



occupational first aid



Authorised Manual of the St. John Ambulance Association in Australia

AUTHORISED MANUAL FOR
**OCCUPATIONAL
FIRST AID**

INSTRUCTION



THE ST. JOHN AMBULANCE ASSOCIATION
THE ORDER OF ST. JOHN
PRIORY IN AUSTRALIA

1981

*Authorised Manual for
Occupational First Aid Instruction
for use by the
St. John Ambulance Association, Australia*

1981

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Foreword

For some time the St. John Ambulance Association has been concerned that no authoritative Australian text has been available to further the practical application of Occupational First Aid training. To meet this need, members of the St. John Ambulance Association, and in particular Dr. Brian Purssey, developed a text under the general guidance of the Director of the Association, Mr. Howard Toyne.

To ensure that this manual would meet necessary requirements throughout Australia, the National Health and Medical Research Council set up an Occupational Health Working Party to assist the St. John Ambulance Association prepare a final text. This working party was convened by the Department of Health Adviser in Occupational Health, Dr. Neville Mitchell.

On behalf of the Priory in Australia of the Order of St. John, I wish to thank all those people who have contributed so much experience and expertise to this manual. In particular I wish to express our thanks to the Department of Health, the National Health and Medical Research Council, and the Occupational Health Working Party.

This manual will meet a long-standing need to further First Aid training in the workplace. It is a practical, and expert guide to improve occupational health. It is a manual of which the St. John Ambulance Association may be proud and I congratulate all those who have contributed to its success.



GEORGE STENING G.C.St.J. E.D.,
Chancellor,
Priory of the Order
of St. John in Australia.

Acknowledgments

Throughout Australia there is an ever increasing awareness among employers of the need for adequate first aid facilities for their employees. At the same time St. John Ambulance Association has recognised the need for special Occupational First Aid training to ensure that first aid in the work environment is of the highest standard. This Occupational First Aid Manual is a positive step in achieving this aim.

The successful production of this Manual is due in large measure to the untiring efforts of Dr Brian Purssey, C.St.J., E.D., M.B., B.S.(Qld), F.R.C.S.(Eng), F.R.A.C.S. St John Ambulance Association extends its very sincere thanks for the outstanding contribution made by him in writing this Manual. His planning and application to the project over some 5 years is a fine example of selfless dedication to the Order of St. John in Australia.

This need for an Occupational First Aid Manual was also recognised by the National Health and Medical Research Council and in 1978 an Occupational Health Committee Working Party was formed to assist St. John in the production of this Manual. Over the next 2 years this working party met regularly and provided invaluable advice and assistance in revising the original draft.

St. John Ambulance Association acknowledges the great contribution made by this working party which consisted of Mr A.H. Toyne, C.B.E., K.St.J., M.B., B.S.(Melb), F.R.C.S.(Eng), F.R.A.C.S., (Chairman); Dr A.G. Cumpston, M.B., B.S.(Syd), M.Sc.(Prev. Med.) Ohio State Univ., Director, Division of Occupational Health, Clean Air and Noise Abatement, Department of Health, Perth; Dr W. P. Nelson, O.St.J., M.B., B.S.(Syd), D.I.H.(Lond), D.P.H.(Lond), Chief Medical Officer, ESSO Australia Ltd. Sydney; Dr B. S. Purssey, C.St.J., E.D., M.B., B.S.(Qld), F.R.C.S.(Eng), F.R.A.C.S., Surgeon, Brisbane; Dr V. E. M. Sheppard M.B., B.S.(Syd), Deputy Director Medical Services, Public Transport Commission of New South Wales, Sydney; Dr E. E. Mattallani, M.B., B.S.(Syd), D.O.H.(Syd), A.A.I.M., M.S.I.A., Public Transport Commission of New South Wales, Sydney, who deputised for Dr Sheppard at most of the meetings; Dr N. M. Mitchell, M.B., B.S.(Syd), D.I.H., Medical Services Adviser (Occupational Health), Commonwealth Department of Health, Canberra, (Convenor).

The result is a well written text which is both professional and practical. It will contribute greatly to the health and care of those in the work environment.

Appreciation is also expressed to all others who, in various ways, contributed or assisted in the production of this Manual including especially Dr Iain D. G. Corness, M.R.C.S.(Eng), L.R.C.P.(Lond), Occupational Health Physician, Brisbane, for support and assistance with all sections of the Manual; Dr Roger Marston, M.B., B.S.(Lond), D.Obst., R.C.O.G., D.I.H., R.C.P.(Lond), R.C.S.(Eng), Occupational Health Superintendent, Mt Isa Mines; Professor T. O'Rourke Brophy O.B.E., M.B., B.S.(Qld), D.A., R.C.P.(Lond), R.C.S.(Eng), F.F.A.R.C.S.(Eng), F.F.A.R.A.C.S., Professor of Anaesthetics, University of Queensland, for help in the preparation of Chapter 10; Dr Robert Scott, M.B., B.S.(Qld), Occupational Health Physician on whose work Chapter 14 is largely based: Dr. E.M. Rathus, M.B. Ch.B.(Capetown) Director of Industrial Medicine, Department of Health, Queensland; Dr Alex Allen, M.B.Ch.B.(Edin), D.P.H.(Edin), M.F.O.M.(R.C.P.), Chief Medical Officer, M.I.M. Holdings, for advice on Chapter 9, Dr. John Pearn, A.M., M.B.B.S.(Qld), M.D.(Qld), Ph.D. B.Sc., F.R.A.C.P., M.R.C.P., D.C.H.(Lond.), Reader in Child Health, University of Queensland, for advice on Cold Injuries; Dr Stuart Pegg, M.B., B.S.(Qld), F.R.A.C.S., F.R.C.S.(Eng.), F.A.C.M.A., Director of Surgery and Director, Burns Unit, Royal Brisbane Hospital, for reviewing and providing the illustrations for Chapter 8; Dr T. Carey, M.B., B.S.(Qld), D.O.(Melb.), Ophthalmologist, Brisbane, for assistance with Chapter 12; Dr Paul Fitzgerald, M.B., B.S.(Qld), F.R.C.S.(Edin), F.R.C.S.(Eng), Director of Casualty, Mater Misericordiae Public Hospital, Brisbane and the Photographic Department of the Mater Hospital for providing some of the illustrations.

Other photographic illustrations were taken by Dr Brian Purssey and Mr Paul Meyers with the assistance of the QATB Training School and Consolidated Fertilizers Ltd. Mrs Lydia Fletcher gave sterling service in typing and retyping the text. Mr Paul Meyers, O.St.J., General Secretary, St. John Ambulance Association, Queensland State Centre and Mr Norman Billing, K.St.J., J.P., Administrative Officer, St. John Ambulance Association, provided administration backing and arranged for the printing of this Manual.

I am sure the Manual will be most successful in filling a much needed role in First Aid teaching. I commend it to you.



A.H. TOYNE
Director
St. John Ambulance Association
Priory in Australia

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Occupational First Aid Course

Core Syllabus

Session

1. Principles and Practice of Occupational First Aid
 - Role of Occupational First Aider
 - Recording, Reporting
 - Medicolegal Aspects
 - Workers Compensation
 - Liaison with Other Personnel e.g. Safety Officers, Civil Ambulance
2. Wounds — Dressing and Redressing
3. Soft Tissue Injuries and Fractures
4. Specific Injuries — Management
 - Hand, Foot, Limb
5. Specific Injuries — Management
 - Trunk, Head, Neck
6. Physical Environment
 - Burns
7. Toxicology
8. Illness, Skin
9. Eye
10. Advanced Resuscitation

A minimum of 30 hours of instruction is required but the actual time allocated for each section of the core syllabus may vary depending upon the requirements of the particular industry and the personnel being trained. Extra lectures e.g. on specific equipment may be required.

It is essential that each lecture period includes both theory and practical procedures. As people move from one industry to another, all aspects of the core syllabus must be covered.

PRINCIPLES AND PRACTICE OF OCCUPATIONAL FIRST AID

Occupational first aid is the practice by a qualified person of emergency and a limited degree of continuing treatment of injury and illness occurring at work.

It includes maintenance of records, recognition and reporting of health hazards and participation in safety programmes.

TRAINING AND QUALIFICATIONS

The National Health and Medical Research Council (N.H. & M.R.C.) recommends in its approved *Occupational Health Guide — Occupational First Aid* that any person responsible for first aid in the workplace should hold a certificate of proficiency in Occupational First Aid. This certificate must have been issued within the previous three years by an Agency approved for this purpose by the relevant Occupational Health Authority in each State or Territory (see Appendix I).

Occupational First Aid is an advanced subject, training in which is restricted to those possessing a St. John First Aid Certificate of Medallion standard or an equivalent recognised by the Order of St. John.

This manual contains the theory and practice on which the course in Occupational First Aid is based. Those who satisfactorily complete the course and pass the prescribed examination will be awarded a Certificate in Occupational First Aid by the Order of St. John.

DUTIES

An occupational first aider must:

- provide emergency first aid treatment;
- make decisions concerning diagnosis and referral;
- dress and redress minor injuries;
- maintain records;
- recognise and report health hazards;
- maintain and stock first aid box (or boxes) and first aid room;
- co-operate with other authorities — safety officers, civil ambulance, nursing, medical and hospital personnel;
- participate in safety programs;
- be familiar with work processes and the work environment; and
- maintain a current Occupational First Aid Certificate.

FIRST AID ROOM

- A first aid room should be provided in a workplace where there are two hundred or more employees at any one time.
- The first aid room should have a minimum floor area of fifteen



Fig. 1 — Treating a casualty in a well equipped First Aid Room.

square metres. It should be adequately illuminated and ventilated, and have easy access to ablution and toilet facilities. The access door should be at least 1.2 metres wide. Doors and windows should be fly-screened and flooring should be of non-skid impervious material. The room should be labelled with a cross and with words FIRST AID in green.

- In workplaces where particular hazards apply, specialised facilities such as resuscitation equipment, emergency showers and eye irrigation facilities may need to be provided.

SECURITY

- A person should be made responsible for the first aid room at those times when employees are at the workplace.
- An up-to-date notice showing the name and work location of the first aider in charge of the room should be clearly marked on the outside of the room.

REQUIREMENTS

The minimum requirements for a first aid room* are:

- adjustable electric examination light on a movable stand;
- armchair;
- couch with blankets and pillows;
- cupboard for storage of medicaments, dressings, utensils and linen;
- desk with telephone;
- dressing trolley or workbench;
- electric power points and means of boiling water;
- movable screen;
- portable stretcher (ambulance type);
- resuscitation and relevant emergency equipment;
- sink and wash basin, each with hot and cold water supply;
- soiled dressing container;
- steriliser;
- supplies;
- upright chairs (2 of).

* Based on the NH & MRC Occupational Health Committee Recommendation to Department of Labour's Advisory Committee, Item 12, *Health Services in Industry and Places of Employment*.

SUPPLIES

The following list is intended as a guide only. Reference should be made to statutory requirements where applicable.

Supplies should be kept simple and basic. More sophisticated items should only be provided when the following conditions apply:

- nursing or medical supervision is present;
- specific needs of the work process are to be satisfied;
- the workplace is isolated from other treatment facilities, e.g. a doctor's surgery or a hospital.

Dressings

- adhesive dressing strips, assorted sizes, individually sealed packets
- adhesive plasters, including hypo-allergenic adhesives with ventilated elastic type backings (various sizes)
- assorted wound dressings (plain), small and medium
- combine dressing rolls, including large emergency field or mine type dressings (sterile)
- cotton wool tipped applicators
- disposable basic sterile dressing sets
- gauze squares, 75 mm x 75 mm,
 - packs 100,
 - individual pack
- non-adherent dressings (individual wrap)
- sheet, sterile (for burns)
- sheets, absorbent, disposable
- wound closure strips

Bandages

- conforming gauze, 5, 7.5 and 10 cm
- elastic crepe, 5, 7.5 and 10 cm
- eye pads
- gauze, 2.5, 5 and 7.5 cm
- sheet wool rolls
- triangular
- tubular bandages and applicators

General

- drinking vessels, disposable
- eye wash or irrigating kits
- forceps (dressing), 125 mm minimum
- forceps (splinter)
- gallipot
- kidney dish, 17 cm

- large basin
- lifters and containers
- medicine glass, unbreakable, graduated
- safety pins
- scissors, dressing
- scissors, surgical
- spatulas, wooden
- splints, air splints
- thermometer, clinical
- torch
- tumbler, unbreakable

Medicaments

- analgesic: paracetamol tabs, 500 mg
- antacid and effervescent mixtures: e.g. magnesium trisilicate (APF)
- emetic: syrup of ipecac

Applications

- barrier cream
- calamine
- detergent-antiseptic base lotion and cream
- eye irrigation solution

Quantities

The quantity of each of the above items depends on the number of employees and can be estimated by referring to the suggested minimum quantities shown under contents of first aid box on Pages 7 and 8.

Where items not in the first aid box are held, advice should be sought from a senior civil ambulance officer, an occupational health nurse, or a doctor.

MAINTENANCE

The first aider shall:

- sweep the first aid room floor and clean it with a mop moistened with detergent-antiseptic each shift, and at other times when necessary;
- remove soiled dressings and place them in a container with a tightly fitting lid, at the end of each shift;
- wipe furniture and ledges with a cloth moistened with detergent-antiseptic and clean the sink each shift;
- maintain an adequate supply of first aid room supplies;
- ensure all medications are clearly labelled and stored in a dry place, and that large quantities are not kept;

- discard all medications that are out-of-date or unfamiliar, including samples provided by pharmaceutical representatives;
- ensure the *no smoking* rule is rigidly enforced and signs to that effect are posted conspicuously in the first aid room.

FIRST AID BOX

- Where a first aid room is not provided or when the first aid room is not available at all times, a first aid box should be provided according to statutory requirements or on the minimum basis of one box per hundred employees or part thereof.
- The first aid box should be designed and constructed preferably of metal so as to be lockable, to prevent the entry of dust and moisture, and to provide adequate volume and shelf arrangements for the storage of contents. It should be coated, both inside and outside, with an impervious white paint and be labelled with a cross and with the words FIRST AID in green. An up-to-date notice showing the name and work location of the person (or persons) in charge of the box should be clearly marked on the outside of the box.

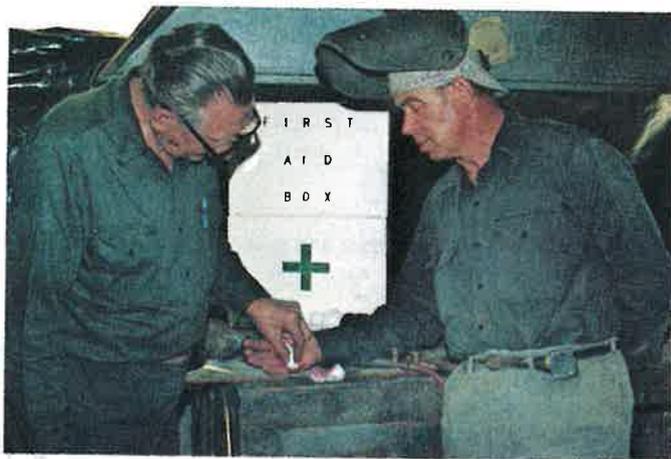


Fig. 2 — Treatment at the First Aid Box in a small factory.

- The First Aid Box should be located not more than 100 metres from the furthest workplace and not more than one storey above or below the floor level of the work place. Its location should be adequately illuminated and ventilated and have convenient access to hot and cold running water. Adequate space and a small table and chair should be available for rendering first aid when this is required.

