birth. However, a woman who has had one or more children may progress through the first stage very rapidly.

Symptoms

- usually, cramp-like pains felt in the lower abdomen, occurring every 10 to 20 minutes and lasting for 15 to 30 seconds; pain is caused by the regular rhythmical contractions of the uterus.

Signs

- usually, a 'show' of bloodstained mucus followed later by the 'breaking of the water'.

Contractions of the uterus cause the opening into the birth canal to dilate, and may dislodge the plug of bloodstained mucus. Rupturing of the membrane containing the fluid that surrounds the baby allows the fluid to gush from the vagina.

Management of the first stage

- reassure the prospective mother
- seek medical aid
- begin to collect the requirements, preparing as above, if medical aid will be delayed.

The second stage — birth

This begins when the birth canal is fully dilated, and ends with the birth of the baby.

Symptoms

- more frequent contractions of longer duration; they occur every 2 to 3 minutes and last 30 to 60 seconds
- a change in the character of the contractions, from abnormal cramping to 'bearing down' pains.

Signs

- bulging of the perineum, with the baby's head visible at the entrance of the birth canal
- an increase in the flow of bloodstained mucus
- the mother may have a bowel movement.

Warning

The mother may have a strong desire to have a bowel movement. This is often an indication of the imminent birth of the baby. Do **not** let her sit on the toilet.



a

26.1a-d Normal childbirth sequence

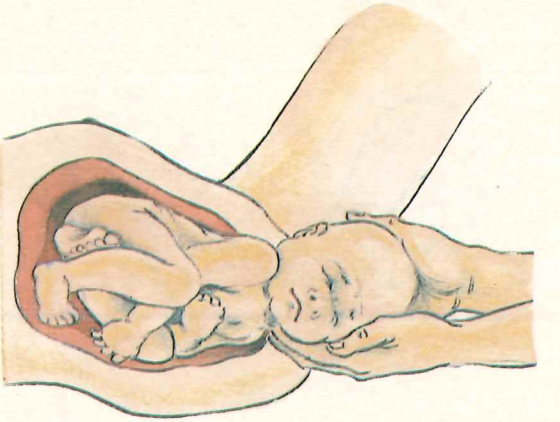


b

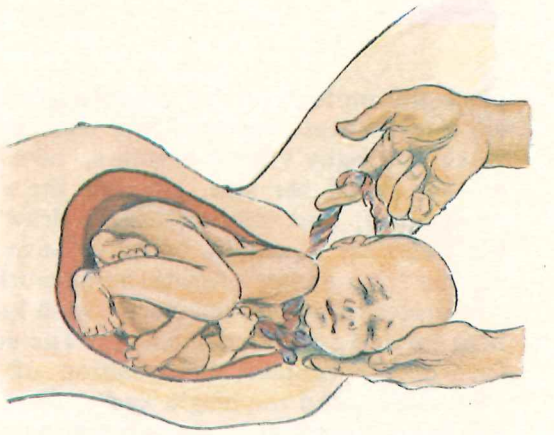
26.1a-d · Normal childbirth sequence

Management of the second stage

- place the mother on the prepared bed on her back, knees drawn up and legs apart
- when the baby's head appears, turn the mother on to her side, close to the edge of the bed, and instruct her to draw up her knees. It is usually easier to have the mother lying on her left side. Some mothers will prefer to lie on their backs, with knees bent up and separated sideways. The comfort of the mother, the position of the First Aider, and the height and position of the bed all need to be considered
- don a mask, for example a clean handkerchief
- wash your hands and dry thoroughly
- swab the area of entrance to the birth canal with antiseptic solution, if available, moving from front to back to prevent soiling of the birth area
- encourage the mother not to hold her breath and not to 'bear down', but to keep her mouth open and pant
- control the baby's head with gentle but firm pressure of one hand to prevent the head from being born too quickly; the head will appear with the face towards the



c



d

26.1a-d Normal childbirth sequence

mother's anus but will then rotate to face one side

- check whether the cord is around the neck of the baby
- if the cord is around the neck, free the cord by easing it carefully over the head of the baby
- support the baby's head in the palms of your hands and wait; the next contraction delivers the baby's shoulders
- hold the baby under the armpits and lift up towards its mother's abdomen, **during the next contraction.**



a

b

26.2a-b Immediate care of the baby

Immediate care of the baby

Remember the baby is wet and slippery. Care should be taken not to pull on the cord.

- wrap the baby in a towel or nappy, ensuring that the ankles are covered
- take a good grip with one finger between the ankles
- hold the baby up by the ankles, with its head downwards, supporting the head and neck with the other hand
- allow any fluid to drain from the baby's mouth and nose
- wipe the eyes and face with sterile cotton wool swabs

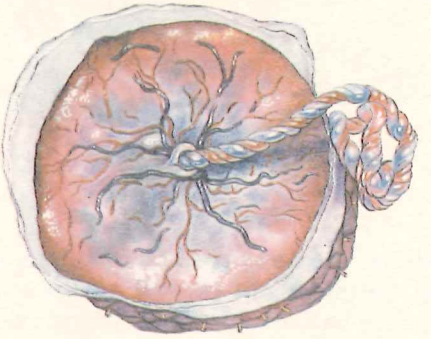
- when the baby cries lay it on its side, on the mother's abdomen, between or alongside her legs
- should the baby not cry or show signs of breathing in 2 minutes, start resuscitation by ventilating the lungs, blowing **very gently**
- when the baby is breathing give it to the mother to nurse.

Warning — breech delivery

Should the baby appear buttocks first (breech delivery) **no interference is the rule. Seek medical aid urgently.**

The third stage

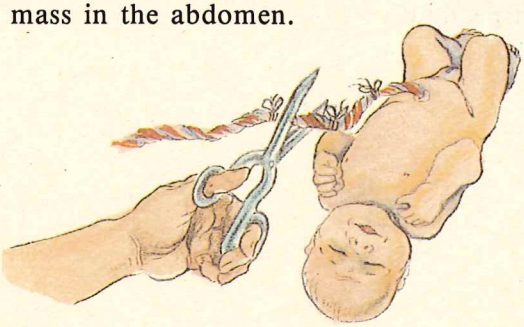
The afterbirth will be expelled by contractions of the uterus and the mother's voluntary efforts.



26.3 The placenta

- place the mother on her back, with legs separated
- 10 or more minutes may elapse before the afterbirth appears
- do **not** pull on the cord as this may cause massive bleeding

- give the baby to the mother to put on the breast; this will help the womb to contract, expelling the afterbirth and controlling bleeding
- always retain the afterbirth (placenta) for medical inspection
- after expulsion of the afterbirth there will be some bleeding from the mother. This can usually be controlled by firm but gentle massage of the womb, felt as a hard round mass in the abdomen.



26.4 Tying the umbilical cord

Dealing with the cord

- wait until the afterbirth has been delivered and the cord has stopped pulsating, usually 2 to 3 minutes after the birth of the baby
- tie the cord very firmly in three places — one 10 centimetres, one 15 centimetres and one 20 centimetres from the baby's navel; unless the cord is securely tied the baby may bleed to death
- you need not cut the cord; this will lessen:
  - the risk of the baby bleeding from the cord
  - the risk of infection
- but, if the mother is isolated from medical aid, you may cut the cord
- if the cord is cut, leave two ties on the baby's side
- place a sterile dressing over the stump of the cord.

Care of the mother

- wash the mother and place a sanitary towel in position
- give her hot drinks
- encourage her to sleep
- regularly check her respiration and pulse rates
- check for excessive blood loss
- control any further bleeding by massage of the womb again, as described above
- retain any used sanitary towels for medical inspection.

27

First aid in remote areas

This chapter is about giving first aid in remote areas, while awaiting medical aid, which, because of circumstances, may take several hours or longer to reach the casualty.

After studying this chapter you should be able to:

- perform the additional management necessary to sustain a casualty who has been injured or has become ill in a remote location.

Regardless of where the incident that caused the injury or illness occurred, the appropriate first aid is that described in other chapters for specific conditions. But because of remoteness or climatic conditions, or other circumstances, it may be hours, or even days, before medical aid arrives.

Checking, observing and recording

In the circumstances mentioned above, you will need to keep the casualty comfortable and reassured, and to observe accurately and record the casualty's condition for the information of medical aid when it does finally arrive. Your records will then be handed over to medical aid.

Checking the adequacy of dressings, bandages, splints, etc. and recording casualty observations should be carried out at regular intervals.

The intervals are determined by the seriousness or otherwise of the casualty's condition and may require observations to be recorded at 10-minute, half-hourly or hourly intervals. The more serious the casualty's condition the more frequent the observations.

Checking the adequacy of dressings

- position the casualty comfortably and in the correct position determined by the injuries and conscious state
- maintain and monitor the casualty's *A*irway, *B*reathing and *C*irculation
- inspect the dressings to see whether blood has soaked through. If so, add further dressings. Make sure the dressings are sufficiently tight
- redressing the wound should be avoided if possible; it is likely to restart the bleeding

- check any fracture immobilisation for firmness of bandages; if loosened, apply a firm bandage over the initial bandage
- check the circulation in the limb, if it is impaired and the extremity is pale and cold, loosen the bandage and retie.

Do not hesitate to change the casualty's position, if necessary.

Observations

Make regular observations of, and record the casualty's:

- conscious state:
  has it improved or deteriorated (refer to Chapter 4)? Note and record the time of any changes
- pulse:
  is the rate fast or slow?
  is the rhythm regular or irregular?
  is it weak or strong?
  count the rate over 1 minute and record
- breathing:
  is the rate fast or slow?
  is it deep, shallow, sighing?
  is it noisy, quiet, gurgling?
  count the rate over 1 minute and record
- pupils:
  are they dilated or contracted?
  are they equal or unequal?
  do they react to light?
  record the time of any changes
- colour of the skin:
  is it normal or pale?
  is it bluish, purplish?
- condition of the skin:
  is it wet or dry?
  is it warm or cold?

Notes:
When observing colour and skin condition, remember this refers equally to a part of the body as it does to the whole of the body,

for example an extremity beyond an injury may be pink, white or blue. This indicates the state of the circulation of that limb, particularly when it is also observed that the extremity feels warm or cold.

Observations to be noted are determined by the casualty's injuries and general condition. If the casualty has a simple lower limb fracture, is conscious and alert, then noting conscious state, pulse, breathing and pupil changes would not be so important. However, observing and recording colour and condition of the toes on the injured limb could be vital.

Remember that the casualty's medical condition may deteriorate during prolonged periods of observation. Illnesses and injuries may become worse, and close observation will help to pick these changes early.

The casualty who waits for medical aid over long periods will become more stressed emotionally and require greater support and reassurance. Tact and understanding is needed.

Environmental conditions may play a vital role and necessitate your intervention. Keep the patient warm in a cold environment by means of added clothing, blankets or yourself if necessary. When the environment is hot keep the casualty shaded, with clothes loose. Try to keep him out of direct contact with the sun.

If the patient's condition deteriorates, do not panic. Keep calm and thereby allay the casualty's fears. Do not forget you yourself will have additional emotional stress.

Keep the rest of your first aid teaching in mind and apply this in the management of the patient. This is all that can be expected of you.

28

Traffic accident injuries

In providing first aid at the scene of a traffic accident, the first few minutes are vital.

After studying this chapter you should be able to:

- take the precautions necessary to safeguard yourself, the casualty and bystanders at the scene of a traffic accident
- perform the first aid necessary to save a life at a traffic accident
- arrange for assistance.

Possible danger from oncoming traffic at a motor vehicle accident is serious. You must be able to take quick, effective control of the situation to avoid another accident which may involve you!