CONTENTS

Suggested minimum quantities where the first aid box is provided for:

| Up to 25 Employees | 26-100 Employees |
|--------------------|------------------|
|--------------------|------------------|

| | | |
|---|-----------|-----------|
| adhesive dressing strips, assorted sizes, individually sealed packets | 50 | 100 |
| adhesive dressing strip 60 mm x 1 m packets | 1 | 2 |
| adhesive plasters, hypo-allergenic adhesives with ventilated elastic type backings, 25 mm packs | 2 | 5 |
| detergent-antiseptic, 200 ml minimum bottle | 1 | 1 |
| disposable drinking vessels, 200 ml | 10 | 20 |
| elastic crepe bandages, 5, 10 and 15 cm | 2 of each | 5 of each |
| eye pads, sterile | 5 | 10 |
| forceps (dressing), 125 mm minimum | 1 | 1 |
| forceps (splinter) | 1 | 1 |
| gauze bandages, 25 mm | 2 | 5 |
| gauze bandages, 50 mm | 2 | 5 |
| gauze square, sterile 75 mm x 75 mm | | |
| • packs 100 | 1 | 1 |
| • individual pack | 2 | 5 |
| kidney tray, stainless steel, 17 cm | 1 | 1 |
| paracetamol tabs, 500 mg | 250 | 500 |
| safety pins | 1 | 1 |
| scissors, blunt nosed | 1 | 1 |
| sheet wool rolls | 2 | 5 |

Suggested minimum quantities where the first aid box is provided for:

| | Up to 25 Employees | 26-100 Employees |
|--------------------------------------|-----------------------|---------------------|
| syrup of ipecac, 100 ml | 1 | 1 |
| thermometer, clinical | 1 | 1 |
| torch | 1 | 1 |
| triangular bandages | 2 | 5 |
| wound dressing, sterile B.P.C. No 13 | 5 | 10 |
| wound dressing, sterile B.P.C. No 14 | 5 | 10 |

In addition to the First Aid box, air splints, stretcher and a sterile sheet should also be provided.

GUIDANCE NOTES ON USE OF MEDICAMENTS AND APPLICATIONS

MEDICAMENTS

Analgesic

- Two 500 mg tablets of paracetamol is the normal dose for headache, fever and pain.
- Pain is a warning of disorder and attention should be directed towards treating the condition responsible. Repeated doses are to be avoided and when relief is not obtained with one dose the casualty should be advised to see a doctor.

Antacid and effervescent mixtures

Most people suffer from occasional bouts of indigestion characterised by symptoms such as abdominal discomfort, heartburn, belching and nausea. The causes of indigestion are varied; but certain foods and beverages, and also stress and fatigue are important causes. Relief may be obtained by taking an antacid and effervescent mixture. Any employee with persistent discomfort should be advised to see a doctor.

Emetic

An emetic induces vomiting. Where vomiting is indicated in the treatment of poisoning, give:

- syrup of ipecac APF: adult dose — 50 ml; followed by one to two glasses of water (Vomiting usually occurs within 30 minutes)

APPLICATIONS

Barrier cream

Barrier creams prevent dust, dirt, oil, paint and other contaminants from becoming firmly embedded in the skin, making it easier to remove them by washing. They may also assist in preventing skin irritation and sensitisation. Barrier creams have no place in the treatment of skin infections.

A barrier cream is applied to the clean, dry skin before starting work, removed from the skin by washing with a suitable skin cleanser after each spell of work, and reapplied before resuming work.

Calamine

Lotions and creams containing calamine provide temporary relief from sunburn, itching and minor skin irritations. Calamine has no place in the treatment of skin infections.

Detergent-antiseptic base lotion and cream

The antiseptic and detergent properties of solutions of detergent-antiseptic (diluted according to directions) are used in cleaning the skin surrounding wounds. Creams containing antiseptic may be used in the treatment of abrasions and to prevent the adherence of gauze dressings.

Eye irrigation solution

Sterile solutions are available in handy sized plastic bottles for individual application. The expiry date on the bottle should be checked and the date of opening recorded on the bottle. Once opened, the solution must be discarded at one month. See the section on Eye Injuries for the indications for and method of use.

Neosynephrine eye drops 1/6 %

These are used to relieve pain, redness and intolerance to light of eyes exposed to welding flash. The expiry date on the bottle should be checked before use, and a fresh 15 ml bottle used for each casualty and then discarded. The indications for and the method of use are described in the section of Eye Injuries.

OTHER MEDICAMENTS AND APPLICATIONS

Other medicaments and applications for the treatment of common conditions such as sore throat, cough, sunburn, insect bites and diarrhoea, may be stocked and used in the first aid room only with the approval of a doctor.

Chapter 2

RECORDS**FIRST AID RECORDS**

Records of injury and illness at the workplace are necessary to:

- provide continuing treatment of casualties;
- provide data for the evaluation of possible health effects when a casual relationship between exposure and illness is suspected;
- monitor the effectiveness of the measures taken by management to control hazards;
- provide data required by unions and management for the resolution of safety and health issues;
- meet the requirements of workers' compensation legislation and the relevant insurance carrier;
- comply with statutory requirements; and
- serve as a data source for statistical and epidemiological research.

FIRST AID RECORD CARD

A master card, the First Aid Record Card, should be kept for each employee.

All attendances are recorded on this card:

- for minor injury and illness not requiring time off work — insert full details;
- for injury and illness requiring time off work — only the date, and a cross reference to the Notice of Injury form is made; and
- for subsequent attendances — full details.

A suitable design is shown in Appendix II.

NOTICE OF INJURY

The two primary sources of information on work-related illness or injury are the casualty and his supervisor. The occupational first aider is usually the first person to whom the casualty can relate the circumstances preceeding the onset of the illness or injury. He is therefore, in a favourable position to fulfil the employee's need for a permanent record of his version of the incident, and management's need for a report immediately after the incident. For each work-related injury or illness leading to time off work, it is common practice for the occupational first aider to complete a Notice of Injury form.

The Notice of Injury should show:

- personal details and occupation of the casualty;
- date and time of reporting for first aid;
- circumstances of the injury (or illness) including:
 - date and time of the injury (or illness);
 - work being performed at the time;
 - supervisor's name;
 - names of any witnesses;
- employee's version of the cause of the injury (or illness);
- treatment;
- advice given or arrangements made for further treatment.

Form design usually satisfies statutory requirements, and the special requirements of the employees' safety programme. A suitable design is shown in Appendix III.

SUPERVISOR'S REPORT

The casualty's supervisor normally makes a report which:

- presents the results of his investigation;
- confirms or denies the details recorded in the Notice of Injury form; and
- contains a statement of proposed action to prevent a similar accident occurring in the future.

STATISTICS

The Notice of Injury form and the Supervisor's report form the basis for the collection of data and the compilation of statistical

records. These data and statistics serve no useful purpose unless they can be presented in a form which meets the needs given in the opening paragraphs of this chapter. Forms should be designed to:

- allow the user to obtain the information required;
- cover all areas of current and potential interest;
- exclude extraneous data; and
- minimise cost and promote efficiency.

REGISTER OF WORK INJURIES

To provide a running record of attendances, re-attendances, nature of injury treated, parts of the body injured, numbers injured in each occupational group, a summary sheet or Register of Work Injuries Form should be maintained. Entries into the Register are kept up-to-date and the number of attendances under each heading is recorded at the end of each shift. Australian Standard 1885-1976 provides an example of a Register of Work Injuries (Appendix IV).

Entries in the Register of Work Injuries should be reviewed in association with the information provided in the First Aid Record Card and the Supervisor's report before data are finally accepted for statistical purposes. Forms completed by the first aider should not be the sole source of information used for statistical purposes.

WORKERS' COMPENSATION

When a report is required for workers' compensation purposes, the form required by law or the insurance company should be used for this purpose only, and should not be used as a substitute for the Notice of Injury form.

PERSONNEL REFERRALS

Where a casualty needs to be referred to a doctor or hospital, a note containing all pertinent details should accompany the casualty. A simple referral form (see Appendix V) will ensure that all pertinent details are provided.



Fig. 3 — Communications. Discussion between an Occupational First Aid Officer and a Safety Officer, in a First Aid Room. Note the filing boxes for storing First Aid Record Cards.

COMMUNICATIONS AND SAFETY

Occupational health is a form of preventive medicine. Some larger organisations have an established and efficient safety service but this is not usually the case in smaller factories and undertakings.

Basic safety of people at work is a management responsibility but management must have information and advice if it is to be effective.

The occupational first aider should realise his responsibilities in the field of safety and should establish effective contact and communications with management in this regard.



Figs 4, 5 *Minor wound*
2 cm incised wound of the leg treated by occupational first aider with sterile wound closure strips.



Figs 6, 7 *Major wound*
6 cm incised wound of the leg referred to and sutured by a doctor.

Chapter 3

WOUNDS

Wounds vary greatly in severity. In the occupational situation, the vast majority seen will be wounds of the skin and most of these will be small.

CLASSIFICATION OF WOUNDS

Before treatment, a wound should be assessed and classified into one of the two groups, major and minor.

Major wound

- is a wound which, because of its size, depth or other characteristics, must, after initial first aid treatment, be referred for medical attention.

Minor wound

- is a simple break in the skin surface which can be treated by an occupational first aider without medical supervision.

Other factors influencing classification must also be considered.

SITE OF WOUND

- A wound which would be assessed as minor on the arm or leg may be major if located on the hand, foot, face or neck.

TYPES OF WOUND

These are classified as:

- **Incised** This is a straight cut caused by a sharp instrument, e.g. a knife, broken glass, sheet metal, etc. The skin edges are clean and sharp and there is little, if any, damage to surrounding tissues. An incised wound may be major or minor (Figs 4, 5, 6 & 7).

- **Lacerated** The skin has been torn, e.g. by a machine. The edges of the wound are ragged and irregular and there is damage to surrounding tissues. All lacerated wounds are major.
- **Contused** When part of the body has been crushed with much bruising of the surrounding tissues and bursting of the skin surface, it is called a contused wound. The wound edges are ragged and irregular and there will be swelling of the surrounding tissues leading to pouting of the wound edges, and often protrusion of the underlying fat. A contused wound is always major.
- **Puncture Wound** A puncture wound is caused by a sharp narrow object, e.g. nail, spike or knife. The skin wound may be insignificant but deeper structures, e.g. blood vessels, nerves, etc., may be injured. All or part of the penetrating object may remain deep in the wound and may not be visible on inspection. Foreign material and bacteria may also be carried deeply into the body tissues. A puncture wound is always major.
- **High Velocity** These wounds are usually caused by small objects, e.g. a bullet, a piece of metal thrown off a high speed wheel, fragment from an explosion, etc. The skin wound may be insignificant but, in all cases, there is considerable damage to deeper structures, including blood vessels, nerves, etc. A high velocity wound is always major.
- **Abrasion** These wounds occur when the skin is rubbed off by a rough object, e.g. a revolving emery wheel. The depth of the wound is dependent on the force, and the time that the skin is in contact with the object. (Fig. 8). The wound surface is frequently contaminated by abrasion material. Only the most trivial of abrasions can be classified as minor.

COMPLICATIONS OF WOUNDS

BLEEDING

Though some bleeding occurs with all wounds, unless a major vessel is severed or the wound is very extensive, it is rarely of any danger to the casualty. Minor bleeding should be ignored when cleaning a wound. Even moderate bleeding should not cause alarm; blood donors regularly give ½ litre of blood with no ill effect. However, do not allow bleeding to continue. Major bleeding must be controlled as soon as possible; when ⅓ of the blood volume is lost (1½ - 2 litres in an adult) circulatory collapse occurs.



Fig. 8 — Abrasion caused by contact with an emery wheel. Note the full-thickness skin loss in centre of the wound.

Symptoms and signs of circulatory collapse

- dizziness and faintness, collapse may occur; eventually if bleeding continues consciousness is lost;
- restlessness and apprehension — the casualty is frightened;
- pale, cold, clammy skin — beads of sweat are often seen on the forehead;
- rapid pulse;
- respiration increased in rate and depth; later yawning, sighing and gasping respiration (air hunger) may occur — these are signs of severe circulatory collapse;
- thirst.

The length of time between injury and the onset of circulatory collapse depends on the volume and rate of blood loss. The more rapid the bleeding the sooner will circulatory collapse occur. With rapid, profuse bleeding the body is unable to maintain an adequate circulation with the natural response mechanisms (increasing the pulse rate, constricting blood vessels, drawing in fluid from tissue spaces) so some of these symptoms and signs may appear before one third of the blood volume is lost.

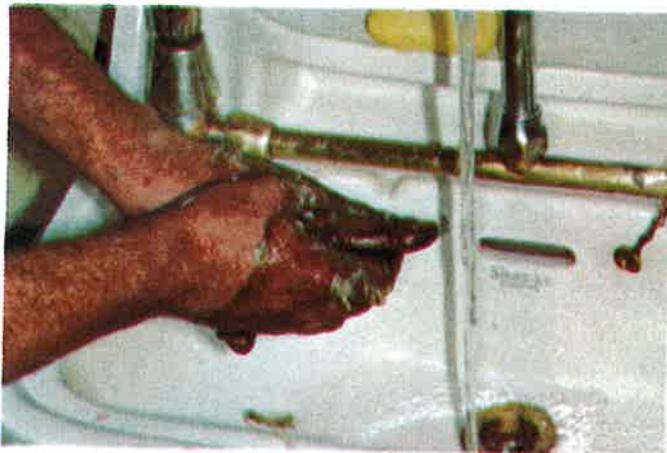


Fig. 9 — Casualty washing injured hand prior to assessment and treatment.

Generally speaking however, once circulatory collapse occurs, the further loss of an equal amount of blood will lead to death. It is therefore of vital importance to stop profuse and especially rapid bleeding as soon as possible.

Treatment of bleeding

- Apply direct pressure over the wound either by squeezing the wound edges together or by pressing directly on the wound, preferably over a clean pad or dressing.
- If possible, elevate the part.
- Bandage firmly — if bleeding continues, apply another pad over the first and bandage firmly again. If blood penetrates the second pad, apply a third pad and bandage firmly again.
- If bleeding continues, press firmly on the third pad and hold until medical assistance is obtained.
- Rest the casualty.

Treatment of circulatory collapse

- Lay the casualty down.
- If possible, elevate the legs e.g. on a chair,
- Give oxygen if available, (see page 109).



Fig. 10 — The wound itself (see also Fig 8) is clean. The surrounding skin was covered with grease.

CONTAMINATION

Foreign material such as dirt or grease may be introduced into the tissues at the time of injury. If not removed, such material causes irritation of body tissue and may lead to infection and perhaps abscess formation.

Treatment

In the majority of cases copious irrigation with clean water is all that is required. If the wound is surrounded by grease or grime, the injured worker should wash the area with soap or, preferably, with a proprietary cleanser, under running water (Figs 9, 10). A nail brush may also be required. Any contaminated wound not cleaned by simple irrigation, or any wound contaminated with garden dirt, must be considered a major wound.

INFECTION

Bacteria are introduced into the tissue of all wounds. The body is quite capable of combating small numbers of bacteria introduced by a clean instrument, e.g. a knife. Infection occurs when bacteria lodged in a wound start to multiply.

Prevention

- Irrigate the wound with clean water.
- Do not touch the wound unnecessarily. However, if direct pressure with the hands is required to stop bleeding, the risk of infection should be ignored.
- Do not breathe, talk or cough over a wound.
- Make sure any dressing is sterile or at least clean.
- Before applying a dressing, swab the surrounding skin with a suitable antiseptic solution.
- Cover with a sterile dressing and fix with a bandage or adhesive tape.

If a wound is infected, the classical symptoms and signs of inflammation appear. These are:

- pain;
- redness;
- heat; and
- swelling.

These symptoms and signs never appear before 6 hours and rarely appear before 12 hours from the time of injury. If the wound is covered by a dressing, pain may be the only indication of infection. With an infected wound the casualty should be referred immediately to a doctor.

ALLERGIC REACTIONS

Casualties may themselves begin to treat minor wounds with various ointments, powders, etc. Itching, redness and occasionally blistering around the wound, often in the shape of the dressing, may result from this treatment. All self-applied ointment and dressings should be removed, the wound redressed, and the casualty referred to a doctor.

TETANUS

Tetanus is caused by the introduction of tetanus bacteria into the wound. Tetanus bacteria are found in the soil and in any material contaminated with animal manure. They will only grow and multiply in an environment where there is no oxygen, such as in deep wounds or puncture wounds. These bacteria do not cause the usual symptoms and signs of wound infection; they liberate a toxin which attacks the brain and spinal cord causing muscle contractions and convulsions. The best treatment of tetanus is prevention.

Prevention

Any casualty who has sustained a deep or puncture wound, particularly if there is likelihood of contamination with soil or animal manure, should be referred to a doctor for an anti-tetanus injection; provided the injection is given within 24 hours, protection will be adequate.

Many people will have had tetanus immunisation at some time and may require a booster injection following injury.

FOREIGN BODIES

A foreign body is anything, wood, metal, glass etc., which remains embedded in the skin or deeper tissues following injury. For the purpose of management, foreign bodies can be subdivided into small, multiple and large.

Small

Small foreign bodies, e.g. splinters of wood or metal, can, if protruding from the skin surface, be easily removed.

Treatment

- Swab skin with an antiseptic solution.
- Ascertain the direction of entry.
- Grasp the protruding end with splinter forceps.
- Pull evenly in the direction opposite to the direction of entry.
- Make sure the foreign body has been completely removed. A blunt end on a removed wooden splinter may indicate that some remains under the skin surface.
- When removal is complete, swab with an antiseptic solution and apply a small dressing.
- If there is doubt about the complete removal of the foreign body, do not probe beneath the skin surface — refer the casualty to a doctor, and send the foreign body already removed with the casualty.
- If penetration appears to have been deep, refer the casualty to a doctor, as an anti-tetanus injection may be required.

Multiple

In accidents with sand blasting, many small foreign bodies may be embedded in the skin.

Treatment

- Have the casualty scrub the affected area under running water with soap or a proprietary cleaner and a nail brush.

- Check to see that all foreign bodies have been removed.
- If all foreign bodies have been removed, dress the area.
- If foreign bodies remain embedded in the skin — refer the casualty to a doctor.

Large

Large foreign bodies are often associated with large wounds, and referral of casualty to a doctor is always required.

Treatment

- If the foreign body is loose in the wound, lift it out. (Send the foreign body with the casualty on referral).
- Treat the wound as though there were no foreign body.



Fig. 11 — Large foreign body (nail) firmly embedded in foot. Removal should not be attempted.

- If the foreign body cannot be removed easily (Fig 11), or has penetrated the chest or abdomen, clean the surrounding skin with antiseptic solution then pad around the wound with folded gauze, cotton wool or rolled roller bandages. (The padding must be high enough to prevent any pressure on the foreign body by the bandage). Apply a dressing over the whole area, bandage and refer immediately.

Note, in puncture wounds, even quite large foreign bodies may be present and not be seen; this is a further reason for referring all puncture wounds.

INJURIES TO DEEPER STRUCTURES

Injury to deeper structures should be suspected in the case of deeply lacerated or stab wounds, particularly in the hand or foot. In these cases, the treatment is to clean around the wound with antiseptic solution, apply a dressing and bandage, and refer the casualty to a doctor.

WOUND DRESSING

If a wound is assessed as minor, it should be treated without referral.

METHOD

- Irrigate the wound with a copious quantity of clean water. (Running water from a tap is ideal.)
- If the surrounding skin is dirty it should be washed with the aid of soap or a proprietary cleanser. Have the casualty do this for himself, once again under running water.
- Wash your hands thoroughly under running water, using either soap or a detergent-antiseptic solution. Use a nail brush to clean under the nails.
- Dry the hands with a disposable paper towel. The hands are now surgically clean but not sterile.
- Open a prepacked, disposable sterile dressing kit and pour dilute antiseptic solution into the container provided.
- Do not touch the contents of the dressing kit with the hands. The disposable plastic forceps provided should be used.
- When a disposable dressing is not available and for small minor wounds, use a gallipot for the antiseptic, a kidney dish for sterile swabs and dressings, and metal dressing forceps. All items

should be sterilised or washed before use. The tips of washed forceps can be sterilised by immersing in antiseptic solution for two minutes.

- Wash and dry the hands again.
- Using one of the plastic forceps, pick up a gauze square or a ball of cotton wool, dip it into the antiseptic solution and swab the skin surrounding the wound. Stroke away from the wound to prevent dirt and antiseptic being introduced into the wound. (Antiseptic solutions are relatively harmless to tissue but nothing is gained by swabbing the wound itself).
- Continue swabbing until the surrounding skin is as clean as possible. After use, dispose of each piece of gauze or cotton wool. A foot-operated pedal bin with a plastic liner is ideal.
- Do not dry the skin, as antiseptics are only effective when wet. All antiseptics take at least 2 minutes to kill bacteria.
- Now, again using another pair of plastic forceps, pick up a sterile dressing and apply it to the wound. Keep the dressing in place with a roller or tube gauze bandage, or adhesive tape. In the case of a very small wound, a simple adhesive dressing may be adequate.
- If the bandage is likely to get dirty, apply an outer bandage. This can be replaced as often as necessary without disturbing the dressing and original bandage.
- With finger injuries, a leather finger stall may be a better method of protecting the dressing and original bandage. However, rubber finger stalls should not be used as they prevent evaporation and make the skin soggy. The base of a rubber finger stall may also act as a constrictive bandage, thereby reducing blood supply to the finger.
- Do not swab a wound with dry cotton wool, as pieces tend to stick to the wound and may be difficult and time consuming to remove.
- Before returning to work, the casualty should understand that the outer bandage must be kept dry. A wet dressing must be replaced as soon as possible by the occupational first aider. If it is likely to be some time before the casualty can see the occupational first aider, it is preferable for the casualty to remove any wet dressing and leave the wound open to the air, or cover it with a clean dry dressing.

REDRESSING A WOUND

The wound is redressed daily using the same technique described for the primary dressing.

The casualty is referred to a doctor if:

- on removing the dressing, there are signs of inflammation;
- after 24 hours, the casualty complains of continuing pain;
- there is evidence of delayed healing.

At times, the initial dressing will have been done by a doctor or trained nurse. Any redressing of these wounds should be done only if and when requested by the doctor or nurse.

TREATING A MAJOR WOUND

Clean the surrounding skin with antiseptic solution, cover with a dressing, bandage and refer immediately.

Chapter 4

CONTUSIONS, STRAINS, SPRAINS, DISLOCATIONS AND FRACTURES

Contusions, strains, sprains and dislocations are "soft tissue" injuries involving one or more of the soft tissues of the body — skin, subcutaneous tissue (the fatty layer under the skin), muscles, tendons and ligaments.

With a fracture there is always some, and often considerable, soft tissue injury, at times more important than the fracture itself.

SOFT TISSUE INJURIES

These are either:

- *acute*, occurring suddenly as the result of a single incident; or
- *chronic*, coming on gradually over a period of time.

Acute soft tissue injuries are caused by:

- external forces e.g. a blow, falls, resulting in a contusion, sprain or dislocation;
- internal forces e.g. excessive muscular action, resulting in a torn muscle or strain.

Chronic soft tissue injuries are caused by repetitive use, or overuse of muscles and tendons, resulting in tenosynovitis or tendinitis.

EFFECT OF TRAUMA ON SOFT TISSUES

Acute — Blood vessels are ruptured with bleeding into the tissues leading to swelling, pain and bruising. When this bleeding is near the skin surface bruising appears rapidly, but when bleeding is into

deeper tissues discolouration either appears later (often up to a week later) or not at all.

Chemicals are released from damaged tissues and lead to the collection of fluid in the tissues (and in joints) with increased swelling and pain.

Chronic — There is no bruising and blood supply to the area is often decreased. It is probably chemical release from damaged tissues which leads to pain and moderate swelling.

DIAGNOSIS

The diagnosis as to which soft tissue is injured and whether or not a bone has been fractured is often of little importance in first aid treatment, except that mobile fractures must be immobilised to prevent further soft tissue injury and pain.

TREATMENT

Acute soft tissue injury

Immediate — All acute soft tissue injuries whether from external or internal causes must be treated by *I.C.E.*, which stands for:

I = Ice (or cold compress)

C = Compression

E = Elevation (and rest)

Ice (or cold compress):

- reduces blood supply to the area and limits bleeding into the tissues;
- relieves muscle spasm; and
- relieves pain as swelling of the tissues is reduced and by a direct effect of cold on nerve endings.

Compression:

- limits bleeding; and
- limits the collection of fluid in tissues and joints.

Elevation (and rest):

- limits swelling by the effect of gravity reducing blood supply; and
- increases venous drainage.

Rest prevents further tissue damage.

In the immediate post-injury period do not:

- use heat;
- massage the area;

- apply any liniment or proprietary cream;
- exercise.

Later management — Assess the severity of the injury by noting:

- the amount of pain;
- the degree of swelling; and
- the loss of function.

Refer all severe injuries for medical attention.

Minor injuries with little pain, little swelling and minimal loss of function are, after 24 hours, treated by:

- moderate heat;
- moderate and progressively increasing exercise; and
- protection from further injury.

Chronic soft tissue injury

First aid for chronic soft tissue injuries is simply recognition of the condition and referral for medical advice. Medical treatment involves such things as rest, physiotherapy, injections to reduce pain and tissue damage, and surgery.

I.C.E. does not help and the application of liniments, or propriety creams and continued use are especially contraindicated.

FRACTURES

The common occupational fractures are not gross fractures of the long bones. Most fractures seen will be small fractures e.g. of the fingers. Treatment of fractures does not differ from that in the *St. John First Aid Manual*, except that sterile dressings (for open fractures) and prepared splints will usually be available.

As:

- diagnosis between a fracture and a sprain or dislocation is often difficult; and
- soft tissue injury is often just as important as the fracture; use *I.C.E.* whenever possible.

Chapter 5

COMPRESSION BANDAGING, COMPRESSES AND SPLINTS

COMPRESSION BANDAGING

This manual frequently advises the application of compression bandaging because it:

- limits swelling caused by bleeding into muscles, connective tissue and joint cavities;
- limits swelling due to traumatic oedema, i.e. fluid collecting in tissues following injury;
- limits excess fluid collecting in joints following injury;
- provides rest to the injured part by partially splinting joints; and
- minimises pain, as much of the pain following injury is due to swelling.

The application of an effective compression bandage is not easy and a badly applied bandage may cause more problems than it solves. Practice in applying all types of compression bandages on uninjured limbs is essential.

USE OF SHEET WOOL

Sheet wool helps in providing even compression and prevents the edges and wrinkles in the bandage cutting into the skin, a common cause of pain and discomfort, especially if swelling continues to increase. Except in the case of the elbow, sheet wool padding is not required for the upper limb, as less tension is required.

METHOD OF APPLICATION**Lower limb**

- Wrap an even layer of sheet wool round the limb completely covering the area to be bandaged (Fig. 12).

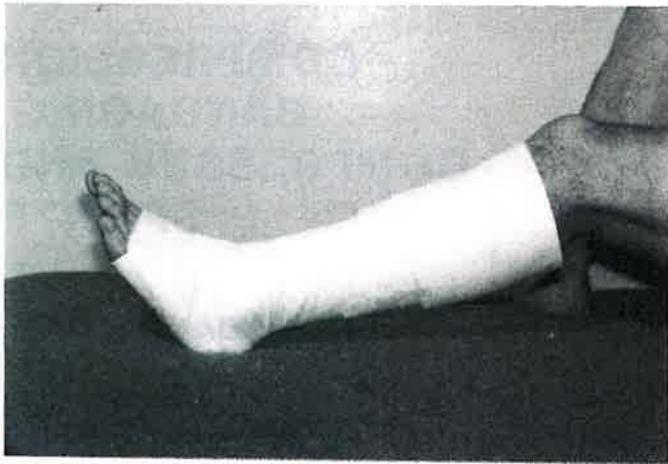


Fig. 12 — Compression bandaging of the lower leg. Sheet wool applied.

- Commence bandaging from below and gradually move up the limb using a reverse spiral. Overlap each spiral below by at least one half the width of the bandage (Fig. 13).
- Keep an even tension by having at least 25 cm of unrolled bandage between the limb and the roll in the hand. Particular care must be taken not to increase tension as bandaging proceeds up the limb.
- The edges should be kept flat with no kinks or wrinkles in the bandage.
- Completely cover all areas, do not leave any gaps (Fig. 14).

Upper limb

- If the elbow is to be bandaged, pad well with an even layer of sheet wool.
- Proceed as for the lower limb but use less tension.

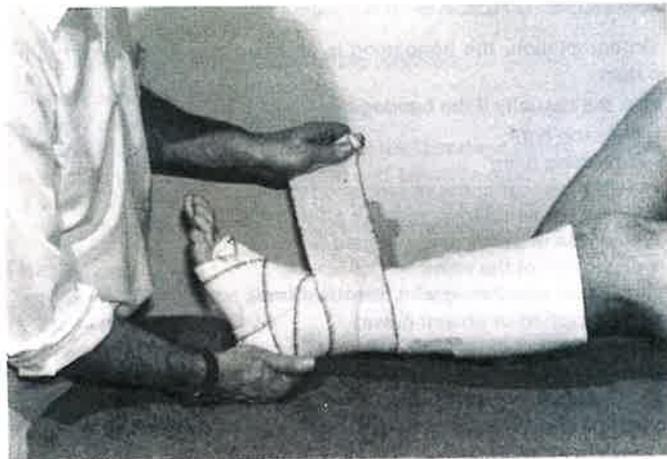


Fig. 13. — Compression bandaging of the lower leg. Applying reverse spiral bandage.

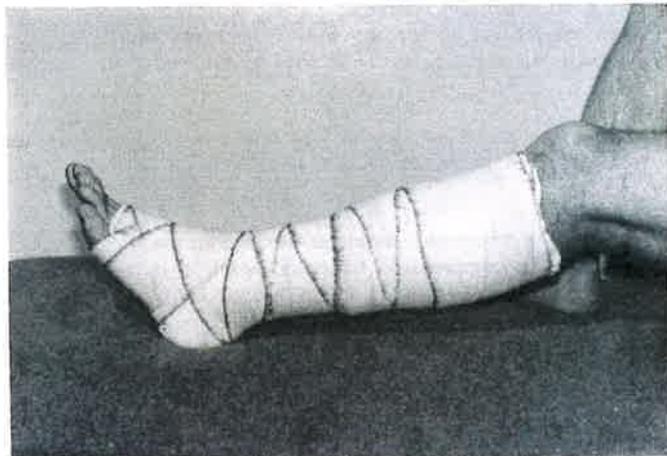


Fig. 14 — Completed compression bandage of the lower leg.

BANDAGE CHECKS

On completion, the bandaging is checked to ensure that it is not too tight.

Ask the casualty if the bandage:

- feels too tight;
- is causing pain;
- is causing numbness or pins and needles.

Look for (by comparing with the other limb):

- blueness or pallor of the fingers or toes;
- distension of the veins.

Feel for (by comparing with the other limb):

- a diminished or absent pulse;
- any coldness of the skin.

If the bandage is too tight, remove it completely and reapply. Do not simply loosen the bandage as it is quite easy to miss one spiral. This is extremely important, as the diminished blood supply caused by a tight bandage may cause permanent damage to tissues, especially muscle, and can even cause gangrene.

SPECIFIC REGIONS

Foot and ankle

- use a 10 cm crepe bandage;
- keep the foot at 90° to the line of the lower leg;
- bandage from the base of the toes to the mid calf.

Calf

- Exactly the same as for the foot and ankle, but extend the bandaging up to just below the knee.

Knee

Two types of compression bandage are used for the knee:

- a temporary compression bandage, which is applied after an injury following the application of ice or cold compress; this bandage stays in place while the casualty is being transported to the doctor;
- a Robert Jones bandage, which is the definitive treatment of a sprained knee.

Temporary compression bandage:

- with the casualty laying down, an assistant supports the leg with the knee straight and the hip flexed to approximately 30°;

- using a 10 cm crepe bandage, bandage from the mid calf to the mid thigh;
- transport the casualty with the leg elevated.

Robert Jones bandage:

- apply a first bandage as above;
- apply a second layer of sheet wool and bandage again;
- apply a third layer of sheet wool and bandage again;
- when properly applied, this bandage allows approximately 10° of knee flexion and the casualty is able to walk.

Thigh

- apply a 10 cm crepe bandage from the mid calf and extend up as far as possible;
- because of its conical shape, the upper thigh is difficult to bandage the upper turns tending to roll down, cutting into the skin. If difficulty is experienced in keeping the upper turns in place, bandaging should be finished lower down the thigh.

Hand and wrist

- with the hand in the position of function (as though holding a cricket ball) and the wrist slightly extended (bent back), apply a 7.5 cm bandage from the base of the fingers to at least 10 cm above the wrist joint;
- elevate in a high sling.