In motor vehicle accidents the casualty is frequently in great danger because the airway is blocked due to the head being slumped forward when the casualty is unconscious.

Another source of great danger is bleeding, both external and internal, as a result of injury to major blood vessels or a blow to the abdomen (e.g. from the steering wheel).

The rules for safety in a motor vehicle are given in Chapter 29.

Assessment of the situation



At the scene of a traffic accident, ensure the safety of:

- self
- casualty
- bystanders.

You should immediately identify yourself, be calm and reassuring and indicate that you are a trained First Aider.

You should ensure that all occupants of the vehicle are accounted for.

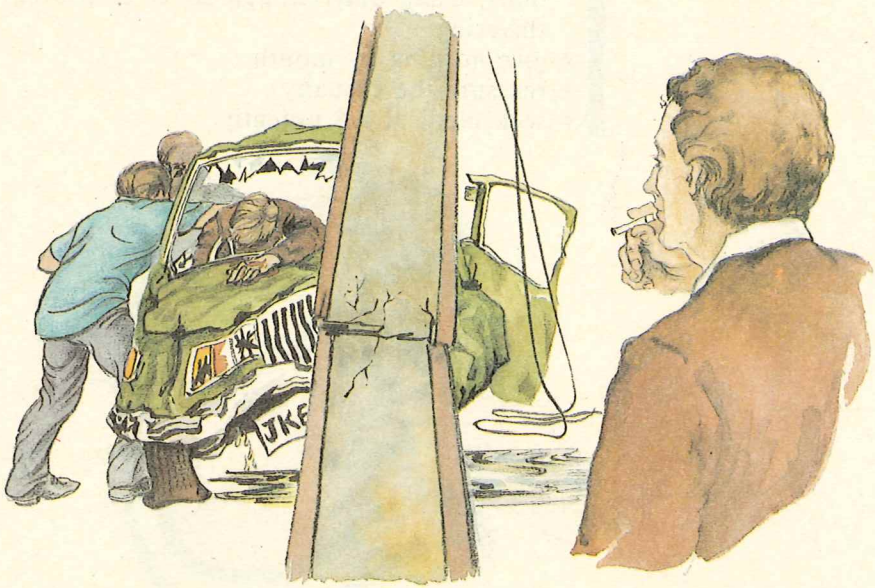
Safety at the scene

To safeguard yourself, any casualties and bystanders, it may be necessary to:

- park your own vehicle ahead of the scene
- switch on hazard warning lights or the right-hand traffic indicator
- station people to warn other road users of the accident
- at night, light up the scene with headlights on low beam, and flashing indicators
- set up warning reflective triangles if available.

For safety, also:

- turn off the ignition or disconnect the battery of a crashed vehicle
- apply the handbrake
- if on a slope, chock the wheels
- extinguish all cigarettes
- keep clear of fallen electricity wires and do not touch the vehicle or occupants if live wires are in contact with the vehicle until it is declared safe by the electric supply authority
- check for leaks of petrol or LP gas.



28.1 Safety at the scene



General management of a traffic accident

- DRABC
- place any unconscious, breathing casualty in the coma position if the casualty is outside the vehicle
- if trapped in a vehicle, tilt the casualty's

head backwards, with jaw support, so that the airway remains open (Figure 28.2)
- attend to serious bleeding
- do not abandon an unconscious casualty who has an airway problem, breathing difficulty, serious bleeding or other life-threatening condition in order to rescuscitate the apparently dead, unless other First Aiders are present and able to help
- when free to do so, cover all wounds
- immobilise fractures
- protect the casualty from weather conditions, using only enough cover to prevent shivering
- give nothing by mouth
- reassure the casualty
- seek medical aid urgently.



28.2 A trapped casualty's head tilted, with jaw support

Summoning help

If help is needed, you should send for it.

Dial 000 in any State Capital, otherwise the number listed in the telephone directory. If a vehicle, involved or passing, has CB radio, channels are reserved for emergency messages and should be used to summon help.

Instruct a bystander or passing motorist to contact the nearest ambulance or emergency service and police, informing them of:

- the location of the incident — district, suburb, etc.
- the name of the street and the nearest cross-street (suburban)
- the distance from a town or major landmark (country) in kilometres, north, south, east or west
- the nature of the accident — two cars, a pedestrian, a motor cycle, etc.
- the number of people injured and any people trapped
- suspected nature and severity of injuries
- special hazards — electricity cables, petrol or fuel spilled, fire, railway crossing, etc.
- the time of the accident, if known.

Ensure that the message is understood by the person receiving it.

Describe location

Name of district, suburb, etc: NUNAWADING

Name of street, road, highway, etc: Maroondah Hwy

Nearest cross street (suburban): Springvale Rd.

Distance from town or major landmark (country) — kms

North ☐ South ☐ East ☐ West ☐

of ——— (describe town or landmark)

Give accident details

Number of people hurt 3 (2 adults, 1 infant)

Time of accident (if known) 3·15 AM approx.

Time this message written 3·21 AM

Notes Truck and family sedan have collided on corner - big petrol spill. Infant critical. Melway: 48 F9 [1984].

28.3 A message form

Helping the trapped victim



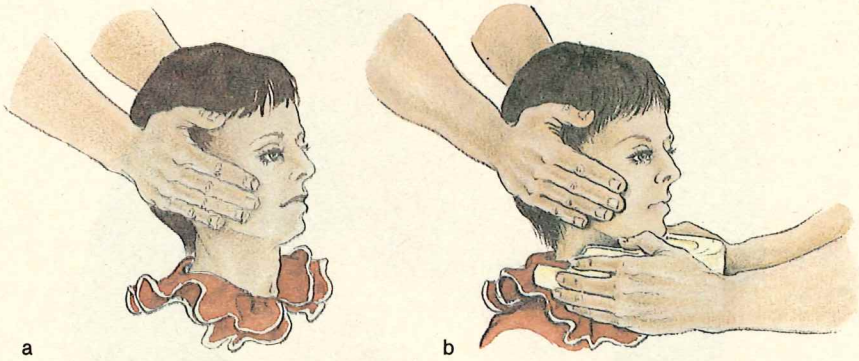
- ensure safety for the rescuer and the casualty
- send for expert rescue assistance urgently
- ensure that the ambulance officers are informed that the casualty is trapped
- if possible, remove heavy objects that restrict breathing or circulation (refer to Crush Injuries, Chapter 16)
- if the vehicle is overturned, ensure that battery acid, hot oil and petrol do not splash on to the victim
- look under the dashboard and seat, and other confined places, to see if other occupants are trapped there
- DRABC, if necessary, until expert help arrives
- if removal is necessary, proceed carefully, as described below.

Casualties should not be moved from the vehicle or scene unless danger makes it necessary. If, however, the casualty must be removed from danger you should remember that there is a possibility of causing further injury and should proceed with great care.

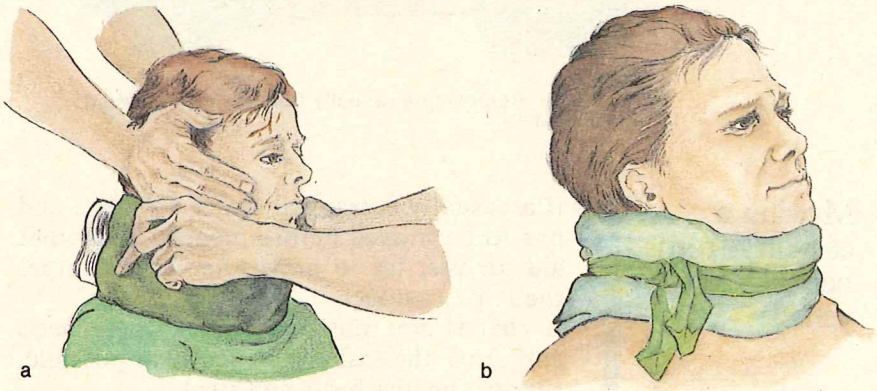
Moving a casualty from inside a crashed vehicle



- DRABC
- only if there is danger to the casualty or to yourself, remove the casualty, doing so as safely and quickly as possible
- keep the airway clear
- try to support the spine
- if possible, apply a cervical collar or splint while the casualty is still in the vehicle. If a prepared collar (see Figure 28.4a-b) is not available, one can be improvised by folding a newspaper and bending it around the neck. This can be kept in place by inserting the folded newspaper in a rolled towel, absorbent material, a stocking or pantihose (Figure 28.5a-b).



28.4a-b Applying a prepared cervical collar



28.5a-b Applying an improvised cervical collar

- recruit enough people to support all parts of the casualty's body
- give your helpers clear instructions on how the casualty is to be moved
- carry out the removal with a smooth, continuous movement if possible
- **support the casualty's head.**



28.6 Removing a casualty from inside a crashed vehicle

Moving a casualty from beneath a vehicle

- if a casualty is trapped under a vehicle and has to be moved before medical and other aid arrives, try to move the vehicle rather than the casualty
- if this is not possible, chock the wheels and move the casualty as gently as possible, supporting the head and neck
- note the exact position of the casualty and/or the vehicle before moving, for a possible police report later.

Crush injuries

A casualty who has a limb crushed beneath a vehicle requires special management, especially if the accident occurred several hours before rescue. Refer to the section on crushed limbs in Chapter 16.

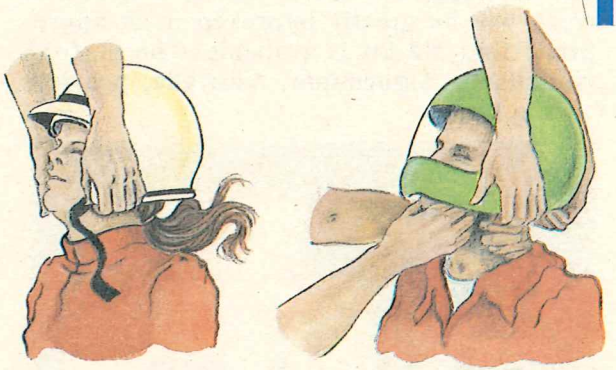
Motor cyclists' protective helmets

In traffic accidents involving a motor cyclist it may be necessary to remove the casualty's crash helmet. This will depend on the casualty's situation and condition.

However, the helmet should be left on for protection where possible and taken off only if the casualty's injuries demand removal or when it is obstructing his breathing, if he is vomiting, or if he has severe head injuries. If possible, the helmet should be removed by the casualty.

Removing a protective helmet

There are two types of protective helmet



a b

28.7a-b Removing a motor cyclist's protective helmet

Head-only type

- unfasten or cut through the chinstrap
- force the sides apart to take pressure off the casualty's head
- lift the helmet upwards and backwards.

Full-face type

This type of helmet needs two persons to remove it safely. One person must support

the casualty's head and neck, while the other lifts the helmet:
- tilt the helmet back
- lift it clear of the chin
- tilt it forward to pass over the base of the skull.

Helping the emergency services

You can provide valuable assistance to the emergency services. On arrival of the ambulance, inform the ambulance officers of the location and condition of all casualties. Be prepared to help if requested.

The management of casualties in a vehicle crash will be greatly improved if an appropriate first aid kit is available. The St John Ambulance Association, Australia, provides such a kit.



28.8 The St John motorists' first aid kit

29

Safety, prevention and protection

The aim of this chapter is to ensure a safe environment free from hazards, by recognition, prevention and protection.

After studying this chapter you should:

- be able to recognise real or potential hazards where they exist
- know how to prevent hazards from occurring in the environment
- know how to protect yourself and others from hazards.