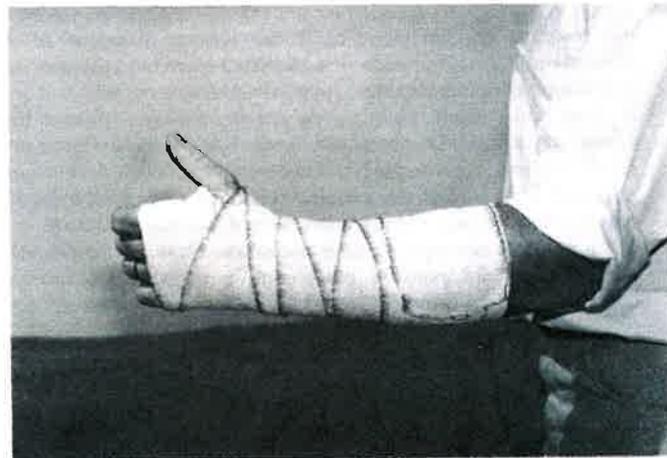


Fig. 15. — Compression bandage applied to forearm.

Forearm

- Bandaging is the same as for the hand and wrist, except that the bandage is extended to just below the elbow (Fig 15).

Elbow

- with the elbow at 90°, check the radial pulse;
- if the radial pulse is absent, straighten the elbow until it is felt;
- with the forearm rotated to the mid-position, pad well with sheet wool;
- apply a 7.5 cm crepe bandage from 10 cm above the wrist to above the mid-upper arm;
- check the radial pulse again — if not felt, rebandage and/or straighten the elbow until the pulse can be felt;
- support in a sling and re-check the pulse.

Upper arm

- Bandaging is the same as for the elbow, except that the bandage is continued up the arm as far as possible.

COLD COMPRESSES

Apart from the standard improvised cold compress made by wrapping crushed ice in a wet towel, two types of commercial preparations are available. They consist of:

- a fluid in a plastic bag which remains semi-liquid when stored in the freezing compartment of a refrigerator. Because of its immediate availability, ease of use and reasonable cost, the use of this type of cold compress is recommended.
- crystals in a small plastic bag inside a larger plastic bag containing a fluid. Crushing the inside bag allows the fluid and crystals to mix, resulting in rapid cooling of the liquid. As this type of preparation is relatively expensive and not re-usable, its use is only justifiable where refrigeration is not available.

To apply a commercial cold compress mould it around the injured part and hold in place with a firmly applied crepe bandage. The part should be elevated, if possible, and the cold compress left in place for at least 20 minutes.

SPLINTS

In general first aid, prepared splints are rarely available and improvisation is necessary. This should not apply in occupational first

aid. To avoid loss of valuable time in improvising splints which are less than ideal, splints should be readily available. Three types are required in the occupational situation.

AIR SPLINTS

An air splint is an inflatable bag of tough, pliable plastic shaped to surround a limb. It is fitted with a full length zipper to enable it to be easily placed and fixed round a limb before inflation. A standard kit contains six air splints, three for the upper limb and three for the lower limb. This is the minimum requirement for an occupational first aid service.

It comprises:

- Short — for hand and wrist injuries;
- Half arm — for forearm injuries;
- Full arm — for upper arm and elbow injuries;
- Short — for foot injuries;
- Half leg — for ankle injuries;
- Full leg — for lower leg and knee injuries (not satisfactory for a fractured femur).

An extra full leg splint designed for ski injuries and featuring an open toe design for fitting over a boot could be useful in situations where heavy boots are worn.

An air splint:

- is easily and rapidly applied;
- provides good immobilisation;
- provides pressure which limits swelling and controls bleeding;
- provides a buffer to movement during transport; and
- can be easily placed over a dressing.

Method of use

- Dress any wound.
- Select the appropriate sized splint, remove from wrapper and unzip completely.
- Slide the splint under the limb, fold it round the limb and do up zipper; if the injury is to the arm, keep the fingers extended (straight).
- Inflate the splint using lung pressure and close the valve. It must be possible to indent the plastic with the thumb or fingers (Fig 16). Do *not* use mechanical means of inflation under any circumstances.
- Elevate the limb if possible.

Following application of the splint and during transport to hospital or medical care, check that the splint is not too tight. This may occur because of:

- over inflation;
- increase in temperature causing air in the splint to expand;
- decrease in atmospheric pressure (e.g. in air transport *including* pressurised aircraft), causing air in the splint to expand;



Fig. 16 — Air splint — testing the tension.

- swelling of the limb due to injury. This is unlikely to occur except when several hours elapse between application of the splint and the casualty reaching medical care. The pressure of the splint acts as a compression bandage and actually limits swelling.

The casualty may complain that the splint feels too tight. Signs of impaired circulation may also be evident. Increase in pressure should be checked by feeling the tension in the splint.

If there is any indication of excess tension, reduce the pressure by opening the valve.

Following use, the splint should be recovered from the hospital or medical facility or replaced.

Air splints have some disadvantages:

With upper limb splints —

- the pulse cannot be felt to check circulation;

- the fingers must be straight, an unsatisfactory position for most hand injuries;
- injuries round the elbow may require partial flexion to maintain a pulse;
- if the elbow is splinted straight, a sling cannot be applied and the casualty may have to be transported lying down;

With lower limb splints —

- distal circulation is difficult to check;
- they are not satisfactory for fractures of the femur.

With all splints —

- over-inflation may impair circulation, particularly in severe injuries where the blood supply may be reduced by the injury itself;
- a punctured splint is useless.

Air splints are mainly of use for fractures and injuries of the ankle, lower leg and knee.

PADDED WOODEN SPLINTS

These are especially useful for splinting the hand and forearm in:

- crush injuries of the hand and forearm;
- injuries to the hand where the hand has been bandaged in the position of function.

Because of their low cost, padded wooden splints can also be used with multiple casualties when the supply of air splints is inadequate.

Preparation

- Pine slats, 6 mm x 70 mm, cut into lengths of 30, 45, 60 and 75 cm are required.
- Cover one side of each splint with shock absorbent plastic sponge approximately 1 cm thick, cut to the size of the splint, and glued in place.
- Cover the whole splint and padding with strong clear plastic sheeting; this protects the padding and enables the splint to be easily cleaned when soiled.
- Store near the first aid box or in the first aid room.

Application

- Place splints along the length of the limb, so as to incorporate at least the joint below the injury and, if possible, the joints both above and below the injury.
- Fill in any gaps between the limb and the splint with sheet wool padding.

- Bandage the limb firmly to the splint with a gauze or crepe bandage.
- Support with a sling or elevate the limb.

The number of splints used depends on the site of the injury and the need to maintain immobilisation. Some examples are:

- Hand: One splint on the front of the hand, wrist and lower forearm.
- Wrist and Forearm: One splint on the front, or two splints, one front and one back, extending from the base of the fingers to beyond the elbow. Allow the fingers to curl over the end of the splint. The elbow is immobilised by placing the arm in a sling (Figs 17, 18, 19).



Fig. 17 — Forearm splint. Note the extra padding with sheet wool, the splint extending past the wrist and elbow joints, and the fingers curling over the end of the splint.

- Upper Arm: Splintage is not required as adequate immobilisation is achieved by a collar and cuff sling and binding the arm to the body.
- Ankle and Lower Leg: Three splints, one on either side and one behind, extending from below the heel to above the knee.
- Knee: A single posterior splint extending from mid-calf to mid-thigh.



Fig. 18 — Bandaging splint to forearm. The top layer of sheet wool is not essential but it adds to comfort.



Fig. 19. — Completed forearm splint. The elbow is now immobilised by applying a sling.

THOMAS SPLINT

This splint, or one of its many modifications, is used for immobilising a fractured femur, but can also be used for fractures of the lower leg or fractures about the knee.

The original Thomas splint consisted of a long U-shaped metal bar with a leather padded metal ring attached at 120° to the open end of the U. Modern modifications have either a half ring or a ring which can be opened to allow the splint to be applied without having to slide it over the leg from the foot up. The ring is also flexible to allow it to be opened or closed to match the diameter of the thigh. The length of the side arms can be varied for various leg lengths. A foot piece is attached to the end of the splint to which the foot or boot is tied, providing traction to the leg and preventing rotation of the foot and leg below the fracture.

The splint should be studied and practice in its application on an uninjured person obtained.

Unless absolutely necessary, a casualty with a fracture or suspected fracture of the femur should not be moved until a Thomas splint has been applied.

Method of application

- At least one and preferably two assistants are required. They do not have to be trained first aiders.
- Reassure the casualty while assessing the injury, and explain what you intend doing to aid him.
- Examine the limb for location of fracture.
- Control bleeding and cover any wounds if present.
- Check pockets and remove objects such as key rings, etc., which may cause pressure.
- Measure the splint for correct length by resting the splint upside down on the uninjured leg. Adjust the side arms to the required length (from the groin to five centimetres past the heel) and tighten. Open or close the padded half circle to fit the thigh. Tie a triangular bandage to the inner side of the half ring.
- Place the splint beside the injured limb and adjust supports to ensure maximum support and comfort. These calico supports should always be on the splint ready for immediate use. Four are required and they should be adjusted so that one third of the thickness of the limb will be below the line of the bars.
- Place one support under the ankle. Bearing in mind the basic principle of support above and below a fracture, position the other three supports along the splint to provide even support for

the limb. Their actual position depends upon the fracture site.

- Have an assistant steady and support the injured limb by hand.
- Remove the shoe and sock. Pad the ankle and instep with sheet wool.
- Apply a bottle knot — see Fig. 20.
- Correct, where necessary, angulation of the limb, and apply traction as follows:

Have an assistant squat down and grasp the heel with one hand and the top of the instep with the other, keeping the foot upright. By leaning back on his heels, the assistant can maintain an even tension along the length of the leg.

- Slide the splint under the leg with the longer arm on the outside.
- Position the padded half circle firmly against the buttock and perineum (between the legs and close against the injured leg)

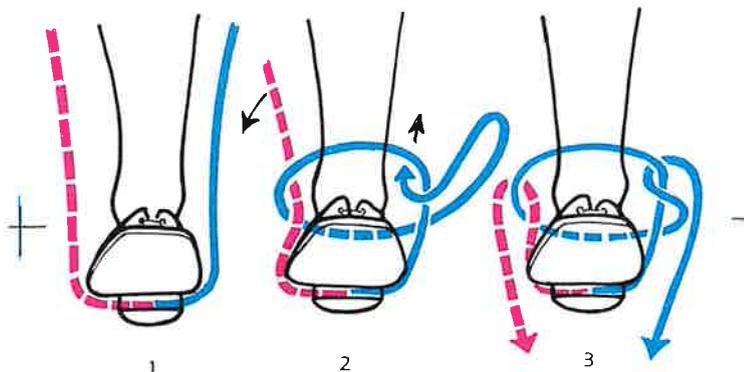


Fig 20. Tying a bottle knot

- Place a narrow fold triangular bandage under the instep immediately in front of the heel and carry the tails up on each side of the leg — the inside tail should be approximately 20 cm longer than the outside tail (1).
- Carry the inside tail across in front of the ankle, around the outside tail, behind the ankle and around the first part of the inside tail (2).
- Tuck the end of the inside tail between the first part of the inside tail and the ankle from below upward (2).
- Carry both tails down on either side of the foot tightening the loops around the ankle and foot (3).

- Pad the side arms at the top end of the splint and tie the triangular bandage over the thigh. Hitch this bandage around the end of the splint to maintain the correct position over the thigh.
- Maintain extension by tying the ends of the bottle knot to the cross bar or foot piece at the lower end of the splint.
- Pad the immediate fracture area and secure the limb by applying a 7.5 or 10 cm bandage, starting as a figure of eight around the foot and ankle and extending up around the leg and splint covering completely to the top end of the splint. It is important to maintain even pressure over the full length of the limb.
- Mark the fracture site on the covering bandage with a ballpoint pen.
- Elevate the limb (e.g. by resting the end of the splint on a small box).
- If the casualty is to be moved, secure the splint to the stretcher to limit movement.
- Loosen the triangular bandage over the top of the thigh during transport, but retie while awaiting arrival of the ambulance.

Chapter 6

LIMB INJURIES

THE HAND

WOUNDS

The hand is a very complex structure containing many muscles, blood vessels, nerves, bones and joints in a confined space. Many important structures lie just beneath the skin. For this reason, wounds of the hand require special care and attention.

Bleeding

Because of the excellent blood supply, small wounds of the hand or fingers often bleed profusely, making assessment difficult. Simple pressure and elevation for five minutes by the clock will reduce the bleeding, enabling a more accurate assessment to be made. In the case of wounds of the palm of the hand, place a large pad over the wound, fold the fingers over the pad, and either bandage or hold firmly, again for five minutes.

Injury to Nerves

Check the casualty for normal skin sensation (can feel light touch) beyond the injury. Compare the sensation with that of an adjoining finger or the other hand. Alteration, diminution or loss of sensation means a nerve may have been injured and the casualty should therefore be referred to a doctor.

Injury to Tendons

Have the casualty bend and straighten the fingers. Any loss of movement means that a tendon may have been severed. Movement

may be inhibited by pain alone; however, the casualty should still be referred for medical attention as failure to refer a casualty with a severed tendon could lead to permanent disability.

Risk of Infection

Never take any risk with infection in the hand, as the result may be catastrophic for the injured person. Infection may enter tendon sheaths or deep spaces in the hand with risk of severe deformity and disability. Early medical assessment and treatment is essential with any wound that is potentially infected (dirty) or when symptoms and signs of inflammation appear.

MANAGEMENT OF MINOR WOUNDS

- After bleeding is controlled, irrigate the wound with running water.
- If the hands are dirty, have the casualty wash the surrounding skin with soap or a proprietary cleanser.
- Inspect the wound. If in doubt about the depth of the wound, separate the wound edges by stretching the skin away on either side. Do not probe the wound.
- If wound is small, clean, neatly incised, no deeper than 3 mm and without fat protruding through the edges, proceed to dress the wound.
- If the wound edges are separated, bring them into apposition and hold together with sterile adhesive strips. Make sure the skin around the wound is completely dry, otherwise the adhesive strip will not stick, causing the wound to re-open.
- Cover all other wounds with a temporary dressing and refer immediately for medical attention.
- A cut over the back of a finger joint is a special problem, as flexion of the finger will cause the wound to open and delay healing. As the skin edges should be stitched together, the casualty should be referred for medical attention.

Bandaging

Apart from the tiny wound which can be covered by an adhesive dressing, all wounds should be carefully bandaged. A roller bandage or tube gauze, if available, is used. Loose ends of knots should be cut short and covered by adhesive tape.

If the casualty resumes dirty work, the first bandage should be covered with a second bandage, and the casualty advised to return

for replacement of the second bandage, as necessary. Alternatively, the first bandage can be protected with a soft leather finger stall, if appropriate. Casualties should not return to work where this may involve the bandages being soaked with fluid. A dressing should not be covered with a rubber finger stall or with adhesive plaster, as the skin becomes soft and soggy and healing is delayed. The wound is redressed daily. If an adhesive strip has been used to hold the wound edges together, leave it in place until the wound is fully healed. Wounds of the hand will normally heal in 7 days.

FOREIGN BODIES

Wooden or metal splinters often enter the skin of the hands. Even if they are small and superficial they should be treated. No puncture wound of the hand should be neglected, it is quite common for even a fairly large foreign body to be present and completely hidden from view.

INJECTION INJURIES

Many industries now employ various devices which, if operated in contact with the skin, inject substances such as grease, plastic and paint into the hand under great pressure.

Initially the injury may be deceptively mild (e.g. a small puncture wound with mild discomfort), but this rapidly changes to severe pain and tenderness. Apply a protective dressing and refer the casualty to hospital as a surgical emergency. Many, even with early, expert treatment, may eventually require amputation.

CONTUSIONS

Simple bruises of the hand may require no special treatment. However, because of the compact nature of the hand, a bruise often involves a joint. Where joint swelling occurs, the treatment is as for a sprain.

SUBUNGUAL HAEMATOMA

Trauma to the fingertip may lead to bleeding under the nail. When the nail appears dark blue or black and is excessively painful, the following treatment applies:

- Swab the nail with antiseptic solution.



Fig. 21 — Bleeding under the thumbnail.



Fig. 22 — Piercing the nail with a red hot paper clip.

- Straighten an ordinary paper clip and provide an insulated holder. The clip can be pushed into one end of a bottle cork to make a light, easily controlled instrument.
- Heat the free end of the clip until red hot e.g. in cigarette lighter flame or spirit lamp.
- Pierce the nail over the centre of the haematoma with the hot end of the paper clip, taking care to pass only just through the nail. If adequately heated, the clip passes easily through the nail and dark blood oozes out. The depth of the blood protects the underlying nail bed and the procedure should be painless.
- Light pressure on the nail with sterile gauze will completely express the blood, with immediate relief of pain.
- Bandage the finger for at least 24 hours to prevent reaccumulation of blood.
- Continue dressing until oozing of fluid through the hole ceases.

If there is suggestion of a fracture of the underlying bone, refer the casualty for medical attention. With such a fracture, there may be loss of movement of the fingertip and marked swelling and tenderness of the pulp (front of the finger).

SPRAINS

Sprains of all joints of the fingers are common, and are usually due to over-extension (bending back) of a finger or forced rotation of the joint. Occasionally forcing the end of a finger to one side will also produce a sprain.

Regardless of what treatment is given, recovery is often slow, and permanent disability not unusual. The resolution of swelling and return of full movement often takes several months and may be incomplete.

If it is obvious from the degree of force involved and the moderate swelling of, and pain in the joint, that a fracture or tear of the ligaments is unlikely, treat without referral.

Treatment

Note — compression is not used for finger injuries.

For all sprains

- Apply a cold compress or hold under cold running water.

Minor sprains, distal two joints

- Immobilise the finger with the joints slightly flexed by:
 - bandaging or taping a malleable metal splint (cut from sheet aluminium) to the palmar surface of the finger; the splint

needs to be no longer than the length of the finger (Fig 23); or

- taping the finger to an adjacent finger.
- The splint or taping can be removed for washing and then reapplied.
- Immobilisation should be maintained for not more than three weeks, after which active exercises are commenced.
- Powerful gripping with the hand should be avoided for one week following removal of the splint.

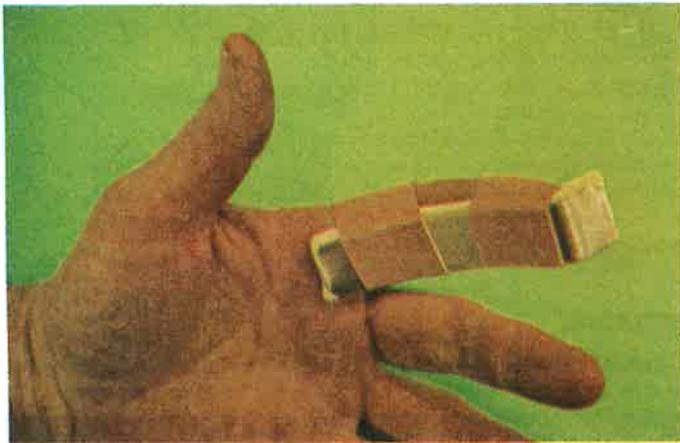


Fig. 23 — Maleable metal splint applied to finger. Padding prevents pressure of metal on skin.

Major sprains, and sprains of the proximal (metacarpophalangeal) joint

- Because of the risk of bony or ligamentous damage, all major sprains should be referred for medical attention.
- Adequate splinting of sprains of the metacarpophalangeal joints requires immobilisation of the wrist as well, so all should be referred.

Sprains of the thumb

Because of the major importance of the thumb in hand function, sprains of the thumb must be considered separately. Loss of efficient use of a thumb is a severe and crippling disability.

Most thumb sprains involve both joints. Any injury resulting in swelling of, and pain in these joints should be referred to a doctor for

full investigation and treatment.

First aid treatment is limited to the application of a cold compress before referral. If some time is likely to elapse before the casualty reaches medical aid, the application of a crepe spica bandage (see *St. John First Aid Manual*), and elevation of the arm in a sling, will ease pain.

MALLET FINGER

Occasionally, a sudden bending force to the tip of a finger may tear the tendon which extends (straightens) the last joint. If the casualty is unable to completely extend the injured finger, refer for medical advice.

DISLOCATIONS

Finger — all joints

Extreme over-extension is liable to tear the ligaments, allowing separation of the joint surfaces and displacement of the distal bone over the back of the more proximal bone. Pain is often quite severe and the deformity is obvious.

This is a common sporting injury and it is not uncommon for some lay person, even without first aid training, to reduce the dislocation. Though fractures are rare with dislocated fingers, the casualty will come to no harm by waiting for medical treatment which should include a preliminary X-ray.

Attempt reduction

- if the pain is severe;
- if there is liable to be considerable delay before medical treatment can be obtained.

Method of reduction

- Grasp the end of the finger and pull firmly along the line of the finger.
- When the joint surfaces are pulled apart, flex the distal part of the finger.
- After reduction, apply a cold compress and refer for a medical check.

Thumb

As both joints have strong supporting ligaments and as reduction of the proximal joint can be very difficult, do not attempt reduction. Apply a cold compress and refer for medical attention.

FRACTURES

Simple (closed) fractures of the fingers or hand are not a difficult first aid problem.

As there is often little or no deformity, the following steps may assist in diagnosis:

- Take an accurate history, e.g. a weight of 10 kg dropped on a finger usually causes a fracture.
- Compress the bone in its long axis — a fracture is painful, a bruise or sprain is not.
- The amount of bruising is usually greater in fractures.
- Pain persisting after 24 hours suggests a fracture is usually present.

Treatment

- As there is little or no bending force from gravity, splintage is not normally required.
- Elevate the hand, if necessary, with a sling, and refer for medical attention.

MULTIPLE LACERATIONS WITH OR WITHOUT FRACTURES

Treatment

- Elevate the hand.
- Completely cover all wounds with sterile gauze thick enough to prevent blood seeping through.
- Place a large pad or rolled bandage in the palm of the hand to maintain it in the position of function (the position of function is the position of the hand when it is grasping a tennis ball or cricket ball).
- Bandage the whole hand and wrist gently with a crepe bandage (7.5 cm), commencing at the fingertips. If bleeding is a problem, elevate the hand to see if the bleeding stops. If bleeding continues, apply a second layer of gauze and bandage again, gently but firmly.
- Keep elevated, if necessary with a sling, and refer immediately to hospital.

CRUSH INJURIES

These are usually caused by the hand being caught between rollers or gears. Extensive crush injuries involve multiple compound



Fig. 24 — Hand bandaged in position of function.

fractures with bursting injury to the skin, and damage to many other structures in the hand. Here the effect of gravity, i.e. the weight of the hand, is important and may cause increased deformity and damage.

Treatment

- Cover the whole hand with sterile gauze.
- Gently place the hand and forearm on a padded splint. Do not fold the hand into the position of function.
- Bandage the hand and splint gently but firmly with a 7.5 cm crepe bandage from the finger tips to just below the elbow.
- Elevate, use a sling if necessary, and send to hospital.

TRAUMATIC AMPUTATIONS

Occasionally a finger, fingers or even the hand or arm is completely amputated in an accident.

Treatment

- Cover the wound with several layers of gauze and apply direct pressure to stop bleeding.
- Elevate the part.
- After a few minutes, replace hand pressure by a firm bandage.
- Collect all severed parts. Wash off any loose dirt with running

water. Place them in a plastic bag or wrap them in sterile gauze or a clean towel moistened with water. If ice is available, surround the wrapping with crushed ice.

- Send the amputated part or parts to the hospital with the casualty.

With the advent of micro-surgery, it is possible to re-attach severed fingers, hands and arms. Even if the severed portion cannot be re-attached, certain structures, e.g. arteries, veins, nerves and skin, may be used for repair of the injuries. The same also applies to the lower limb and to other parts such as the nose, ears, scalp, lips and male external genitalia. When packing any severed part in ice, make sure it is not in direct contact with the ice, as it may be damaged the same way as with frostbite.

Because of the time factor involved, the sooner a part is re-attached, the greater the chance of success. The hospital should be notified by phone of the circumstances of the injury so that prior arrangement can be made before the casualty arrives. Also, a note explaining how the amputation occurred may provide extremely valuable information to the operating surgeon.

THE FOOT

The foot has the same number of bones, blood vessels, nerves and tendons as the hand. Virtually all that has been said about injury to the hand also applies to the foot. However, even with a relatively minor wound, weight bearing may cause pain and further damage. Also, it may be difficult to wear boots or shoes over a dressing. All puncture wounds of the foot should be referred for medical attention, because of the risk of infection.

FOOT INJURIES

The foot can be injured in many ways. Falling objects, falls on to the feet, kicking solid objects, are common causes of injury in the occupational situation.

Even minor foot injuries can be incapacitating. Major injuries, especially when crushing is involved, frequently lead to many months off work.

Prevention

The wearing of strong boots or shoes can do much to reduce accidental foot injury. Safety boots and shoes (Australian Standards

AS Z2-1968 and Z3-1968) incorporating protective steel toecaps are already widely used in many industries. Occupational first aiders should encourage the use of suitable footwear.

Treatment

- Carefully remove the boot or shoe and sock and assess the injury.
- If the skin is not broken:
 - I.C.E.
- If the skin is broken:
 - Cover the wound with a sterile dressing.
 - Apply a compression bandage.
 - Elevate the limb.
 - Refer all foot injuries except minor contusions and sprains with little or no swelling, for medical attention.

(Note: Compression bandaging provides adequate immobilization; splintage is not required).

INGROWING TOENAILS

The two major factors causing an ingrowing toenail are:

- attempting to cut the toenail back along and under the nail fold; and



Fig. 25 — Ingrowing toenail. Note nail cut back past the nail fold which is swollen and inflamed. Referral required.

- incorrect or small footwear causing pressure on the side of the toe.

Therefore advise:

- Let the toenail grow until the sides of the nail protrude beyond the nail folds.
- Cut the toenail straight across or even concave, leaving the sharp corners of the nail extending beyond the nail folds.
- Correct footwear — no pressure on the great toes.

This condition often causes people to cease work and attend the first aid post.

- When there is some pain and swelling but no pus, massage and stretching of the nail fold away from the nail, followed by the careful insertion of a strip of gauze, soaked in spirit, between the nail and the nail fold, may help in controlling early infection.
- If the fold of skin at the side of the toenail is inflamed and oozing pus — refer for medical attention.

UPPER LIMB

WOUNDS

Except at the elbow, wrist and lower forearm, the important structures in the upper limb are further from the skin surface than in the hand. For this reason, simple, clean, incised wounds away from these areas, up to a size somewhat larger than those on the hand, may be safely treated without referral.

However, if difficulty is experienced in opposing the wound edges with adhesive strips, refer immediately for medical attention.

CONTUSIONS

Treat with *I.C.E.*

STRAINS

Tenosynovitis of tendons in the region of the wrist

Though this condition occasionally follows a strain type of injury, it is usually caused by a rapid repetitive motion of the hand and fingers, e.g. typing, handling and sorting small objects, light assembly work,

hairdressing, etc. Workers who alternate jobs requiring repetitive motion with other work every day or two rarely develop tenosynovitis. This is an important measure in the prevention of tenosynovitis. It is more common in females than males and usually occurs in the dominant wrist, i.e. the right wrist for right handed persons and vice versa.

Symptoms and signs

- Pain, often of a burning nature, extending from the tendons involved up towards the elbow. The pain is made worse by movements involving these tendons.
- Local tenderness and swelling.
- Crepitus — grating sensation felt when the fingertips are placed over the tendons of the wrist and the casualty opens and closes the hand.

These casualties should be referred for medical attention.

Tennis elbow

This condition is neither restricted to tennis players nor do most cases arise from playing tennis. It is a common occupational injury caused by a forceful wrench (usually rotational) of the forearm, or from overuse of hand-held tools.

Symptoms and signs

- Pain (on lifting, on outward rotation of the hand and forearm against resistance, and on firm gripping with the hand) over the outside of the elbow usually radiating towards the back of the hand.
- Tenderness over the outside of the elbow.

Casualties with this condition should be referred for medical attention. Continuing to work with tennis elbow could, in some instances, be potentially dangerous as there can be a sudden failure in grip or in the forearm's lifting power.

Vibration disease of the hand and arm

Mechanical tools, e.g. pneumatic hammers, portable grinders, chain saws and vehicle controls, can cause vibration or percussion to be transmitted to the hands and arms. This may lead to the hands becoming cold, pale, blue and often painful. Cold, and the necessity to maintain a tight grip on the tool aggravate the condition.

Treatment

The first aid treatment is to warm the whole person and the part affected. This usually leads to rapid relief of symptoms and disappearance of signs. Medical attention should be sought.

SPRAINS, DISLOCATIONS AND FRACTURES

For first aid treatment of sprains, dislocations and fractures of the upper limb, reference should be made to the *St John First Aid Manual* and Chapter 4.

LOWER LIMB

WOUNDS

The principles of management of wounds are the same as for the upper limb. In the region of the ankle, there are many tendons just beneath the skin surface and these may easily be damaged.

CONTUSIONS

I.C.E.

STRAINS

A strain of the calf muscles is a fairly common injury, characterised by the sudden onset of pain in the calf (made worse by walking or squeezing) and swelling of the affected area.

Treatment

- *I.C.E.*
- Refer for medical attention.

SPRAINS

Ankle

It is often very difficult to differentiate between a sprained ankle and a fracture. If there is pain on the application of thumb pressure over the tip of the lower end of the fibula (lateral malleolus) or tibia (medial malleolus), a fracture is likely to be present. If in doubt, the casualty should be referred for medical attention.

Treatment

I.C.E. Elevation should be continued for ½-1 hour for minor sprains. With firm compression bandaging, the casualty may then resume weight bearing. However, if there is pain on weight bearing or the pain is more severe on the following day, the casualty should be referred for medical attention.

Knee

Knee injuries at work are common. The diagnosis of the injury, e.g. bruising, torn ligament or cartilage damage, is unimportant from the first aid point of view. The First Aid management is the same in all cases.

Treatment

- *I.C.E.*
- If swelling of the knee occurs rapidly (within 15-30 minutes), severe injury, with bleeding into the joint, must be suspected. In these cases, a temporary compression or a Robert Jones bandage should be applied and the casualty referred for medical attention.
- A more gradual swelling of the knee suggests fluid within the joint or in the superficial tissues. In these cases, medical advice should still be sought, although it is not as urgent.

Hip

Because of the large muscle mass and strong ligaments surrounding the joint, sprains of the hip are rare.

FRACTURES

Major fractures of the lower limb are uncommon in occupational situations. A considerable problem in such fractures can be the location of the casualty at the time of the fracture (e.g. in the hold of a ship, on scaffolding).

Application of adequate splintage is required before attempting to move the casualty, to ensure further tissue damage and blood loss do not occur. Special stretchers and splints should be available where rescue from difficult situations is likely to be required.

VARICOSE VEINS

Varicose veins are the dilated, tortuous, thin walled veins (varicosities) of the lower limbs usually visible on the skin surface. The cause of varicose veins is not definitely known. However, occupational situations such as prolonged standing in one spot may aggravate the condition with increase in the number and size of varicosities. Occupational trauma also causes complications (bleeding, ulceration and thrombosis [clotting]).



Fig. 26 — Varicose veins of the leg with pigmentation and ulceration.

Bleeding

As the veins are located just under the skin, trauma may cause the vein wall to rupture with extensive bleeding under the intact skin, or profuse bleeding through a laceration or abrasion.

Treatment

Treatment comprises pressure and elevation.

Ulceration

In some people with varicosities, a major complication is ulceration, especially on the inside aspect of the leg above the ankle. The skin is often scaly and pigmented (brown) and even minor trauma can give rise to the rapid development of a major ulcer.

Treatment

- ointments have no place in treatment;
- apply a sterile non-adherent dressing;
- bandage firmly from the base of the toes to the upper calf; and
- refer for medical advice.

Thrombophlebitis

Trauma may also cause clotting (thrombosis) in varicose veins. The veins become hard, knotty and painful, and the overlying skin may be hot and red.

Treatment

- Apply a firm compression bandage and refer for medical advice.