Although the First Aider's role is to manage a casualty in an emergency, you should also strive to achieve a safe, accident-free environment. Safety rules and, above all, commonsense do help to prevent accidents.

The environment and its associated hazards, and safety rules for that environment, can be grouped in four areas that are more or less related:

- the home
- the motor car
- recreation
- the workplace.

The home

General comments

Accidents are likely to occur in and around the home. As these may often be serious, people must be aware of possible dangers and do all in their power to prevent them.

Parents of young children have a special responsibility to check the safety of their environment. Certain selected and more common dangers are outlined below, but it is not suggested that all possible dangers have been included.

Glass safety rules

- constantly check your home for objects that may cause injury
- make clear, eye-level markings on large transparent walk-through doors
- fit safety glass wherever and whenever possible. This is particularly important for full-length glass doors and windows
- promptly sweep up broken glass.

Toy safety rules

- select toys on the basis of safety
- do not purchase toys made of glass, celluloid or fur, or those with eyes made of stitched-on buttons or beads

- do not leave toys lying about on the floor or on stairs where they may cause a fall
- keep all playthings in a safe condition.

Firearm safety rules

- dismantle firearms for storage
- store firearms and ammunition safely **and separately,** locked out of reach of children.

Other safety rules

- close electrical sockets in all rooms with 'dummy plugs', which are difficult for the small child to remove
- follow the manufacturer's instructions carefully when using any equipment
- position ladders safely when used in the home for such tasks as inserting light globes, hanging curtains or doing high dusting
- do not step on chairs or the end of a table top
- destroy or securely store plastic bags, as suffocation may occur if a child pulls a bag over its head
- guard stairs with gates
- prevent children from playing with fireworks
- supervise children's play areas at all times.

The kitchen

This can be a very dangerous room, as much household activity is centred here.

- watch to see that children cannot reach hot or dangerous objects
- turn handles of saucepans and other cooking containers away from the edges of the stove
- place containers with hot food and drinks in the centre of the table out of reach of toddlers
- preferably use place mats, which are less likely to be pulled off the table than the dangling ends of a tablecloth

- hook electric cords out of reach
- unplug electric cords when not in use and check them regularly for unsafe wear
- use sharp objects only for their intended purpose; keep them sharp, handle them with care and store them safely
- store poisonous substances, such as bleach, polishes and detergents at a high level, in a childproof cupboard, **not under the sink.**

The bathroom

- never leave a young child alone in the bathroom
- always put cold water into the bath before and after adding hot water, lessening the risk of scalding
- never leave a young child unsupervised in the bath with an older child, who may turn on the hot water tap
- place non-slip mats in the bath to prevent accidental slipping
- have a childproof lock fitted to the medicine cabinet
- use special safety closures for medicine containers
- destroy unwanted medicines by flushing down the toilet (except where there is a septic system) or by burning
- securely lock all bath cleaning agents, skin perfumes and pressurised containers out of reach of children
- supervise the old and the young in the bathroom.

The laundry

- never leave a young child alone in the laundry whilst the washing machine is in action, or if buckets or tubs of water are in use for any purpose

- loop the ironing cord out of reach to prevent the iron, whether hot or cold, from being pulled down on to the child, possibly causing serious injury; cord holders can be attached to ironing boards
- lock away all soaps and detergents.

The lounge

- attach non-slip backing to floor rugs to prevent the possibility of falls
- provide a guard for the fire or radiator to prevent burns
- do not leave cigarette lighters or matches lying within reach of children.

The bedroom

- do not smoke in bed
- avoid accidental drug overdose in children or in confused elderly people by not leaving medicines or tablets in an easily accessible place, such as the dressing table, or in handbags
- avoid cot accidents by choosing one with side-bars so spaced that a child's head cannot be thrust through them, possibly causing strangulation; ensure that the anchorage of the cot sides is of a reliable secure type
- do not provide electric blankets for young children, because they can become wet, the switches and plugs are tempting playthings and jumping or bouncing on them may break the wires
- provide your children with night attire made from non-flammable or low flammability material and of a form-fitting tracksuit design
- avoid flowing nightdresses and gowns.

Outdoors

The pool

- have the pool easily visible from the living area
- surround the pool with a childproof fence conforming to the requirements of the Standards Association of Australia
- teach all users to swim
- at all times supervise children swimming
- never swim alone
- have a non-slip surface in and around the pool
- only allow non-inflatable toys in the pool
- store pool chemicals safely and away from children
- have available a long pole or ring buoy with a rope that can be used for rescue
- cover the pool when not in use
- take away removable steps or ladders from pools when not in use
- constantly study methods of rescue and resuscitation.

The tool shed and the garden

- lock away, when not in use, all tools, weedkillers, insecticides, sprays, kerosene and other dangerous items
- label the above materials correctly
- never transfer poisons to soft-drink bottles
- if it is unavoidable that the garden rake or fork be left temporarily, ensure that their prongs are embedded in the ground
- hang tools in the shed, in such a way that they do not fall
- do not leave ladders standing against walls or trees — they could be a temptation for children to climb or play on

- remove the door from an old refrigerator used as a play house or cubby hole
- place an old refrigerator on even ground so that it will not topple over
- ensure that a responsible adult is always in charge of barbecues, incinerators, hot ashes and burning rubbish
- never throw kerosene or petrol on to a smouldering fire or use them to start a fire
- never put old aerosol cans in the incinerator
- ensure that rubbish bin lids fit firmly so that children cannot remove them and play with the contents
- wrap broken glass and china with thick layers of paper and tie securely before discarding
- store pool chemicals away from petroleum products.

Fire drill

- have an emergency telephone number handy
- keep an effective fire extinguisher in a central place — **not** next to the stove
- keep a fire-blanket in the kitchen for use on burning oil, frying pans, etc.

If fire occurs:
- call the fire brigade
- shut all doors and windows
- turn off all electric power
- extinguish the fire if possible.

The motor car

Chapter 28 describes how to treat casualties involved in traffic accidents. The safety rules for motorists are:
- have your car, caravan and trailer checked regularly for roadworthiness

- give full attention to your driving
- observe the traffic laws
- drive at a safe speed
- do not drink and drive
- do not drive while taking medications unless on medical approval
- do not drive too far without a break and a rest
- always ensure that all passengers wear safety belts
- restrain all child passengers by approved seat belts, with webbing and webbing straps for bassinettes
- make sure that the children are in the house or in full view when backing the family car
- always look to the rear and in the rear vision mirror to ensure that no other person or animal is in the way while you are reversing
- back the car slowly
- never leave children alone in a car where they may play with the gears, causing the car to move
- never leave ignition keys in the car, as the car may be accidentally started by a child
- check the glove box to ensure that there are no tablets or matches
- ensure that children do not have access to a cigarette lighter, which may be activated by children playing in a car
- **on hot days, do not leave infants unattended in a car** (see Chapter 24)
- if a pedestrian, wear clothing that is easily seen from all directions.

Recreation

Boating

Basic rules for safe boating:

- carry adequate equipment
- carry approved life jackets, one for each person aboard
- carry sufficient fuel and water
- distribute the load evenly and do not overload
- inform a responsible adult where you are going
- know the rules, local regulations, and distress signals
- watch the weather
- guard against fire
- ensure engine reliability
- do not mix alcohol and boating.

Before setting out

- check the weather forecast — in bad weather it is safer ashore
- check the boat and make sure that the engine is in working order
- check your safety equipment, ensuring that there are fire extinguishers in working condition and enough life jackets
- check that there is enough fuel for a return trip
- make sure that no petrol has been spilt or is leaking
- never jump into a boat or carry bulky items when boarding
- step aboard as close to the middle of the boat as possible, and hold on
- keep low down when moving in a small boat
- make sure that you have told someone where you are going and what time you expect to be back.

Under way

- know the navigation rules and obey them
- keep a constant lookout
- consider other people, both swimming and boating
- slow down near small craft.

Hiking

- inform authorities of your plans
- wear suitable clothing
- guard against sunburn
- take water, matches, compass and map of the area
- never take long walks without obtaining expert advice
- keep together
- wait for help if lost
- remember that streams lead to civilisation and help.

Camping

- label all dangerous items clearly
- make sure that stoves and lanterns are safe
- ensure that containers of hot fluids cannot be tipped over
- ensure that collapsible tables are stable
- protect yourself and others against insect bites
- mark tent-guys clearly
- make sure that your camp fire is out before leaving.

Survival in the desert

- replace fluid and minerals lost by sweating; the requirement is 4 litres per day in hot weather
- dig in dried lakes and creek beds in an attempt to find water
- protect yourself from the sun, utilising whatever shade is available
- maintain cooling of the body
- wear clothing at all times
- during the daytime, rest and cover the body, including the head, to protect against:
  – sunburn
  – heat

– sand
– insects
- travel only at night, and then only if the direction of travel and destination are known; clearly mark your tracks
- if an emergency does occur in remote desert country, help the rescuers by laying adequate signals.

Preventing cold exposure

- wear clothing that protects from the wind and the rain (woollen undergarments and waterproof clothing)
- have adequate sleeping bags and covers
- have a minimum of four in the party
- have experienced members
- plan the trip for the weakest member
- ensure that members are physically fit, to cope with the workload
- listen to weather forecasts
- if caught in bad weather, take shelter early and watch for early signs of trouble.

Swimming

At the beach

- when surfing on an open beach, always choose a beach that is patrolled by surf lifesavers
- observe directions of lifesavers on patrol
- bathe between the flags
- swim or surf with the crowd, never alone
- if a non-swimmer, do not take inflatable rubber boats into surf
- if caught in an undertow or rip, do not try to swim against it; raise your right hand and await assistance (floating, treading water and avoiding panic all conserve energy)
- do not panic
- when assistance arrives, do not struggle with your rescuer
- do not throw sand when at the beach as it can cause serious eye injuries.

In fresh water

- avoid swimming in lonely rivers or dams unless accompanied by other people
- make inquiries concerning the swimming area
- thoroughly investigate the swimming area before entering
- do not enter dark water
- do not dive into unknown streams or dams until sure of the depth and absence of underwater obstacles
- make sure before entering the water that you can easily get out again
- watch for currents, which usually flow near steep river banks
- check for underwater hazards, such as fallen tree limbs
- do not dispose of litter in the water.

The workplace

Accidents do not just happen. They are caused. Injuries happen to people not things.

The basic principles of accident prevention in the workplace are:

- working conditions must be as safe as possible
- workers must be protected from hazards that cannot otherwise be eliminated
- all personnel (management as well as workers) must be trained in safety
- in all but the smallest works, there should be a safety officer, or some member of management charged with this special responsibility
- special caution is necessary in areas that have a record of accidents
- accident-prone workers require observation to ascertain whether their accidents are due to themselves or to the way in which the job is organised

- any badly sited machinery or furniture must be sited more safely
- workers must be particularly aware of any badly worn and uneven floors and stairways.

Every adult person has a responsibility to be alert to possible dangers and to do all in his power to prevent accidents to his own family and to other people.

7

Practical skills

30

Lifting and moving casualties

This chapter explains methods of lifting and moving casualties correctly and with safety after their injuries have been attended to.

After studying this chapter you should know:
- correct safe methods of moving a casualty
- when to move a casualty
- when to leave a casualty until additional help is available.

A knowledge of correct lifting and moving techniques will enable you to remove casualties from life-threatening situations, quickly and with greater safety, when such removal takes priority over treatment.

Warning — Movement of casualties

Unless absolutely necessary, **do not** move a casualty until professional help arrives. However, if the casualty's life is endangered by fire, the likely collapse of a building, or a similar hazard, **remove the casualty by the quickest means available regardless of injuries or the manner in which removal must be made. Do not become a casualty yourself.**

When injuries appear serious and/or extensive, seek medical aid urgently.