Chapter 7

INJURIES TO THE TRUNK, HEAD AND NECK

CHEST INJURIES

The chest comprises the thoracic spine behind, the ribs on each side and in front, and the sternum in the midline at the front. The ribs are connected and covered by muscles and ligaments. This framework contains the heart, great vessels and the lungs. It is closed below by the diaphragm and, because of the dome shape of the diaphragm, the ribs also overlap and protect the liver, spleen and part of the stomach.

Integrity of the chest is essential for the supply of oxygen to the body.

Interference with the normal function of the chest may have serious results.

CLOSED CHEST INJURIES

MINOR

Trauma to the chest may cause simple contusion of the chest wall or fracture of one or more ribs. The greater the force of injury, the more likely a fracture rather than contusion.

Symptoms and signs

A minor contusion will be mildly painful and tender. More severe contusions and simple rib fractures are identical from the first aid point of view. They cause:

- pain, especially on deep breathing and coughing;
- tenderness, often marked, over the injured area;
- rapid shallow breathing, using the diaphragm rather than the chest.

Treatment

Minor contusions will not normally require any treatment, although a cold compress may help.

More severe contusions or simple rib fractures usually require no treatment, as the casualty splints the chest by shallow breathing.

- Sit the casualty up — leaning towards the injured side may ease pain.
- If the pain is severe or if jolting may occur during transport, the application of a broad triangular bandage and a sling to the arm on the side of the injury may be of value — see *St. John First Aid Manual*.
- Refer the casualty for medical attention.

MAJOR

Chest injuries are major if there are multiple fractures (flail chest, stove-in chest) or if there is injury to deeper structures.

Flail or stove-in chest

This is a relatively rare but very serious injury in which several ribs on one or both sides of the chest are fractured. Some occupational causes are:

- loading dock injuries when a person is crushed between a vehicle and the loading dock;
- railway siding injuries when a person is caught and crushed between the buffers of shunting railway wagons;
- waterside injuries when a person falls between a boat and the wharf and is crushed as the boat moves against the wharf;
- compression against the steering wheel in a motor vehicle accident;
- a fall from a height.

Symptoms and signs

- marked pain;
- shallow and rapid breathing;
- often cyanosis (blueness of the lips and nail beds) is present;
- paradoxical breathing (i.e. part of the chest wall moves in on inspiration and out on expiration, in relation to the rest of the chest wall) may be present.

Treatment

- It is virtually impossible to stabilise a flail or stove-in chest by first aid. A large pad over the area, secured round the chest by a broad triangular bandage or held by the open hand may ease pain and improve breathing.

- Sit the casualty up inclined towards the injured side.
- Give oxygen if available.
- Commence Expired Air Resuscitation if breathing fails.
- Transport the casualty to hospital urgently.

Pneumothorax

Where a broken rib has pierced the lung, a pneumothorax, i.e. air in the pleural cavity with collapse of the lung, may result. This condition is not normally diagnosed by the occupational first aider.

Symptoms and signs will be the same as for a simple fracture, but the casualty will be distressed and short of breath. The casualty should be sent urgently to hospital because pressure may build up inside the chest (tension pneumothorax), causing increased shortness of breath and eventually, death.

Internal bleeding with chest injuries

Internal bleeding may be:

- into the chest, causing partial collapse of the lungs as well as blood loss (often a pneumothorax is also present);
- into the abdomen with lower chest injuries, due to rupture of the liver (on the right side) or spleen (on the left side).

The casualty may present with symptoms and signs of circulatory collapse. Partial collapse of the lungs will add to the respiratory distress. Urgent evacuation to hospital is essential.

Treatment

- Give oxygen if available.
- Commence Expired Air Resuscitation if breathing fails.

Summary

Minor contusions:

- no treatment (but if painful a cold compress may help).

Minor rib fracture (or major contusion):

- no treatment and refer; or
- standard first aid and refer.

All major injuries:

- give oxygen if available;
- assist breathing if required;
- send urgently to hospital.

OPEN CHEST INJURIES

These injuries are rare and the classical 'sucking wound of the chest' is rarer still. Most penetrating wounds of the chest do not

'suck', as the hole is sealed off by the damaged tissue in the chest wall.

Treatment

The treatment in either case is the same:

- Rapidly place a pad (preferably a non-adherent dressing) over the wound, fix it securely with a broad triangular bandage and evacuate casualty to hospital. The major danger to life is blood loss (into the chest) from injury to deeper structures.

BLAST INJURIES

In an explosion or blast situation, the increased pressure in the lung's air passages may cause rupture of the air sacs. This interferes with the normal gaseous interchange (oxygen and carbon dioxide) between the air in the lungs and the blood. The casualty has difficulty in breathing, may be cyanosed (blue), and the veins in the neck and on the head may stand out.

Treatment

- Administer oxygen if available.
- Commence E.A.R. if breathing fails and consciousness is lost.
- Send urgently to hospital.

ABDOMINAL AND PELVIC INJURIES

These are no more common at the workplace than in any other walks of life. The general principles of treatment already learnt in the standard first aid course should be applied.

WOUNDS

Simple superficial wounds are dealt with in the same way as wounds on limbs. In the case of deeper wounds (e.g. stab wounds), penetration of the abdominal wall, with perhaps injury to deeper structures, should be considered. The wound is dressed rapidly and the casualty sent urgently to hospital.

CONTUSIONS

Simple minor contusions of the abdominal wall require no treatment. However, where the force has been considerable and the pain is severe, internal injury should be suspected.

STRAINS

With heavy lifting, most strain injuries occur in the back muscles. Abdominal muscle strain, especially in the lower abdomen and groin, can also occur. The only symptom is pain made worse by activity. There is no first aid treatment. If there is inflammatory disease within the abdomen, lifting, with contraction of the abdominal muscles, may cause pain. Therefore, if the pain is out of all proportion to the injury, particularly if there is also nausea and vomiting, the casualty should be referred for medical attention. Nausea and vomiting never occur with simple muscle strains. With any strains in the groin adequate records should be made, because of compensation requirements if a hernia appears later.

INTERNAL INJURIES

Severe blows to the abdomen may either rupture a portion of the bowel and/or cause internal bleeding.

With rupture of the bowel, leakage of bowel contents into the peritoneal cavity leads to severe pain and rapid shallow chest breathing. The casualty is usually cold, pale and sweating. Any movement tends to increase the pain so the casualty lies still, often with drawn up knees.

With internal bleeding, the symptoms and signs of circulatory collapse appear when sufficient blood has been lost. Before these appear, pain may be the only symptom. Therefore, with any severe injury to the abdomen, the casualty should be sent urgently to hospital.

Treatment

- Lay the casualty down.
- Keep comfortably warm.
- Provide reassurance.
- Give nothing to eat or drink.
- Give oxygen, if available, for respiratory distress or circulatory collapse.
- Evacuate urgently to hospital.

BACK INJURIES

Back injury is the largest single cause of occupational incapacity in the Australian workforce.

Though severe injuries involving damage to the spinal cord with consequent permanent paralysis (paraplegia and tetraplegia) do occur in occupational accidents, the vast majority of workers incapacitated by back injury are suffering from a strained back.

Approximately 20% of occupational injuries requiring time off work are due to a strained back. Often they are caused by incorrect lifting techniques.

Back injuries can be prevented. It is extremely important for occupational first aid officers to be familiar with all aspects of employment which, if incorrectly carried out, may result in back injury.



Fig. 27 — Incorrect lifting technique — load away from the body.

Predisposing factors in back injury

Lifting:

- with a bent back;
- with a load some distance from the body;
- with a 'cold' back;
- with a rapid jerk;
- with a twist of the body due to inadequate work space;
- then losing balance while lifting;
- too heavy a load;
- an unexpectedly heavy load;
- a moderate load too many times, too rapidly;



Fig. 28 — Correct lifting technique.

- and carrying a load too far;
- a load too high;
- when physically unfit or untrained.

Pulling or pushing:

- with a bent back;
- with a rapid jerk;
- and losing balance;
- at awkward heights and angles.

By knowing and understanding these factors, the occupational first aider will be able to give advice on how to avoid injury. When there are factors outside the control of the individual worker, management should be notified.

Prevention of back injury

- Keep the back straight — bend and lift with the legs.
- Keep the feet as close to the load as possible.
- 'Loosen up' the back before lifting.
- Lift evenly and smoothly — do not jerk.
- Do not lift and twist at the same time.
- Make sure the feet are well placed and secure — do not lift, pull or push on a littered or slippery floor;
- Do not lift too heavy a weight.
- Get help or mechanical aid when necessary.
- Avoid muscle fatigue by not lifting a load too many times or too rapidly, and by carrying a load for the minimum distance.
- Check where the load has to be carried and where it is to be placed.
- Check the load for nails, sharp edges, grease and other hazards.
- Grip the load with the palms of the hands and the base of the fingers — avoid using the fingertips.
- Pull or push
 - with a straight back;
 - without jerking;
 - with the feet firmly placed;
 - between waist and shoulder level;
 - straight ahead or back only.

A physically untrained person commencing work or a worker returning after a period of incapacity should not be expected to lift, pull or push the same load at the same rate as a fit and physically trained person. Manpower is a most inefficient means of lifting and moving heavy loads. Mechanical aids should be used whenever possible.

Work space should be well planned and adequate for the job. Floors should be kept clean, tidy and dry. Pieces of wood, metal and other debris cause accidents. Where floors become wet or slippery, lifting should be minimised.

BACK INJURIES DUE TO LIFTING — THE STRAINED BACK

The strained back may involve injury to muscles, ligaments or intervertebral discs. However, the diagnosis of which anatomical structure is involved is of no importance to, and quite beyond the diagnostic capabilities of, the first aid officer.

Symptoms and signs

- Not all casualties have symptoms and signs immediately after lifting or twisting. Symptoms may not appear until the following day.
- With recurrent back strains, symptoms and signs may appear after an apparently trivial movement.
- Pain is diffuse rather than localised.
- Pain may radiate into the groin or down a leg.
- Coughing and sneezing may aggravate the pain.
- Stiffness is usually present. Inability to bend forward is almost always present. At times the casualty will be almost unable to move and will have difficulty in walking.
- There is little local tenderness and no local swelling.
- Pins and needles may be felt in one or both legs.

Management

As most workers with a strained back require time off work, they should be referred for medical attention.

A worker with back strain should not be treated with a ray lamp or liniment, and encouraged to continue working. This is likely to increase the resultant time off work.

BACK INJURIES DUE TO DIRECT TRAUMA

These may result from a moving object striking the back or the moving back striking a stationary object (including falls).

Minor injuries

The injury may appear trivial but on cooling down after ceasing work, and especially the next day, symptoms and signs may become marked. The actual injury is contusion of the back muscles.

Symptoms and signs

- Pain localised to the area of trauma.
- Local tenderness.
- Occasionally, local swelling and visible bruising.
- Muscle stiffness.

Treatment

- Apply ice packs immediately.
- Apply heat (ray lamp, hot shower) the following day, and subsequently.
- Exercise gradually.
- Refer for medical attention if there is doubt as to the severity of the injury.

Major injuries

These include injuries to the spine and spinal cord. There may also be multiple injuries to other parts of the body. An unconscious casualty may also have a back injury, in which case the back injury takes second place after the treatment of life-threatening injuries.

There is a history of severe trauma.

Symptoms and signs

- Immediate onset of pain and restriction of movement.
- Local tenderness and swelling.
- The casualty may be frightened to move.
- The casualty may be paralysed below the level of injury.
- There may be numbness or tingling or loss of sensation to touch or pain, or paraesthesia (altered sensation) of the body below the level of injury.
- The casualty may feel 'cut in two'.
- Bruising, abrasion or laceration of skin may be present.
- At times the symptoms and signs of back injury are masked by symptoms and signs of injury to other parts of the body.

Management

- Move the casualty only if in immediate danger.
- Treat life-threatening injuries first.
- Assess spinal cord injury by testing for sensation and active movement below the level of the injury.
- Send for an ambulance to transport the casualty to hospital.
- If the casualty must be moved before the ambulance arrives, move gently, avoiding extension or flexion of the spine — a firm stretcher is essential.
- Treat injuries to other parts of the body.

At times it may be necessary to move the casualty ignoring any potential or actual damage to the spinal cord, e.g. to carry out Expired Air Resuscitation or Cardio-Pulmonary Resuscitation.

REHABILITATION

When a person returns to work after a period of incapacity from a back injury, discuss with him how his work habits might be modified to prevent recurrence of the injury.

HEAD AND NECK**OPEN INJURIES****Wounds**

The occupational first aid officer should not treat wounds of the head and neck by himself. Standard first aid treatment only should be applied before referring the casualty for medical attention.

- All wounds bleed profusely and, although temporarily controlled by pressure, they may require surgical ligation of blood vessels for permanent control.
- All wounds tend to gape widely, and suturing is required to prevent disfiguring scars.
- The eyelids, nose, mouth and ears present special problems in management.
- Wounds near the mouth and nose may compromise the airway.
- In the neck, major structures lie close beneath the skin surface.
- On the scalp, bleeding tends to mat the hair, making inspection of the wound difficult.
- Dressing and bandaging are difficult.

CLOSED INJURIES**Contusions****Face**

Even minor contusion of the face may result in major swelling; especially in the vicinity of the eyes.

A cold compress applied soon after the injury, limits and often completely prevents this complication.

In more severe injuries, the facial or nasal bones may be fractured, and swelling of the tissues often completely hides deformity.

If a fracture of the facial bones is suspected, refer the casualty for medical attention immediately

Neck

Direct trauma to the front of the neck may, in addition to causing local bruising, damage the air passages. Although there may be no respiratory difficulty at the time, this could develop due to progressive swelling of the tissues. Refer the casualty for medical attention immediately.

Strains

Neck

A strain of the neck may lead to acute pain and stiffness. In addition:

- the head may be tilted to one or other side by muscle spasm;
- pain is constant and may radiate down into the shoulders and arms;
- head movement is limited, especially in rotation;
- pins and needles may be felt in the hands.

As the condition is very painful, at times totally disabling, and may take a long time to recover, the casualty should be referred for medical attention.

Fractures

Neck

These may be caused by:

- direct trauma;
- falls, especially on to the head;
- whiplash injury in motor vehicle accidents.

Mechanism of whiplash injury

A stationary vehicle is hit from behind by a moving vehicle. The body moves suddenly forwards and, unless prevented by a head rest, the head whips back into hyperextension.

Minor whiplash injury results in muscle and ligamentous strain. Pain and stiffness often increase over the following days and may last for months.

Major whiplash injury may result in an unstable fracture of the cervical spine with potential or actual damage to the spinal cord.

In all fractures of the cervical spine, there is risk of damage to the spinal cord resulting in tetraplegia (paralysis of the arms, trunk and legs and also of some muscles of respiration).

Potential or actual spinal cord damage should be suspected in the case of:

- severe injury;
- severe pain;
- tingling or numbness, especially in the hands and arms;
- the casualty being unable to move legs or arms.

Management

- Move the head and neck as little as possible.
- Hold the head in the mid-position with the neck moderately extended, not tilted forwards or backwards or turned to either side.
- Support the head and neck in this position by the use of sandbags on either side of the head and/or by the application of commercial first aid collar, or a cervical collar made of folded newspaper or a folded towel.
- Only move or tilt the head if it is absolutely necessary to save life, e.g. if the airway is obstructed or Expired Air Resuscitation or Cardio-Pulmonary Resuscitation is required.
- Send for an ambulance immediately and stay with the casualty.
- If the casualty must be moved, use a firm stretcher and constantly support the head and neck while moving the casualty on to the stretcher.

Chapter 8

BURNS AND SCALDS

Excessive heat damages and destroys body tissues. The degree of heat, the length of exposure and the area of the body surface burnt are the important factors, not the burning agent. The higher the temperature and the longer the exposure, the greater will be the depth of the burn. The larger the area of body surface involved, the greater will be the risk to life.

- Burns exceeding 10% of the body surface are dangerous.
- Burns exceeding 50% of the body surface are often fatal.

CLASSIFICATION OF BURNS

- Superficial — partial skin thickness burn.
- Deep — whole skin thickness burn (with or without damage to deeper structures).

CAUSES OF DEATH AND DISABILITY

These are:

- circulatory collapse;
- infection;
- respiratory distress.

CIRCULATORY COLLAPSE

Serum pours out from damaged capillaries in the burnt area and appears as blistering, swelling of the tissues under the skin and weeping from raw areas. Enough fluid may be lost from the circulation for the signs of circulatory collapse to appear.

Fluid loss is not related to the depth of the burn. Except where the

burn consists of redness of the skin only, as much fluid is lost from superficial burns as from deep burns.

Fluid loss is relatively slow in comparison with bleeding, and it is at least two hours, and usually close to four hours, before signs of circulatory collapse are apparent even in the most major burns. Within this time, it should be possible to transport the casualty to hospital or hand him over to a trained ambulance officer.

Adults with burns exceeding 15% of their body surface will normally require intravenous infusion of fluids. The sooner the casualty reaches hospital the sooner will intravenous fluids be given and the lower will be the incidence of death and serious illness.

INFECTION

With burns, bacterial infection is the most important factor in death, and the major cause of prolonged illness and permanent disability. First aid treatment is all-important in their prevention.

Infection:

- delays local healing;
- destroys live tissue cells and may convert a superficial burn into a deep burn;
- causes failure of skin grafting;
- may liberate toxins into the blood stream causing general illness;
- may invade and attack deeper tissues;
- may cause septicaemia and death.

Burns are sterile but, as with any open wound, they are very liable to infection by bacteria. Infection can be transmitted from the hands and respiratory tracts of the first aid workers, from unsterile dressings, and especially from blankets.

In occupational first aid, sterile dressings and a sterile sheet should always be available.

RESPIRATORY DISTRESS

This may be due to smoke inhalation, the inhalation of hot gases or burns of the face, mouth and upper air passages.

Smoke inhalation

The lungs may be damaged interfering with the passage of oxygen from the air sacs (alveoli) to the lungs. Oxygen, if available, should be given. Casualties with smoke damage to the lungs may appear to get

better, but after this initial period of apparent recovery their condition may start to deteriorate. *For this reason, all smoke casualties must be sent to hospital as soon as possible.*

Inhalation of hot gases or burns of the face, mouth and upper air passages

Here the problem is respiratory obstruction due to progressive swelling of the tissues of the air passages (Fig. 29). Urgently evacuate the casualty to hospital without waiting for signs of obstruction to appear. Oxygen, if available, should be given for respiratory distress.



Fig. 29 — Superficial and deep burns of the face and mouth. Swelling of the lips, tongue and nose could cause airway obstruction.

MANAGEMENT OF BURNS

RESCUE

Unless he is the only person on the scene, rescue should not be the duty of the first aid officer. He must be available to provide first aid treatment following rescue.

IMMEDIATE TREATMENT

- Douse the burnt area with copious quantities of cold water or immerse the area in cold water for at least 10 minutes by the clock.
- Remove any easily removable clothing. Do not pull off clothing adherent to the skin as skin may also be torn off with the clothing.
- Remove any rings, bracelets or belts.
- Do not touch the burnt area with the hands, or talk or cough over the area.



Fig. 30 — Superficial burn of the hand — blistered skin removed. Note the large open wound liable to infection.

ASSESSMENT

Area

- Use the "rule of nines".
- For smaller burns, an area covered by the front of the casualty's hand and fingers represents 1% of the body surface.

Depth

- Inspect the burn in a good light.

Symptoms and signs — superficial burns

- Simple redness of the skin.
- Marked pain.
- Blistering.



Fig. 31 — Superficial burn of the foot with blistering. Note how much fluid is lost to the body from a burn of under 1% of the body surface.

Symptoms and signs — deep burns

- Less pain.
- Skin dark brown or black and leathery hard.
- Skin brownish yellow with a dead white background.
- Skin dead white without scorching due to prolonged exposure to a lower temperature.



Fig. 32 — Deep burn of the back and neck. Colour varies from off-white to black.

It is often extremely difficult to estimate the depth of a burn. The history of burning may help:

| BURNING AGENT | TIME OF EXPOSURE | TYPE OF BURN |
|----------------------|------------------|--------------|
| Hot or Boiling Water | Short (1-2 sec) | Superficial |
| Hot or Boiling Water | Long | Deep |
| Steam | Short | Superficial |
| Steam | Long | Deep |
| Boiling Fat or Oil | Short or Long | Deep |
| Molten Metal | Short or Long | Deep |
| Flash Burn | Short | Superficial |
| Flame Burn | Short | Usually Deep |
| Flame Burn | Long | Deep |
| Electrical Burn | Short or Long | Deep. |

FURTHER TREATMENT

If the burn is:

- deep;
 - superficial and larger than 6 sq cm;
 - badly blistered;
 - on the fingers or hand (except the most minor burn);
 - on the face;
- medical attention is required.

Using sterile forceps, cover the burn with:

- sterile non-adherent dressings, sterile gauze or sterile sheet.

If the burn is on a limb:

- reinforce the dressing with gauze squares or combine dressings;
- bandage lightly;
- elevate the limb;

Send the casualty immediately to hospital.

If the burn is small and not in one of the above groups, it should be treated as follows:

- Wash and dry your hands.
- Swab the burnt area and surrounding skin with antiseptic solution.
- Leave for at least two minutes and then dry with sterile gauze.
- Puncture blisters with the point of sterile scissors.
- Cover the burn with a 10 cm square non-adherent dressing.
- Reinforce with at least 4 layers of sterile gauze.
- Bandage or fix securely with adhesive tape.

With most small burns, the casualty will be able to return to work. It is essential that the dressing be kept dry.

- First redressing:

This should be done about four days after injury. Remove and replace the bandage and reinforcing gauze. Do not touch the non-adherent dressing. Redress with gauze and bandage.

- Second redressing:

This is done approximately seven days later. The burn should be healed and the non-adherent dressing should come off easily. If it is not completely healed, redress and leave for a further few days. If at any time there is any evidence of infection, refer for medical attention. If the outer dressings become wet or dirty, replace as required using the same technique as for the first redressing.

BURNS OF SPECIAL TYPES

ELECTRICAL BURNS

These may be:

- due to electric flash. There is no actual contact between a live object and the body. The skin may be blackened giving the appearance of a severe burn, but, when washed, it may be almost undamaged.
- due to contact with hot elements (e.g. radiators). This causes a pure heat burn and is treated as such.
- true electrical burns. These are due to arcing or direct contact of the skin with a live object. With arcing, a small deep burn occurs at the point of entry only. With direct contact, burning occurs at both the points of entry and exit of the current but the major damage usually occurs at the point of entry.

Damage is due to the heat generated by the passage of the current and the direct effect of electricity on the body tissues.

Low tension burns are usually deep and localised to the point of contact. High tension burns are also deep at the point of contact but may, as well, extend up the centre of a limb, causing major damage to blood vessels, nerves and muscles.



Fig. 33 — Electrical burn of the hand.

The burnt skin is white and opaque, may be scorched and blackened, and the superficial layers are often raised and loose.

Management

- First treat the life threatening effects of electricity.
- Then treat as for any other deep burn.

CHEMICAL BURNS

Many more chemical burns occur in the occupational than in the general first aid situation. All occupational first aid officers should be fully informed of the dangerous chemicals used in their workplace, the first aid treatment of the effects of these chemicals, safety



Fig. 34 — Chemical burn of the back of the knee. Superficial skin destruction has occurred.

measures required for their use, and methods used in the rescue of casualties. This information may have to be obtained from the chemical suppliers.

Chemicals commonly causing burns are:

- strong acids
 - sulphuric;
 - hydrochloric (spirits of salts);
 - nitric;
 - hydrofluoric (hydrogen fluoride);
- strong alkalis
 - sodium hydroxide (caustic soda);
 - potassium hydroxide (caustic potash);
 - calcium oxide (lime);
- phenols
 - phenol;
 - lysol;
- phosphorus.

Treatment

- Remove all contaminated clothing immediately.
- If lime is the chemical involved, remove any solid particles still on the skin.
- In all cases, wash the affected area with large quantities of running water for at least 10 minutes by the clock.
- Then inspect the contaminated area under a good light.
- If skin damage has occurred, dress as for burns due to heat.
- Send all casualties to hospital as soon as first aid treatment is completed. Chemical burns are often deep, and damage may still be occurring even though all the surface chemical has been removed.

Hydrofluoric acid (hydrogen fluoride)

Where workers are at risk, it is recommended that occupational first aid officers be familiar with the NH & MRC approved *Occupational Health Guide — Hydrogen Fluoride (Hydrofluoric Acid)*.

Note that:

- Important sources of exposure occur in aluminium smelting, welding, fertiliser production, fluorocarbon and fluoride production, metal refining and the pickling, etching and polishing of glass and pottery, and uranium enrichment.
- Hydrogen fluoride in both gaseous and aqueous form is strongly corrosive and causes severe and painful burns to the skin, eyes and mucous membranes. Skin burns from a dilute solution (1%–20%) of hydrofluoric acid may not be immediately painful or visible. The first symptom is a delayed throbbing, burning pain which is followed by localised death of skin, deeper tissues and

blood vessels, that may penetrate to bone. Contamination around the nails can give rise to a painful infection which may require amputation of the finger. Healing of the affected area is usually slow.

- Workers exposed to hydrofluoric acid must be made aware of the delayed effects so that treatment is commenced immediately following skin contact, not when symptoms appear.
- Exposure of the eyes to hydrogen fluoride causes a burning sensation with redness and watering of the eyes. Splashes of dilute acid rapidly cause severe eye damage.
- Inhalation of hydrogen fluoride causes an intolerable prickling, burning sensation in the nose and throat with cough and pain beneath the breastbone. Nausea, vomiting, diarrhoea and ulceration of the gums may also occur. In low concentrations, irritation and dryness of the nasal passages, bleeding from the nose and sinus disorders may result. Exposure to high concentrations may cause laryngitis and bronchitis. Pulmonary oedema, a life threatening collection of fluid in the lungs, may occur 12 to 24 hours after exposure.

Treatment

Speed in removing the casualty from the contaminated atmosphere and in removing hydrofluoric acid from the skin is of primary importance.

Treatment must be started immediately, and the casualty referred to a doctor even when the injury seems slight.

skin

- Remove all contaminated clothing.
- Wash the contaminated area under copious amounts of running water for at least 10 minutes by the clock.
- Wash your own hands and dry them on a paper towel.
- Apply *calcium gluconate gel** on and around the contaminated area and massage it in with the fingers.
- Continue massage with repeated application of calcium gluconate gel until 15 minutes after the pain has completely disappeared or until medical treatment is available.
- Evacuate the casualty to hospital.

*Information regarding the source of supply of Calcium Gluconate gel may be obtained from the occupational health authority in each State or Territory (see Appendix I).

eyes

- Irrigate immediately and copiously with water for at least 20 minutes by the clock. (See Page 137 for method of eye irrigation.)
- Evacuate the casualty to hospital.

respiratory tract (inhalation)

- Rescuers must wear respiratory apparatus for protection.
- Immediately transfer the casualty to an uncontaminated atmosphere.
- If breathing has stopped, commence Expired Air Resuscitation (or Cardio-Pulmonary Resuscitation if the heart has also stopped).
- If breathing is still present, lay the casualty down, keep him warm and comfortable and administer oxygen if available.
- Examine the skin for burns, and treat as above.
- Evacuate urgently to hospital.

Under no circumstances must any casualty who has been exposed to hydrogen fluoride in any form be allowed to go home or to return to work until he has been seen and declared fit by a doctor who is aware of the hazards and the nature and extent of the exposure.

FRICTION BURNS

Contact of the skin with a fast moving surface, e.g. a revolving wheel, may generate enough heat to cause a burn. Usually the skin will be abraded mechanically so that the major damage will be the abrasion, not the burn. In all but the most minor injuries, apply a dressing and refer for medical attention.

CAUTIONS IN BURN MANAGEMENT**Do not:**

- apply any lotions, ointments or oily dressings;
- remove any clothing adherent to skin;
- give anything by mouth to a burn casualty who is being evacuated to hospital. Only in the rare instance where there will be a delay of hours before the casualty reaches hospital should small amounts of water or tea be given to drink.

MINIMAL BURNS

These are superficial burns which, although only covering a small area, are often very painful. This is the only type of burn which may be treated by the application of a mild antiseptic cream. It should then be covered with a small adhesive dressing.

Chapter 9

PHYSICAL ENVIRONMENT — HEAT, COLD AND ELECTRICITY

In many occupational environments it is not possible to maintain the temperature and humidity within the optimum range.

The Departments of Labor and Industry in each State lay down standards for ventilation, air supply, temperature, air movement and humidity. In industry, therefore, illness and injury due to environmental heat and cold are relatively rare.

HEAT

The range of occupations where excessive heat may be experienced is considerable, extending, for example, from iron and steelworks to the workshop located in an unlined galvanised iron building where welding, and internal combustion engines etc., add to the surrounding temperature.

Normal body temperature is maintained at approximately 37°C.

Heat is produced by body metabolism and lost by:

- radiation from the skin surface,
- convection, i.e. carried directly away by movement of the surrounding air;
- evaporation of sweat from the skin;
- expired air.

Other factors influencing body temperature are:

- the more muscular activity in working the more the heat produced;
- the higher the environmental temperature, the less heat is lost by radiation and convection;

- when the environmental temperature exceeds 37°C, the only mechanism available to keep the body temperature down is the evaporation of sweat;
- When humidity is high, the evaporation of sweat is reduced; hence a hot humid environment is more likely to cause heat stress, particularly when hard physical work is involved.

FLUID INTAKE

When working in hot humid environments, large quantities of water are required to replace the sweat lost; at:

- 24°C approx. 4 litres per 24 hours is required;
- 30°C approx. 7 litres per 24 hours is required;
- 35°C approx. 10 litres per 24 hours is required.

SALT INTAKE

Salt is lost in sweat but this can be adequately replaced by adding salt to food eaten; salt tablets should not be used. Proprietary preparations containing salt and other electrolytes are available but should only be used on medical advice.

HEAT ILLNESS

Factors involved in heat illness are:

- environmental temperatures approaching or exceeding 37°C;
- high humidity (decreases evaporation of sweat);
- hard physical work (increases heat production);
- inadequate ventilation (increases local humidity round the body);
- insufficient water intake;
- insufficient salt intake;
- lack of acclimatisation (inefficient sweating with excess salt in the sweat).

Three types of heat illness occur:

- heat cramps;
- heat exhaustion; and
- heat stroke.

Heat Cramps

If the salt lost in the sweat is not replaced, cramps of the abdominal and limb muscles may occur.

Prevention:

- Increase salt intake by adding more salt to the food.
- Proprietary electrolyte preparations — only on medical advice.

Treatment

- As for prevention.

Heat exhaustion

This is mainly due to fluid loss by sweating and respiration which has not been adequately replaced. Salt also is lost but the effect is minor in comparison with the loss of water. Heat exhaustion often comes on gradually over a period of days or weeks as the worker gradually becomes dehydrated.

Symptoms and signs

early

- Progressive loss of energy and drive with inability to perform work.
- Loss of appetite (sometimes for weeks).
- Headache, often severe.

late

- Cold, clammy, pale skin.
- Rapid, weak pulse.
- Nausea and vomiting.
- Increased respiratory rate.
- Normal or subnormal temperature.
- Collapse may occur.

Prevention

- Adequate intake of water. Though thirst is the usual indicator of how much water is required, a person's thirst is quenched before fluid losses are fully replenished. Frequent drinking must be encouraged.
- Adequate salt in the diet.
- Acclimatisation

Treatment

This is basically rehydration and rest.

- Remove to a cool environment.
- Rest.
- Give plenty of water to drink, but not too rapidly as vomiting may occur. A level teaspoon of salt may be added to the first 600 ml of water. Too much salt may cause vomiting.
- Sponge with cold water and fan to encourage evaporation or place under a cool (not cold) shower.
- If collapse occurs seek medical aid urgently.

Heat Stroke

Heat stroke is a life-threatening medical emergency. If not recognised and treated energetically, there is a real possibility that the casualty will die. Although it may, heat stroke in most cases does not follow heat exhaustion. The cause is the loss of body temperature control, not dehydration as in heat exhaustion. Sweating ceases and the temperature rises precipitously. People over the age of 50 are particularly liable to develop heat stroke but it can also occur in young healthy individuals exposed to prolonged heat and physical exertion.