Wait for medical aid to arrive if:
- no further danger is apparent
- the casualty's airway is maintained
- breathing is continuing
- bleeding has been controlled
- the casualty is safe from further harm.

Remember, ambulance is the preferred method of transport for a seriously injured casualty. Improvised transport may endanger the casualty's chance of survival and should be used only if no ambulance is available.

General principles of lifting a casualty

The aim, in all lifting, should be to keep the casualty as comfortable as possible and to prevent unnecessary strain or injury to yourself, and prevent further injury to the casualty.

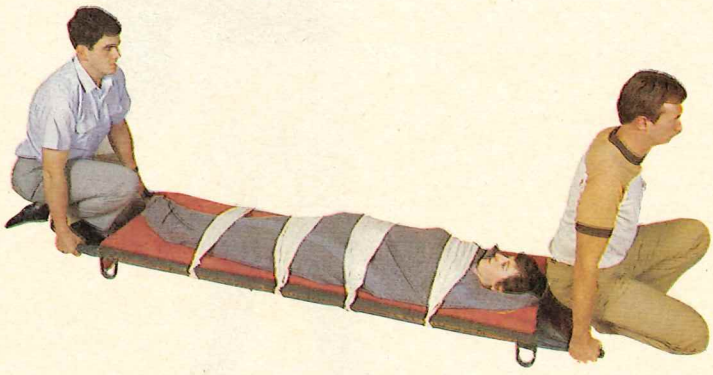
General principles, when lifting casualties, are listed below.

The casualty

- treat all injuries and immobilise fractures
- keep the casualty informed about procedures
- tell the casualty when you are about to lift
- seek the casualty's help and co-operation
- **ensure that the casualty feels secure.**

The First Aider

- realise your limitations, for example if you need help, ask for it
- keep your back straight
- lift using your thigh and leg muscles
- ensure that your feet are on a firm and level surface, where possible
- have your feet parallel and apart when lifting a stretcher or for the blanket lift
- for handseats, point your feet in the direction of intended movement
- hold the casualty firmly but gently
- **avoid risks, where possible.**



30.1 Correct posture for lifting a casualty

Moving a casualty

The procedure used to move a casualty will depend on whether more than one First Aider is available.

Using one First Aider

The various methods open to the First Aider working alone are the following:

- the cradle
- the human crutch
- pick-a-back
- the fireman's lift and carry
- the lift and drag.

The cradle

This is used by one First Aider to carry a child or a lightweight person:

- place the casualty's nearer arm around your neck



30.2 Moving a casualty: cradle lift

- pass one of your arms under the casualty's mid-thigh
- place your other arm under the trunk, around the waist
- lift.

If the casualty is heavier than anticipated use further help. **Do not slump forward whilst carrying.** Arch backwards to counterbalance the weight.

The human crutch

This is used for adult casualties when they can walk with assistance:

- help the casualty to stand
- stand at the casualty's injured side and pass your nearer arm behind the casualty
- grasp the casualty's clothing near the opposite hip
- place the casualty's nearer arm around your neck



30.3 A human crutch: one First Aider

- hold that hand with your free hand; if the casualty can use his other hand, he will gain additional support from a stick or walking aid
- step off together with the inside foot.

Pick-a-back

This is used for the conscious casualty who can hold on:

- help the casualty to stand
- stoop in front of the casualty
- have the casualty place his arms over your shoulders and clasp them together firmly across your chest
- carry your arms under the casualty's knees
- if possible, clasp your hands in front
- straighten and proceed.



30.4 Pick-a-back

The fireman's lift and carry

This is used for adult casualties who can stand with or without help, but cannot walk. If necessary, you can help the casualty up by the following procedure:

- position the casualty face downwards
- kneel on one knee at the head of the casualty
- pass both arms beneath the shoulders
- draw the casualty towards you and clasp your hands behind the casualty's back
- bring casualty to either standing or kneeling position depending on size of casualty.

To carry the casualty on your right shoulder:

- grasp the casualty's right wrist with your left hand
- bend down with your head under the casualty's extended right arm so that your right shoulder is level with the lower part of the abdomen and place your right arm between or around the thighs
- taking the casualty's weight on your right shoulder, straighten up
- pull the casualty across both shoulders and transfer the casualty's right wrist to your right hand.

To carry the casualty on your left shoulder:

- carry out the above procedure, but change right for left and vice-versa.



a

30.5a-c The fireman's lift and carry



b



c

30.5a-c The fireman's lift and carry

The lift and drag

This is used to drag a heavy helpless casualty from danger:

- turn the casualty onto the back
- tie the wrists together
- face and kneel astride the casualty
- bend forward, thread your head and one arm through the casualty's arms so that the weight is distributed across your shoulders and back

- lifting the casualty's head and shoulders clear of the ground, crawl on your hands and knees from the danger area.

Never take the weight solely on your neck. Warning



30.6 The lift and drag

Using two or more First Aiders

Several different methods of moving a casualty are available for use by two or more persons. These are:

- the two-man human crutch
- the four-handed seat
- the three-handed seat
- the two-handed seat
- the fore and aft method of transport
- the fore and aft chair lift.

The human crutch

This is used for a casualty who can support weight on one leg without increasing the injury:

- help the casualty to stand
- both First Aiders stand, one on each side of the casualty
- the casualty places arms around the shoulders of both of you
- each of you puts your nearer arm around the casualty's waist and grasps the clothing on the casualty's opposite hip

- each of you grasps the casualty's wrist that is around your shoulder, with your free hand
- each of you steps off with the inside foot while the casualty swings between you using the same principle as with wooden crutches.



30.7 A human crutch: two First Aiders

The four-handed seat

This is used when the casualty can help, using one or both arms:

- two of you face each other behind the casualty and each grasp your left wrist with your right hand and each other's right wrist with your left hand
- both of you squat down
- instruct the casualty to place one arm

around the neck of each of you and sit on your hands
- rise together and each step off with the inside foot, using a crossover step.



a



b

30.8a-b The four-handed seat

The three-handed seat

This is used for supporting either leg when the casualty is able to help, using one or both arms.

To support the left leg:
- two of you face each other behind the casualty
- if you are the helper on the casualty's right, grasp your own left forearm with

your right hand and the other helper's right forearm with your left hand, leaving the other helper's left hand free to support the casualty's left leg. If you are the helper on the casualty's left, grasp the other helper's right forearm with your right hand

- both of you squat down
- instruct the casualty to place one arm around the neck of each of you and to sit on your hands
- with the bearer on the left supporting the casualty's leg, rise together and each of you step off with your inside foot, using a crossover step.

To support the right leg:

- follow the above procedure, but change right for left, and vice versa.

30.9a-b
The three-handed seat



a



b

The two-handed seat

This is used for any conscious casualty who can be carried in a sitting position. It allows the casualty to help by placing the uninjured leg under the injured one to support it:

- two First Aiders face each other, one on either side of the casualty, with the toe of your outside foot facing the direction of movement
- each of you place the arm nearer to the rear of the casualty around the casualty's waist
- each of you place your other arm under the casualty's thighs at approximately mid-length, clasping the wrist of the other First Aider
- both arise slowly and together, lifting the casualty from the ground

30.10a-b
The two-handed seat



a



b

- when upright, each of you steps off with your inside foot, turning it into the direction of movement.

Note: The higher the casualty is lifted on to your chests, the easier carrying will be. Your arms under the casualty's thighs should not be straight, as this makes carrying more difficult.

The fore and aft method of transport

This is used for a casualty when space does not permit the use of a hand seat:

- one of you, stand between the casualty's legs, facing the feet
- bending down, grasp the casualty under the knees



30.11 The fore-and-aft method of transport

- the other of you stoop behind the casualty and, after raising the head and shoulders, pass your arms under the casualty's armpits grasping the casualty's wrists against the chest
- rise together and step off, walking in step.

The fore and aft chair lift

This is used for a conscious casualty with serious injury and where a chair is available:

- seat the casualty in a strong chair
- one of you, grasp the back of the chair and tilt the chair to the point of balance
- the other one, with your back to the casualty, kneel on one knee and grasp the front legs of the chair
- rise and both proceed in step.



30.12 The fore-and-aft chairlift

Stretchers

Rules for carrying casualties on stretchers

- the stretcher must be tested for strength and security before placing the casualty on it
- the stretcher should be kept as level as possible
- movement must be minimal
- the casualty must be positioned on the stretcher in the correct nursing position, determined by injuries and condition
- the casualty should be protected from prevailing weather conditions
- haste should be avoided.

Note: The casualty should not be moved until medical aid arrives if there is any possibility that transport will adversely affect the casualty's injury or condition.

Securing a casualty to a stretcher

- using two broad bandages tied together, secure the casualty at:
  - shoulder level
  - hips
  - mid-thigh
  - calves

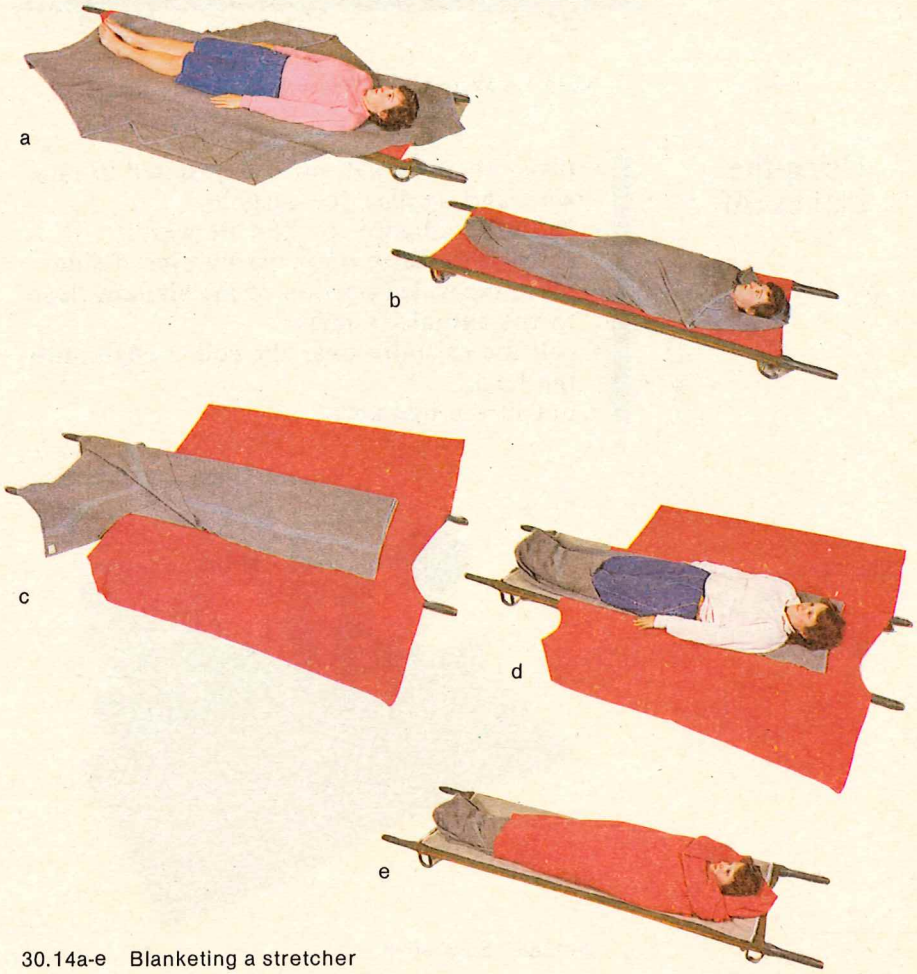


30.13 Securing a casualty to a stretcher

- apply bandages firmly enough to prevent the casualty from moving
- do not allow bandages to make the casualty's disabilities worse.

Blanketing a stretcher

Use the illustrations below to learn how to blanket a stretcher, using one or two blankets; also how to load a stretcher when no blankets are available.



30.14a-e Blanketing a stretcher



30.15 Loading a stretcher without using blankets

Using the blanket lift

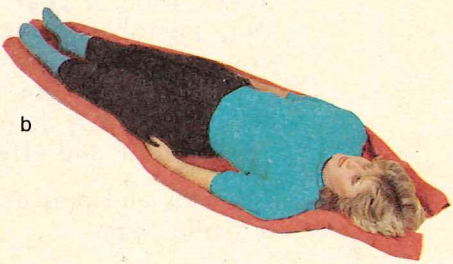
- place the blanket on the ground in line with and against the casualty
- roll it lengthwise for half its width
- roll the casualty onto the uninjured side
- place the rolled portion of the blanket close to the casualty's back
- roll the casualty over the rolled edge onto the back
- unroll the blanket



a

30.16a-c Blanket lift

- for lifting, roll up the edges of the blanket close to the casualty. Two First Aiders should kneel on either side of the casualty and grasp the rolled edges, arms well apart, ensuring that the casualty's head is fully supported. While lifting the casualty, the First Aider should lean backward slightly and pull outward on the blanket to keep it firm.



b



c

30.16a-c Blanket lift

Improvised stretchers

A stretcher can be improvised by using a:
- wire mattress
- ladder
- door
- table
- plank
- pole, with coats, sacks, blankets or bandages attached
- coats.

When using a coat, turn the sleeves inside out, pass poles through them and pin the coat ends around the poles. A cross piece, lashed to each pole at the head and foot, will make this improvised stretcher more comfortable and effective.

Blankets and pins can be used with poles in a similar way.



30.17 An improvised stretcher with poles and coats

Warning

Casualties with head injuries, unconscious casualties, or those likely to become unconscious, or to vomit, should be carried in the coma position on the stretcher, either improvised or otherwise.

If the casualty has to be carried over rough ground or down hill, he must be securely fastened to the stretcher.

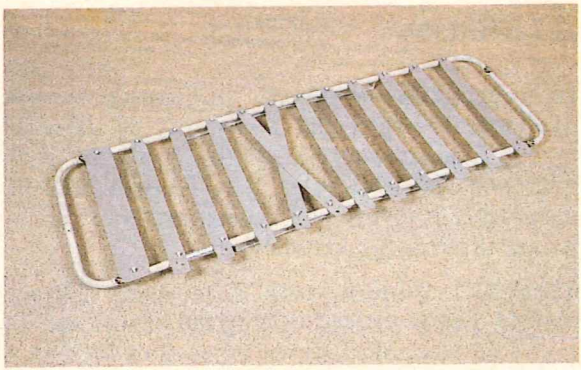
The Jordon lifting frame

A rigid frame with plastic gliders, the Jordon frame can be used to lift an injured person with little or no disturbance to or movement of the injuries.

This type of stretcher is particularly useful for a casualty with a suspected spinal injury or other major injury if the casualty is accessible and if the frame can be placed around him.

The Jordon lifting frame is placed around the casualty, and special plastic gliders are slid underneath him where he lies. These gliders are fastened to the rigid frame. The position and tension of each slat can be adjusted individually against the casualty's body.

The frame can then be lifted and carried by two or more First Aiders with minimum disturbance to the casualty.



30.18 The Jordon lifting frame

The scoop stretcher

This is an alternative to the Jordon lifting frame and is in use in some Australian States.

The scoop stretcher enables a casualty to be gently 'scooped' on to the stretcher by a scissors leverage action. The casualty can be moved in the position found, so minimising the possibility of complicating the original injury. It is adjustable to the casualty's physique.

It can be lifted and carried by two or more First Aiders, with minimum disturbance to the casualty.

Warning

Casualties with suspected spinal injuries need special care:

- avoid pressure on localised areas
- use padding
- remove coins, keys, etc. from the casualty's pockets. Skin damage from localised pressure can be caused remarkably quickly
- sandbags or similar padding may be used to maintain the head in a neutral position.

See also Chapter 13.

Transport vehicles

If a properly equipped ambulance is not available to transport a casualty to medical aid it may be necessary to make do with whatever is available. The nature of the casualty's injuries will determine the appropriate alternative vehicle.

Transport vehicles with a casualty aboard should **never** exceed the speed limit and in many cases should travel more slowly so that injuries are not worsened.

Casualties suffering from the following conditions must always be transported as stretcher patients:

- head injuries
- spinal injuries
- abdominal injuries
- lower limb injuries
- embedded foreign bodies or penetrating wounds to the eye.

Casualties with minor injuries and some upper limb injuries may be carried, preferably only for short distances, sitting in a standard car seat, provided that the injured parts are adequately supported.

31

Special bandaging, dressings, and splints

This chapter is about special bandaging and dressings and methods of immobilisation of certain injuries.

After studying this chapter you should know and understand:

- the application of a *field* dressing to a wound
- the principles of immobilisation of certain limb fractures using special equipment.

Many of the items described in this chapter are only carried in ambulances or located in first aid rooms. Usually they will not be available to the First Aider. They are included in this book for information in the event that a First Aider is called on to help medical aid in the use of this equipment.

Bandaging

Bandaging has been described in Chapter 10 and in other chapters in relation to specific injuries.

Management of a fractured collar-bone

The management of a fractured collar-bone, as given in Chapter 16, uses a St John sling. Alternative methods of management of a fractured collar-bone use a figure-of-eight bandage or broad bandages.

Figure-of-eight-method

- remove or loosen any straps on both sides
- place padding between the chest and arms encircling the shoulder girdle on both sides
- using a 15 centimetre roller bandage, start at the back over the shoulder-blade on the uninjured side
- carry the bandage over the shoulder on the injured side and then under the armpit
- complete the figure-of-eight by carrying the bandage across the shoulder on the uninjured side and under the armpit
- continue to loop, and pin away from the armpit or fracture
- apply sufficient pressure to brace the shoulders backwards
- check the condition of the pulse in both arms.



a b

31.1a-b Supporting a fractured collar-bone using figure-of-eight bandaging (front and rear views)



a b

31.2a-b Supporting a fractured collar-bone using broad bandaging (front and rear views)

- remove or loosen any straps on both sides
- place padding between the arm and the chest wall on both sides

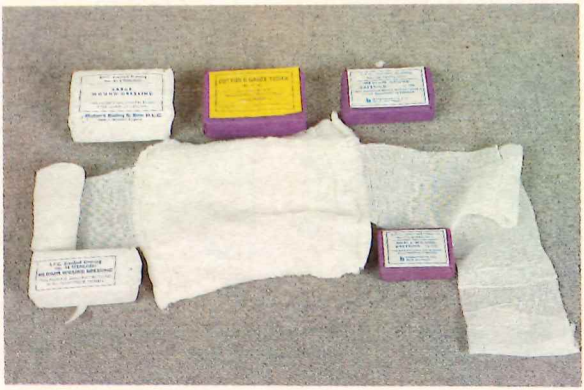
Broad bandage method

- using a broad bandage, pass one end under the armpit, and tie at the back
- repeat on the opposite side
- use a third broad bandage to tie these loops together tightly between the shoulder-blades
- apply enough pressure to brace the shoulders backwards
- check the condition of the pulse in both arms.

Field dressings

The general principles of dressings and their application have been discussed in Chapter 10. This chapter should be studied in association with that earlier one.

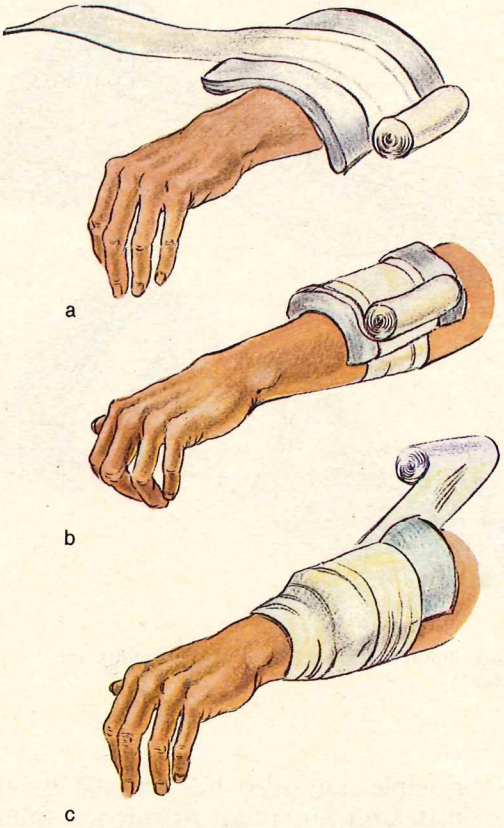
Some prepared dressings are made of layers of gauze and a pad of cotton wool attached to a roller bandage. These are particularly useful for field conditions.



31.3 Some prepared dressings and bandages

Application of field dressings

- twist the package or pull the tab to open
- with the dressing still folded in one hand, unwind the short end of the bandage
- apply the sterile surface of the dressing to the wound
- secure the dressing by winding the short end of the bandage around the limb
- use the long end to firmly retain the dressing
- ensure that both edges of the dressing are totally enclosed
- secure by tying the two ends over the dressing, using a reef knot.

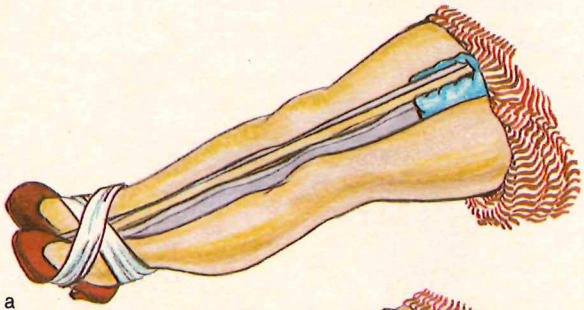


31.4a-c Applying prepared dressings

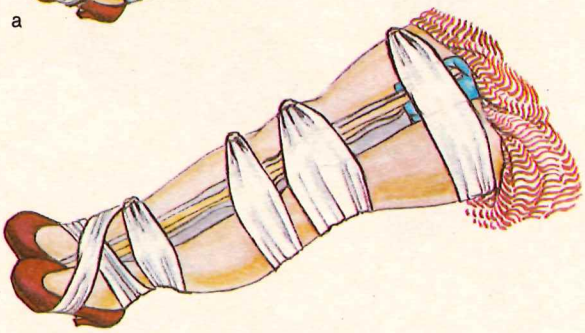
Immobilisation

The principles of immobilisation of fractures (broken bones) and other injuries to joints have been discussed in earlier chapters.

A limb with a broken bone should be immobilised to a firm object by bandages that immobilise the broken bones above and below the fracture and also the **joints** above and below the fracture (see Figure 31.5a).



a



b

31.5a-b Immobilising a fracture with splints and bandages

This principle may also be achieved by the use of inflatable air splints or traction splints (see Figures 31.6-31.9 inclusive).

Air splints

Air splints consist of a double walled plastic tube with a valve in the outer wall for inflation. The splint is usually fitted with a zip slide fastener to make application to the limb easier.



31.6 An inflatable splint

Inflatable air splints, correctly applied, are a quick and effective means of immobilising limb fractures.

These splints are not recommended for fractures of the thigh or upper arm because they cannot immobilise the joint above the fracture.

The advantages of an inflatable air splint are:

- it is easy to apply
- it controls swelling and bleeding
- the fracture area and limb can be observed
- it does not need to be removed for X-ray because it does not obscure the limb.

Application of inflatable splints

- select a splint of appropriate size to immobilise the joint above and the joint below the fracture site
- use alternative methods of splinting if a

sufficiently large inflatable splint cannot be found

- apply the splint directly to the skin when possible, except for open wounds. It may be applied over clothing provided that folds and wrinkles have been smoothed out
- if the casualty has long nails, cover them with a cloth to prevent puncture of the splint
- straighten a limb deformed by fracture, with gentle traction, and then apply the splint while traction is maintained; check the pulse in the limb when straightening; if the pulse is absent or disappears, do not straighten
- the amount of air pressure required in the splint is largely determined by the casualty, if conscious, who should experience a feeling of comfort and support when the splint is adequately inflated; if pain is not relieved, check that the splint is sufficiently inflated.

Warning

If inflated too tightly, an air splint can restrict the circulation in the splinted limb. The splint must only be so inflated that it can be indented by firm pressure of the thumb.

The entire hand or foot is covered, without leaving fingers or toes protruding when an air splint is applied.

Because gas expands when heated or with rising altitude, the air pressure in an inflatable splint must be adjusted when there are changes in these conditions. This adjustment is to ensure that there is adequate circulation in the injured limb.

Never leave a casualty who has an air splint in position in sunlight, as the air in the splint expands with heating, and pressure builds

up. Magnification through the layers of plastic can cause a burning sensation to the injured limb.

An air splint should **not** be used on any fracture, on any limb, when the circulation has been, or is likely to be affected, such as in the wrist, ankle or elbow.

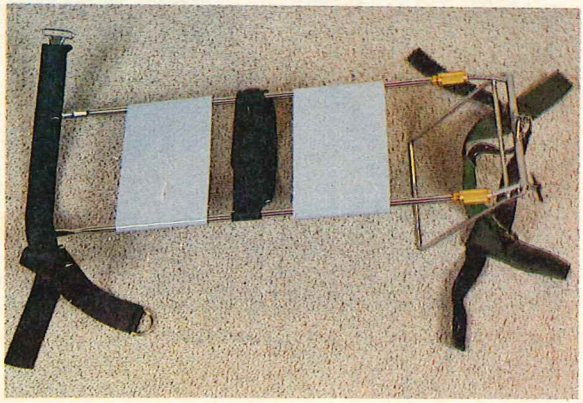
Care must be taken when storing inflatable splints to ensure that they are rolled or stored flat, and not folded, as some types may crack at sharp folds.

Care of inflatable splints

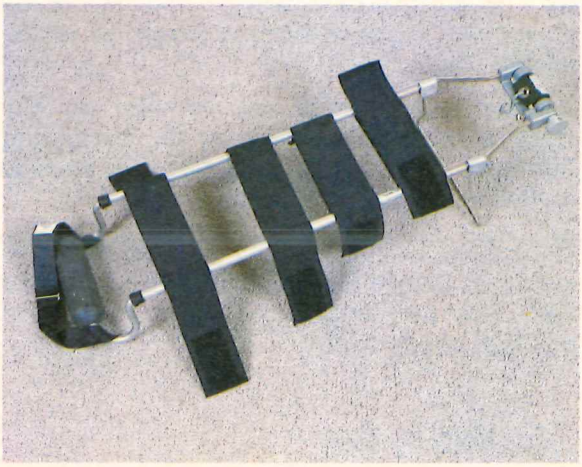
Traction splints

A number of traction splints are available and in use by ambulance services throughout Australia. They are used for leg injuries only.

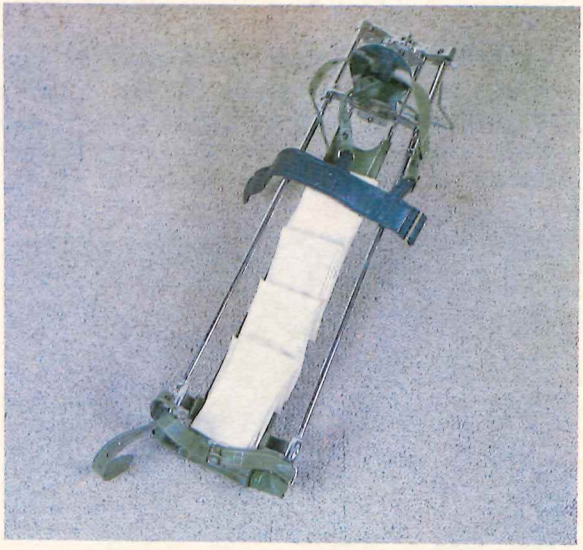
The principle of their application is that traction on the foot extends the leg, drawing the broken bone into normal alignment and immobilising the bone ends to prevent further damage. A metal frame extending up the



31.7 A Tridon traction splint



31.8 A Hare traction splint



31.9 A modified Thomas traction splint

sides of the legs, with leather or canvas straps, holds the leg securely.

Proper application of this type of splint can immobilise fractures of the thigh and the lower leg.

Traction splinting will ease pain, reduce shock and help to prevent additional damage to nerves, blood vessels, bones and other tissues.

Examples of these are:
- the Tridon traction splint
- the Hare traction splint
- the modified Thomas splint

The Ambulance Services in your State or Territory would be happy to show you and allow you to become familiar with the type used in your area.

8

Appendices

Appendix A

Non-toxic materials

The following materials, commonly swallowed by children accidentally, are non-toxic:

Aerosols — except, naturally, when deliberately abused
Antacids — powders, tablets or mixtures
Antibiotics — liquids, capsules or tablets
Aquarium additives — if the fish can live with it, so can humans
Baby cosmetics
Ballpoint pen ink
Baby oil
Bath oil
Bubble bath preparations — perfumed liquid detergents
Calamine lotion
Candles — coloured or plain, shaped or not
Caps — for toy pistols
Chalk of any colour
Contraceptive pill
Cosmetics — face, body or hair
Fabric conditioners or softeners — often nauseating
Golf ball core — may cause physical damage to the eye, only

Laxatives
Lipstick
Motor oil, and other lubricating oils
Pencil — 'lead' is graphite
Silica gel — desiccant gel
Suntan preparations
Talc — unless inhaled — as a 'foreign body' in the lungs
Thermometer — the mercury is inert
Toothpaste — with or without fluoride
Vitamins
Water colours
Zinc cream

Appendix

B

Syllabus

Course Content of The St John Ambulance Association

Senior First Aid Certificate

Core subjects

a Introduction
Principles and practice of first aid
Priority of management
Structure and function of the body (overview)

b Life sustaining skills
Airway management
Resuscitation techniques
Management of unconsciousness
Bleeding control

c Management of the injured
Wounds
Fractures
Eye injury
Burns

d Management of medical conditions
Heart attack
Stroke
Diabetes
Seizures
Asthma
Poisons
Bites and stings
Exposure to heat and cold

These core subjects must be included in any course which entitles the student to receive a certificate of competency and the full course will include a minimum of 16 hours of instruction.

First aid is essentially a practical subject and practical skills must be performed confidently. Therefore a minimum of 60% of course time must be spent on learning practical skills.

Teaching of additional subjects to those specified by the core subjects must be authorised by the State Centre of the St John Ambulance Association, and subjects may only be drawn from current authorised St John Ambulance Association publications.

9

Glossary
Index

Glossary

This glossary contains some words that have not actually been used in the text of *Australian First Aid.* They are included because they are words that you may hear used by doctors, ambulance officers, nurses or, sometimes, casualties. You are advised to become familiar with them.

Abdomen	part of the body between the chest and the pelvis, containing digestive organs
Abrasion	an open wound caused by direct contact with a rough surface
Absent breathing	no perceptible sign of breathing
Absent circulation	no perceptible pulse
Absent pulse	no detectable heartbeat
Absorption	taking up of fluids or gases
Achilles tendon	see Tendo-Achilles
Acid	a corrosive substance; a neutraliser of an alkali
Acute	sharp, severe and short in duration

Addiction	a state of being dependent on continued use of a drug
Afterbirth	the placenta, cord and membranes expelled after delivery of the baby
Airway	the passage by which air enters and leaves the lungs
Alkali	a corrosive substance; a neutraliser of acid
Allergic	sensitive to some substance, such as bee venom
Alveoli	air spaces in the lungs
Amputation	the cutting off of a limb, digit, or appendage
Angina pectoris	a heart condition in which there is an acute pain in the chest caused by interference with the supply of oxygen to the heart, usually brought on by exercise or anxiety
Antiseptic	a substance that helps to prevent the growth of germs
Antivenom	a substance used to neutralise the venom of a poisonous animal
Anus	the external opening of the rectum
Artery	a vessel carrying blood away from the heart
Asphyxia	deficiency of oxygen and increase of carbon dioxide in the body
Assessment	evaluation of problems affecting the casualty as indicated by the history, symptoms and signs as observed by the First Aider
Asthma	spasm of the bronchial tubes
Autonomic nervous system	the branch of the nervous system that works without conscious control
Bandage	material used to cover or hold in place a sterile dressing
Bladder	a sac acting as a reservoir, e.g. urinary bladder (for urine), gall bladder (for bile)
Blood pressure	the force exerted by the blood against the wall of an artery; the force to circulate the blood; an important sign in diagnosis

Bone marrow	interior of bone, producing blood cells
Bowel	part of the digestive canal below the stomach and duodenum
Breastbone	the flat bone which forms the middle of the front of the chest and which separates the ribs
Bronchi	large air passages
Buttocks	the two rounded parts of the body at the lower rear of the trunk
Capillaries	smallest blood vessels
Cardiac arrest	sudden stoppage of effective heart action
Cardio	relating to the heart
Cardio-pulmonary resuscitation	a resuscitation technique that combines expired air resuscitation with external cardiac compression
Carotid pulse	the heartbeat as felt in the arteries of the neck
Casualty	a victim of an accident or sudden illness
Cerebro-vascular accident	a condition arising from damage to, or blockage of the blood supply to the brain, resulting in paralysis, uneven pupils and shock
Cervical	pertaining to the neck
Cholesterol	fatty substance deposited from the blood in the arteries
Ciguatera	food poisoning that sometimes results from eating tropical reef fish
Circulation	the movement of blood through the body
Coccyx	the tail bone — the lowest part of the backbone (spine)
Coma	a state of unconsciousness
Coma position	the way an unconscious casualty is placed to ensure that the airway is clear and any likely obstruction flows out from the mouth
Compress	a dressing applied cold to assist control of bruising and swelling and to relieve pain

Compression dressing	Dressing used to control bleeding by direct pressure
Concussion	injury to the brain, usually caused by a blow, sometimes leading to dizziness, nausea, loss of consciousness and weak pulse (brain shaking)
Congestion	abnormal build-up of fluid in some part of the body
Constrictive bandage	a firmly applied bandage above the injury site, and above the middle joint of the limb, to control bleeding, used only when direct pressure fails
Contusion	a closed wound caused by a blow from a blunt object
Convulsions	violent and involuntary contractions of the muscles, often called 'seizures' or 'fits'
Corked thigh	bruised thigh
Cornea	the 'window' of the eye
Coronary arteries	arteries that carry the blood supply to the heart muscles
Coronary occlusion	a heart condition in which a clot, or narrowing of the artery wall, blocks the blood flow in the coronary arteries
Corrosive	destroying gradually — eating away a surface
CPR	cardio-pulmonary resuscitation
Cranium	the skeleton of the head excluding the face and jaws
Crater wound	a wound that results when tissue is torn from the body
Crepitus	the grating feeling of a broken bone or roughened cartilage
DRABC	stands for Danger, Response, Airway, Breathing, Circulation — the alert to a possible life-threatening situation and the St John Action Plan for its management
Dehydration	excessive loss of salt and water from the body

Delusions	false beliefs, not correctable by reasoning
Diabetes	disease of the insulin-producing cells in the pancreas
Diaphragm	the dome shaped muscular wall separating the abdomen from the chest cavity
Diarrhoea	frequent loose evacuations of the bowels
Digestive glands	the salivary glands, liver, gall-bladder and pancreas
Dilated	widened
Disc	a layer of fibro-elastic tissue between two vertebrae
Dislocation	injuries in which the bones of a joint are pushed out of normal contact with each other
Disorientation	a state of mental confusion, particularly relating to time and place
Distal pulse	the heartbeat as checked at the wrist or ankle
EAR	expired air resuscitation
Elbow	the joint between the forearm and the upper arm
ECC	external cardiac compression
Emergency rescue	a procedure for moving a casualty from a dangerous location to a place of safety
Envenomation	poisoning from bites, stings or penetrating wounds — usually from reptiles, insects and marine creatures
Epilepsy	a condition of the brain leading to seizures
Evert	to turn inside outwards
Exhaling	breathing out
Expired air resuscitation	the technique used by the First Aider of breathing for the casualty when the casualty is unable to breathe for himself
External cardiac compression	compression of the heart from outside the body by pressing on the breastbone in order to try to provide artificial circulation of the blood

Faeces	waste food products passed by the bowel
Fainting	a form of loss of consciousness
Fibrillation	irregular twitching of muscles of the heart (see Ventricular fibrillation)
Flail chest	a condition caused by multiple fractures of the ribs and instability of the rib cage
Flammable	easily set on fire (*note the word inflammable has the same meaning)*
Flex	bend
Floating ribs	two pairs of ribs that do not join at the breastbone
Forearm	the part of the arm between the elbow and the wrist
Fracture	a break in a bone
Gall bladder	a sac in the upper abdomen for storing bile
Genitals	the organs of reproduction
Glands	organs that secrete specific substances
Greenstick fracture	the bone is bent, and partially, but not completely broken
Gullet	the passage from the back of the throat to the stomach
Hallucinations	belief in sights and sounds that are actually imaginary
Hallucinogen	a drug that causes hallucinations
Hamstrings	muscles on the back of the thigh
Heart	the hollow muscular organ responsible for pumping blood
Heat stroke	a serious, life-threatening condition in which the body's temperature is dangerously high
Hinge joint	a joint that moves like a door-hinge e.g. elbow, knee
History	when relating to first aid — the story of the incident or the illness obtained from the casualty or witnesses at the scene of the incident

Homicidal	on the point of taking another's life
Hormone	a substance, produced in one organ, which causes activity in another part of the body
Hyperventilation	overbreathing, causing dizziness
Hypoglycaemia	low blood sugar; the resulting attack is sometimes referred to as a 'hypo'
Hypothermia	the severe accidental cooling of the body
Hysteria	emotional outburst
Immobilise	to prevent from moving
Incision	a cut made by a sharp instrument
Index finger	the first finger of the hand
Infection	the invasion and growth of harmful germs in the tissues of the body
Insulin	a hormone produced in the pancreas and which controls the use of sugar in the body
Intestines	the lower part of the alimentary canal
Intoxication	a state of excitement or drunkenness induced by alcohol or other drugs
Ipecacuanha	a drug used to induce vomiting
Irrigate	to wash a wound with a constant stream of water
Jaw support jawthrust	procedures for opening the airway
Labour	the process of childbirth
Larynx	the voice box
Lateral position	a position in which an unconscious casualty may be placed, with the neck supported, to ensure that his airway is clear and that any likely obstruction flows out from the mouth
Liver	a large organ located in the upper abdomen
Lumbar	pertaining to the loins or lower back
Lungs	the pair of breathing organs in the chest cavity

Mallet finger	injury to the terminal joint
Medication	medicine of some kind
Metabolic illness	a disorder caused by imbalance of the body's chemical processes, such as diabetes
Micro-organisms	germs
Midwife	a person assisting at a birth
Motor nerves	nerves that stimulate movement of muscles
Mucus	sticky fluid from some parts of the body, e.g. the nose, bronchi
Narcotic	a drug that produces sleep or stupor
Nausea	a feeling of sickness
Necklift	a procedure for opening the airway
Nerves	tissues that convey impulses from one part of the body to another
Neurotic	describes a condition in which a person imagines or magnifies symptoms
Nipples	the tips of the breasts
Nostril	either aperture of the nose
Obstructed	blocked
Ovaries	the female organ in which ova are formed
Oxygen	a gaseous element of air
Pallor	paleness of skin
Pancreas	a gland that produces insulin as well as alkaline digestive matter
Paradoxical breathing	seen in flail chest injuries where the injured side moves in on inspiration and balloons out on expiration
Paralysis	loss or impairment of the ability to move parts of the body
Patella	the knee cap
Pelvis	the bone structure that forms the lowest part of the trunk
Perineum	the pelvic area between the genitals and the anus

Placenta	special tissue attached to the mother's uterus that nourishes the unborn baby
Plasma	the fluid component of blood
Posture	attitude of body
Pressure pad	firm pad applied over dressing to assist in control of bleeding
Pulmonary	relating to the lungs
Pulse	the transmission of the heartbeat felt in various parts of the body
Pupil	the opening in the centre of the iris of the eye
Psychoneurotic	hysterical
Psychotic	describes a condition of severe mental illness
Quadriceps	muscles on the front of the thigh
Ratio	proportion of one thing to another
Rectum	the final section of the alimentary canal ending in the anus
Red cells	carry oxygen and carbon dioxide in the blood
Regurgitation	backward flowing of stomach contents into the throat and mouth area
Respiration	breathing
Response	the First Aider's means of assessing the state of consciousness or unconsciousness in a casualty
Resuscitation	reviving one who is seriously injured or apparently dead
Rotary	rotating
Sacrum	the solid bony mass at the base of the spine, which supports the pelvis
Saliva	secretions in the mouth
Sciatica	pain spreading down the side or back of the leg along the course of the sciatic nerve
Secretion	fluid from glands in the body
Sedatives	drugs to calm the nerves and promote sleep

Seizures	violent muscular contraction and relaxation (convulsions)
Shock	a condition in which the circulatory system is not carrying sufficient blood to the tissues
Shoulder-blade	the flat bone of the back jointed with the bone of the upper arm
Signs	the features of the patient's condition that can be seen, felt, heard or smelt
Sinus	any of the eight cavities in the skull that are connected with the nasal cavity
Sinusitis	inflammation of a sinus
Skeleton	bones of the body
Skull	the bony framework of the head, enclosing and protecting the brain; it consists of the cranium and the facial section
Spasm	sudden, involuntary contraction of muscle or muscles
Spinal cord	the bundle of nervous tissue extending from the base of the brain and which is surrounded and protected by the spine
Spleen	an organ in the abdomen
Sprain	stretching of the ligaments
Sputum	mucus from the lungs, bronchi and throat that is ejected through the mouth
Sterile	free of germs
Sternum	breastbone
Stomach	an organ in the abdomen
Stomach ulcer	an open sore on the surface of the inner lining of the stomach
Strain	overstretching or overexertion of a muscle
Stroke	a cerebro-vascular accident resulting in partial paralysis
Suffocation	death from lack of oxygen
Suicidal	on the point of taking one's own life
Symptoms	what the casualty tells you about his condition

Tendo-Achilles (Achilles tendon)	the tendon of the calf muscles at the back of the ankle
Tetanus	a serious and often fatal infection
Thoracic	pertaining to the chest (thorax)
Tibia	the main long bone of the lower leg
Toxic	poisonous
Toxicity	a poisoning effect due to excessive dosage of a drug
Trachea	the windpipe
Ulna	the long bone of the forearm
Umbilical cord	the cord attaching the baby to the placenta and the mother
Unconsciousness	a condition in which the brain fails to respond to the messages sent to it
Ureter	the tube leading from the kidney to the bladder
Urine	a solution of waste products removed from the blood by the kidneys
Uterus	the womb
Vagina	the passage leading inwards from the external female genitalia
Venom	a poison, normally from a snake, insect or other animal or marine creature
Ventricular fibrillation	a condition in which the contractions of the heart muscle are unco-ordinated so that the heart quivers or twitches and therefore does not pump blood
Vertebrae	(singular vertebra) the individual bones that make up the spinal column
Voice box	part of the windpipe where the vocal cords are situated
Vomiting	ejection of the contents of the stomach through the mouth
Vomitus	stomach contents vomited up

White cells	the cells of the blood that combat infection
Windpipe	the air passage between the throat and the lungs
Wound	a break in the continuity of the tissues of the body
Wrist	the joint connecting the hand and the fore-arm.

Index

Abdominal cavity, 31, 212
  conditions, 214-5
  injuries, 212-4, *214,* 342
abrasions, 109-10, *110*
accidents, road, 361-72, *365, 366, 367, 369, 370, 371*
air pressure, 347
air splint, 419-21, *419*
airway, 42-50, *43*
  check, 51-5, 55
  clearing, 44-50, *44, 45, 46, 47, 49*
alcohol, 289
anatomy, lungs, 23, *23*
angina, 259-61
ankle sprains, 128, *128,* 344
antiseptics, 116
arm injuries, 223-9, 338-9
  forearm, 226-8, *227*
  upper arm, 223-6, *225, 226*
arm sling, 158-9, *158, 159*
arterial bleeding, 94, *94*
arteries, 25, *26,* 259-61
asphyxia, 131, 132
  causes, 132
  symptoms, 10-11
asthma, 253-4, *254*

Bandages, 125, *146,* 148-55, *148, 150-1,* 414-6
conforming, 149
figure of eight, 414, *415*
pad, 145-7
pressure, 147
ring, 147, *147*
triangular, 152-5, *152-3, 154*
bee stings, 305-6, *306*
birth, 348-58, *352-7*
bites, 112
bites and stings, 297-316
funnel web, 302-3, *303*
insects, 305, 308-9
lizard, 302
red back spider, 304, *304*
snake, 298-302, *300-1*
spider, 302-4
blanket lift, 406-7, *406, 407*
blanketing stretcher, 405, *405*
bleeding, 87-110, *91-6 passim*
ear, 190, *190*
external, 90-8, *91-5 passim*
gums, 177
hand, 97-8, *97*
internal, 99-100
nose, 193-4, *194*
reaction, 89
varicose veins, 98
blood 26-7
platelets, 27
pressure, 87
volume, 87
boat safety, 380-1
body functions, structure 22-36
brain damage, 41, 61, 168, 267-8, *268*
compression, 80, 168, 173-4
illness 266-7
breathing, 24, *24,* 50-2, 243-56
check, 8, 51, *51,* 245-6
rate, 8, 244
bruise, 117-8, *117*
burns, 131-41, *135, 136, 137*
bitumen, 141
chemical, 140

corrosive, 140
deep, 135, 139
electrical, 140
eye, 185-7
management, 137-41, *138*
radiation, 139-40
superficial, 135, 139
treatment — see management
bush ticks, 307-8, *307, 308*
bushwalking, 282

Camping, 382-3
cardiac arrest, 59, 255, 261
carotid pulse, 60-61, *60*
casualty care, 12-13, 39-41, *391*
cavities, pelvic, 31
cell, 22
cervical collars, 198-9, *198,* 368, *369*
chemical inhalation, 50, 282, 289
chest, 31, *31,* 201-9
flail, 205-7, *206, 207*
injuries, 202-9, *208, 209,* 341
paralysis, 197
skeleton, 31, *31*
childbirth, emergency, 348-58, *352-7*
choking, 250-2, *251, 252*
circulation, 59-62, 258-9, *258*
absent, 60
blood, 26-7
check for, 60-1, *60,* 159
system, 24-7, *25, 26*
cold
compress, 340
exhaustion, 323-6
exposure, 10, 323-9, 383
injuries, 327-9
cold metal injury, 329
collar bone fracture, 222, *223, 224,* 414-6, *415*
collar sling, 156-7, *156-7*
coma position, *49,* 78, 81, *82-3*
concussion, 173
congestive cardiac failure, 263
conscious patient, diagnosing, 79

contusion, 117-8, *118*
  finger, 340
  wounds, 118
convulsions, 273-4, *274*
corked thigh, 345, *345*
coronary occlusions, 261-2
corrosive disinfectants, 281
CPR, 61-75, *64-6, 68-72*
cradle, 392-3, *392*
cramps, 319-20, 346, *346*
crush injuries
  back, 215-6, *216*
  chest, 203-7, *203-6*
  limbs, 238-9
crutch, 393-4, *393,* 397-8, *398*

Death
  sudden, 262-3
dehydration, 317-23, 382
diabetes, 268-71
  coma, 270-1
  highblood sugar, 270-7
low blood sugar, 269-70
digestion, 34-5
digestive system, 34-5, *34*
dislocations, 128-9, *129,* 176-7, 239-40
  finger, 239, 339
DRABC, 17-19, *18*
drag lift, 396-7, *397*
dressings, 144-5, *144, 146*
  emergency, 416-7, *416, 417*
drowning, 246-50, *249*
drugs, abuse, 285-90
  alcohol, 289
  cannabis, 289
  cocaine, 289
  hallucinogens, 289
  inhaled volatile solvents, 289
  marijuana, 289
  opiates, 289
  overdose, 286-8
  sedatives, 289
  stimulants, 289

Ear, 189-92, *190*
  foreign bodies in, 191-2, *192*
  rupture of, 191
ECC, 61, 64-75, *64-66, 68-9, 71-2*
elbow injuries, 338-9, *339*
electrical burns, 140
emergency childbirth, 348-58, *352-7*
emergency rescue, 13-4, 133-4
emotional disturbance, 291-4
emotional illness, 294-6
emotional reaction, 292-4
epileptic seizure, 271-3
expiration, 24, *24*
exposure to cold, 323-9, 383
external bleeding, 90-8, *91-5*
eye, 11, 182-9, *182, 184*
  burn, 141, 185-7, *187*
  everting lids, 185, *185*
  examining lids, 184
  foreign bodies, 183-5
  injuries, 182-9, 336-7
  smoke, 188
  wounds, 187-8

Facial injuries, 174-9, 336
fainting, 274-6, *275*
field dressings, 416-7, *416, 417*
finger injuries, 229, *229, 239,* 339-40, *340*
  nail contusion, 340
fire drill, 379
fireman's lift, 395, *395, 396*
first aid remote areas, 357-62
fish hook removal, 114-5, *114, 115*
flail chest, 205-7, *206, 207*
food poisoning, 283
fore and aft
  chair lift 403, *403*
  transport, 402-3, *402*
foreign bodies
  in ear, 191-2, *192*
  in eye, 183-5
  in nose, 192-3
  in wounds, 113-5, *114, 115*
  swallowed, 214

four-handed seat 398-9, *399*
fractures, 120-8
  causes, 120-2, *120, 121*
  closed, 122, *123*
  collar bone, 222, *223, 224,* 414-5, *415*
  complicated, 122, *123*
  effects, 122
  fingers, 229, *229*
  foot, 237-8
  forearm, 226-8, *227*
  hand, 228-9
  kneecap, 233-4, *234*
  lower leg, 234-7, *234-7*
  management, *83,* 124-8, *127,* 418-23, *418*
  neck of thigh bone, 232-3
  nose, 336
  open, 122, *123*
  pelvis, 217-8, *218*
  ribs, 203-5, *203-5*
  skull, 168, *171,* 174
  stress, 347
  toes, 237-8
  upper arm, 223-6, *225, 226*
frostbite, 327-9

Gas poisoning, 132, 282-3
gauze, 145, 149, 416
groin injury, 342

Hallucinogens, 289
hamstrings, 334
hand, 33
  carriage, 398-401, *399-401*
  injuries, 97-8, *97,* 228-9
  seats — see carriage
hanging, 255
head injuries, 167-79, 335-7
  assessment, 169-70
  causes, 168-9, 335
  management, 170-4, *171, 173*
head tilt, 47-48, *48*
headaches, 169, 320-1
heart attack, 261-2

heart failure, 263
heat cramps, 319-20
  exhaustion, 320-1
  exposure, 318-23, 382-3
  stroke, 10, 321-3
high blood pressure, 266
high voltage, 134
hiking, 382
  history, 6-7
hypo, low blood sugar, 269-70
hypothermia, 326-7

Incised wounds, *110,* 111
infection, 108, 116-7, 350
  of wounds, 116-7, 122, 144-5
injuries
  bones, joints, muscles, 108, 119-29
  groin and testicles, 342
  knee, 343, *343*
  muscles, 344-6, *345-6*
  sports, 333-47
  tendo-Achilles, 333
  urinary system, 342
  shark attack, 95, 96
inspiration, 24, *24*
internal bleeding, 99-100
internal injuries, 99-100
  kidney, 99, 342
  spleen, 99, 342

Jaw
  fracture, 174-6, *175, 176*
  injuries, 174-7
  management, 174-7, *175, 176*
joints, 31-2, 418
Jordon lifting frame, 409, *409*

Knee injuries, 240, 343, *343*
kneecap, fracture, 233-4, *234*

Lacerated wounds, 111-2, *111*
larynx, spasm, 250
lateral position, 78, 84-6, *85*
leg injuries, *32,* 33, 343-7

lift and drag, 396-7, *397*
limbs, 32-3, *32*, 222-240
liver, 342
loosened teeth, 178-9, *179*
low blood sugar, 269-70
lungs, anatomy, 22, 23, *23*

Mallet finger, 340, *340*
marine stings, 309-16
medical aid, 2-19, *5*
mental illness, 294-6
motor nerves, 27
mouth to mouth resuscitation, 53-9, *53, 54, 58*
mouth to nose resuscitation, 56-9, *57, 58*
muscles, injuries, 344-6, *345, 346*

Neck contusions, 337-8
neck lift, 47-8, *48*
nerves, 27
  motor, 27
  sensory, 27
nervous system, 27-8
neurotic illness, 294-5
nose, 192-4, *193, 194*, 336

Opiates, 289
organs, sense, 181-94
overexposure to cold, 323-9

Padding, 126, 148
pain relief, 286, 289
paralysis, chest, 197
pelvic cavity, 31
  conditions, 218-20
  injuries, 217-8, *218*
pelvis fracture, 217-8, *218*
penetrating wounds, 112-3, *112*
pesticides, 283
pick-a-back, 394, *394*
poisons, 277-84
  alcohol, 280
  ciguatoxin, 283
pool safety, 378

pressure/immobilisation technique, 149
prevention of accidents, 2-4, 273-85
psychiatric conditions, 294-6
psychotic illness, 294-6
pulse, 8-10, 25
  absent, 60
  carotid, 9, *9,* 60-61, *60*
  feeling for, 9, *9,* 10, *10, 60*
  radial, 10, *10*

Radial pulse, 10, *10*
rate of breathing, 244
red blood corpuscles, 26
reef knot, 154, *154*
reproductive systems, 219-20
rescue, 133-4
  electrical hazards, 134
  emergency, 133-4
  fire, 133
respiration, 22-4, *24,* 50-2, 244-56
  recording, 244
respiratory systems, 22-4, *23*
resuscitation, 39-75, 244-53
ribs, fractures, 203-5, *203-5*
road accidents, 361-72, *365-7, 369-71*
  safety, 364-5, 379-81
rupture
  ear drum, 191

Safety rules, 373-85
  at home, 374-9
  car, 379-80
  recreation, 380-4
  workplace, 384-5
scalds and burns, 131-41, *135-7*
scoop stretcher, 410
scorpion stings, 308-9
scuba diving, 191
sedatives, 289
seeking medical aid, 2-19
sense organs, 181-94
sensory nerves, 27
shark attack, 95, 96

shock, 101-4, *103*
  emotional, 293
  physical, 101-4, *103*
shoulder-blade, 32, 223
shoulder injuries, 239, 338
signs and symptoms, 4-5, 21
skeleton, 28-33, *28*
skin, 10-11, 36, *36*
skull, fracture, 29-30, *29,* 168, *171,* 174
sky diving, 174
slings, 155-62
  arm, 158-9, *158, 159*
  collar and cuff, 156-7, *156, 157*
  improvised, 162, *162*
  St John, 160, *161*
smoke in the eyes, 188
snake bite, 298-302, *300, 301*
spasm of larynx, 250
spinal injuries, 195-9, 337
  assessment, 197
  cause, 196-7, 337
  management, 198-9, *199*
splints, 126, 163-4, *163, 164*
  special, 178-9, 236-7, *237*
  Hare, *422,* 423
  inflatable, 419-21, *419*
  Thomas modified, *422,* 423
  Tridon, *421,* 423
sprains, 128-9, *128*
  ankle, 128, *128,* 344
sport injuries, 118, 333-47
stab wounds, 112-3, *112*
stimulants, 289
stings, 305-16
  bee, 305-6, *306*
  European wasp, 306-7, *306*
  marine, 309-16, *312-4*
  scorpion, 308-9
  stonefish, 310-2, *310-1*
  wasp, 306-7
St John Action Plan, 17-19, *18*
St John sling, 160, *161,* 222, 229
strain, 130, *130*
strangulation, 255

stress fractures, 347
stretchers, 404-10, *404, 408*
stroke, 267-8, *268*
sunburn, 139-40
survival in desert, 382-3
swallowed foreign body, 214
swimming, 283-4
symptoms and signs, 4-5, 21

Teeth, 177-9, *179,* 337
tennis elbow, 338-9, *339*
tendo-Achilles injury, 333
temperature, 10
tentacles, stinging, 312-6, *313, 314*
testicles, injury, 220, 342
three-handed seat, 399-400, *400*
throat swelling, 252-3, *253*
tick, bush, 307-8, *307, 308*
tissue, 22
traction splint, 421-3, *421, 422*
transport, 13, 410-1
triangular bandages, 152-5, *152-3, 154*
two-handed seat, 401-2, *401*

Unconsciousness, 77-86
  diagnosing, 52, 79-80
  causes, 78
upper arm fractures, 223-6, *225, 226*
urinary system, 35, *35,* 219

Vehicle crash injuries, 361-72
  management, 365-72
ventricular fibrillation, 262-3

Wasp stings, 306-7
water safety, 378, 380-1, 383-4
white blood corpuscles, 27
wounds, 87, 107-118, *117*
  abdomen, 212-4, *214,* 342
  abrasions, 109-10, *110*
  foreign bodies, 113-5, *114, 115*
  incised, *110,* 111
  lacerating, *111,* 111-2
  penetrating, 112-3, *112*
  contused, 117-8
  stab, 112-3, *112*

Notes

Notes

Notes

Notes

Notes

Notes

Notes

Notes

Notes

Notes

Notes