Whenever a workman collapses in a very hot, humid atmosphere, suspect heat stroke.

Symptoms and signs

- Dizziness, weakness and headache.
- Irritational, sometimes wild behaviour.
- Occasionally, generalised convulsions.
- Hot, dry skin.
- Rapid, full (bounding) pulse.
- Later ominous signs indicating very severe illness are — ashen grey skin colour and rapid weak pulse.
- High temperature (over 40°C).
- Loss of consciousness (with little warning) in over 50% of cases.

Treatment

- Move the casualty to a cool place.
- Remove clothing.
- If unconscious, place in the coma position and maintain an open airway.
- Reduce body temperature urgently with:
 - cold water (ice cold bath preferable);
 - cold shower;
 - fans.
 (Vigorous massage of the skin while applying water and fanning will increase the rate of cooling.)
- If conscious, sips of water may be given but remember the problem is very high temperature due to cessation of sweating, not dehydration.
- Seek medical aid urgently.

Prevention

The only prevention is to limit the time workers spend doing hard physical work in hot, humid atmospheres. Elderly, physically unfit, and unacclimatised persons should not work in these conditions.

For more details information on this subject, refer to the NH & MRC recommended document "Effects of Heat on Health, Comfort and Performance".

PRICKLY HEAT

This usually presents as an itchy rash with multiple red, slightly raised dots. It occurs most commonly in the groins, in the armpits, behind the knees and under the waistband of trousers although any part of the body may be affected.

A less common variety is a non-itchy papular (raised dots but not red) rash which is important as it may progress to heat stroke.

Prickly heat is due to blockage of the sweat ducts with retention of sweat under the skin.

Treatment

- Apply calamine lotion to relieve itching.
- Dabbing with methylated spirits may be helpful.
- A cool shower or bath followed by brisk rubbing with a towel may help open the blocked sweat ducts. Use plain water; soaps and detergents may make the condition worse.
- If possible, the person should be moved to a cooler environment (e.g. an air-conditioned room). This is particularly important with the non-itchy papular variety.

Sometimes infection occurs leading to the formation of pustules similar to folliculitis (see page 145). In such cases seek medical advice.

COLD

Illness and injury due to cold may occur with work in cold stores, with the use of liquefied and solidified gases (e.g. liquid nitrogen, dry ice, etc), with gases under high pressure, and in outdoor occupations in winter, particularly in the snow country.

CHILBLAINS

These are red, itchy or painful lesions, sometimes with swelling or blistering. They are seen on the fingers, toes and ears.

Treatment

- Do not rub.
- Apply a non-adherent sterile dressing if blistering is present.
- Refer for medical attention.

FROSTBITE

This is damage to and death of skin and deeper structures caused by freezing of the tissues. The areas usually affected are:

- ears
- nose
- cheeks
- chin
- fingers and toes

Factors in the development of frostbite:

- exposure to very low temperature (-4°C to -10°C), or lower;
- time of exposure; the first signs of frostbite usually appear after 6–18 hours exposure; in extreme conditions, the time required may be as little as 30 minutes;
- if skin is exposed, a higher wind velocity will cause earlier onset of the condition;
- onset is also hastened by wet clothing, e.g. wet socks and gloves which have become frozen.

Three grades of severity are recognised:

- Frostnip — the earliest phase, completely reversible with no resultant skin damage.



Fig. 35 — Tip of finger one week after deep frost bite. Note loss of bulk due to tissue destruction and cyanosis from impaired circulation.

- Superficial frostbite — only the skin is involved but permanent damage and scarring results.
- Deep frostbite — deeper tissues are frozen and permanently damaged with considerable tissue loss. Amputation may be required.

Symptoms and signs

Frostnip:

- Whitening of the skin with loss of feeling. Completely reversible with no resultant damage if the area is rapidly warmed.

Frostbite:

- A small painless white spot is the earliest sign. If recognised at this stage and treated energetically, further, more extensive damage, may be prevented.
- As freezing of the tissues continues, the white area enlarges and may change in colour to yellowish-white.
- Frostbitten areas feel numb and are insensitive to touch and painful stimuli. They are firm or hard to the touch.
- With thawing, blisters may form and pain may be intense.

Treatment

This is the same for frostnip and both superficial and deep frostbite.

Immediate:

- Protect from wind and cold; seek shelter and warmth.
- Warm the affected area with body heat (e.g. by placing the hand under the arm or by cupping the hand over the nose or ears).
- Remove any constrictions which may impede blood flow to fingers or toes.
- Protect the affected area from friction or injury.

As soon as possible:

- Rapidly warm the affected areas by immersing them in water at 40°C – 42°C for 20 minutes. This temperature has been found by experiment to be critical in reducing and minimising permanent skin and tissue damage. The temperature of the water must be measured with a thermometer.
- Cover any blisters with a dry (preferably non-adherent) dressing and bandage lightly.
- Keep the affected area level — neither elevated nor dependent.
- Seek medical attention.

Do not:

- rub the affected area;
- apply radiant heat e.g. from a fire or electric radiator;
- give alcohol.

Prevention

- Regularly check yourself and others for the early signs of frostbite (remember it is painless) and treat energetically.
- Wear suitable clothing. Footwear must be waterproof to prevent socks becoming wet and frozen.
- Avoid exposure (especially uncovered skin) to very low temperatures for any length of time.
- Keep out of the wind.
- Note especially that frostbite permanently damages superficial blood vessels making the casualty particularly susceptible to further frostbite.

RAPID FREEZING OF TISSUES

This is caused by:

- splashing the skin with very cold liquids e.g. liquid nitrogen;
- contact with dry ice;
- compressed gases escaping through a small orifice and playing directly on the skin.

There is rapid freezing of the skin and perhaps deeper tissues. The skin becomes white and hard.

Treatment

- Immediately thaw the frozen areas by immersing in warm water up to 42°C for 20 minutes. With rapid thawing, little or no permanent damage will occur. Pain may be quite intense, but once thawing is complete it settles rapidly.
- If skin damage has occurred, apply a sterile non-adherent dressing and refer for medical treatment.

SKIN CONTACT WITH VERY COLD OBJECTS

Skin tends to adhere to any object at sub-zero temperatures and, on pulling away, the superficial layer may be torn off. The resulting wound is very similar to an abrasion, and little or no freezing of the tissue occurs.

Treatment

- Immediately immerse the area in warm water for a few minutes.
- Minor areas may be treated as for minor abrasions or burns.
- Larger areas should be dressed and referred for medical treatment.

HYPOTHERMIA

This is a condition in which body temperature is lowered to less than 35°C. It occurs when an inadequately clothed person is exposed to low temperatures for a long time.

Symptoms and signs

- Lethargy.
- Muscular inco-ordination.
- Disturbances of speech and vision.
- Shivering, especially in the early stages.
- Mental confusion.
- Unconsciousness, when the body temperature falls to very low levels.

Treatment

- Move the casualty to a warm place, or, if this is not possible, protect from wind.
- Wrap in blankets and allow to warm slowly.

Do not:

- apply direct heat;
- immerse in a warm bath.

Prevention

- Keep warm.
- Keep moving.
- Keep dry.
- Keep out of the wind.

ELECTRICAL INJURIES

In Australia, electrical injuries rank 14th as a cause of accidental death.

GENERATION AND DISTRIBUTION

Electricity in Australia is delivered as alternating current (A.C.) with a frequency of 50 Hz. It leaves power stations as high tension (H.T.) electricity at 132,000 volts and above. Transformer sub-stations reduce this voltage and it is supplied to consumers as low tension (L.T.) electricity which is 240 volts, or 415 volts for industry.

Only a few industries use direct current (D.C.) which is, within limits, less dangerous than A.C. However, D.C. can kill.

SAFETY AND PREVENTION

The major causes of electrical accidents are:

- lack of maintenance of equipment;
- repairs undertaken by untrained personnel;
- faulty (broken or disconnected) earth-wire.

Many pieces of electrical equipment are provided with an earth wire to ensure that if the equipment accidentally becomes live, the current will pass rapidly to earth, thereby reducing the current passing through the body of anyone who touches it. One third of all fatal electrical accidents are associated with a faulty earth wire.

Dry skin offers considerable resistance to the passage of current. Wet skin, especially skin wet with perspiration, is a much better conductor and thus predisposes to injury and death from electricity.

Extension cords, incorrectly connected or inadequately maintained, are associated with 30% of deaths from electrocution.

Switches incorrectly placed in the neutral line allow appliances to be live although ostensibly "switched off". This is responsible for 6% of electrical deaths.

Only 14% of deaths from electrocution occur in electrical tradesmen; therefore, prevention should be emphasised in all occupations. A typist's lamp or electric typewriter can be just as lethal as an electric drill or lathe, if incorrectly connected or poorly maintained.

EFFECTS OF ELECTRICITY

Electricity injures the body in three main ways:

- A direct effect on the brain and /or heart.
- Heat production.
- Tetanic muscle contractions.

Direct effect on the brain

This may cause:

- unconsciousness, temporary or sustained but usually reversible;
- convulsions;
- cessation of respiration due to paralysis of the respiratory centre;
- death or permanent disability in the case of very large currents.

Direct effect on the heart

This may cause:

- ventricular fibrillation (commonly);
- cardiac standstill (rarely).

In both conditions, the heart has stopped pumping blood and there is no circulation and no pulse. The vast majority of potential and actual deaths from electrocution are from these effects.

Large currents are not required. The heart is most susceptible to frequencies of 40-60 Hz (domestic range). Current flow of from 10 milliamperes to 10 amperes at 240 volts is liable to cause ventricular fibrillation.

With much higher voltages, the heart may be stopped but it will resume beating normally when the current ceases to flow, provided there has not been irreversible damage to the rest of the body, particularly the brain. This does not mean that large currents and voltages are safe. One quarter of all deaths from electrocution are from high tension electricity.

Heat production

This causes burns at the points of entry and exit of the current. See Electrical Burns (Page 86).

Tetanic muscle contraction

This may cause inability to let go of the live object and an inability to breathe because of spasm of the diaphragm and chest muscles whilst current is flowing.

Other injuries, including fractures, may occur as a result of the casualty falling or being thrown against surrounding structures.

Other effects of electricity which are not life-threatening include:

- Nervous reaction similar to fainting. The casualty appears pale, cold and sweating and complains of dizziness. Symptomatic treatment is required.
- Muscle pain, stiffness and weakness which may occur later and last for several days.
- Psychological effects such as apprehension and nervousness.

RESCUE

Low Tension (L.T.)

Separate the casualty from the source of the current by:

- turning off the switch; and
- pulling out the plug.

Do not attempt to kick the casualty clear. Current flowing for as little as 60 milliseconds may cause ventricular fibrillation.

High Tension (H.T.)

Do not touch any H.T. conductor until a qualified authority has checked and declared it safe.

- Think before you act.
- Do not become the next victim.

TREATMENT

- If the casualty is unconscious, treat as for unconsciousness from any cause.
- Send for ambulance and/or medical assistance urgently.
- Check for and treat other injuries and burns.
- All persons sustaining an electric shock severe enough to cause even a momentary loss of consciousness should be medically examined before returning to work.

UNCONSCIOUSNESS AND ADVANCED RESUSCITATION

UNCONSCIOUSNESS

When a person is unconscious he is unaware of his surroundings and therefore is unable to appreciate, react to, avoid or escape from danger. Such a simple thing as the jaw and tongue falling back and obstructing the airway can lead to death.

The causes of unconsciousness include:

- head injury
- poisonous gases
- asphyxia
- drug overdose
- stroke
- electric shock

TREATMENT

Irrespective of the cause of unconsciousness, the initial first aid treatment is the same:

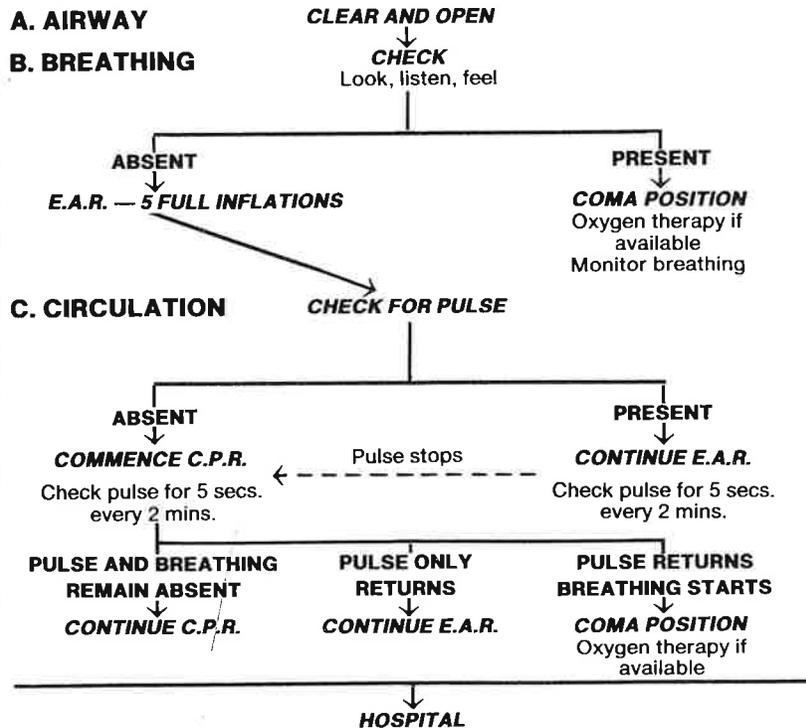
- Remove the cause and/or the casualty from the cause.
- Check the Airway — if obstructed, clear it and ensure it is open.
- Check for Breathing —
 - if present — turn casualty into the coma position, maintaining an open airway;
 - if absent — commence E.A.R. (Expired Air Resuscitation).
- Check for Circulation —
 - if present — continue E.A.R.;
 - if absent — commence C.P.R. (Cardio-Pulmonary Resuscitation).

- Control bleeding if present.
- Check and treat other injuries.
- Maintain a careful watch on the colour of the casualty.
- If cyanosis is present even with an open, unobstructed airway — give oxygen if available.
- Assess the level of consciousness. This is not important in the first aid management of the casualty, but a report on the level of consciousness and any variation in this level may be very valuable in the later medical management.

Note and record:

- whether the casualty lies quietly or is restless;
- the response to command, touch, pain;
- the pupils:
 - their size;
 - equal or unequal;
 - reaction to light;
- the pulse rate.
- Do not give anything by mouth.
- Never leave the unconscious casualty.
- Send for or transport the casualty to medical attention.

RESUSCITATION — SUMMARY



VENTILATION RATE — E.A.R. — ADULT: 12/15 min.

RESUSCITATION SEQUENCE — C.P.R.:

ONE OPERATOR

2 INFLATIONS followed by
15 COMPRESSIONS

TWO OPERATORS

1 INFLATION followed by
5 COMPRESSIONS

COMPRESSION RATES — E.C.C. — ADULT:

ONE OPERATOR — 80/min

TWO OPERATORS — 60/min

Ensures 60 compressions in one minute.

COMBINED MINIMUM REQUIREMENTS FOR ADEQUATE C.P.R.:

ONE OPERATOR — 8 inflations and 60 compressions in 1 minute.

TWO OPERATORS — 12 inflations and 60 compressions in 1 minute.

These can *only* be obtained by regular practice on a training manikin.

ADVANCED RESUSCITATION

Many first aid rooms contain resuscitation equipment not normally available to an occupational first aid officer. As this equipment is intended for use only by persons trained in its use, the method of use is not described in this text.

Expert advice from a doctor or a senior ambulance officer trained in this field should be sought before equipment is purchased. Any equipment already present should be checked by an expert, and unsatisfactory equipment discarded or replaced.

OROPHARYNGEAL AIRWAY

An oropharyngeal airway is a supplementary device used to assist in establishing and maintaining an adequate airway (Fig. 36). It is used in association with backward head tilt and jaw support or jaw thrust.

Two sizes are required:

- Guedel 2 — for adult females and teenagers;
- Guedel 3 — for adult males.



Fig. 36 — Oropharyngeal airways.

Indications for use

- With a bag-valve-mask or a manually triggered oxygen resuscitator always commence without an oropharyngeal airway. However, in the rare instance where there is still some airway obstruction (not due to foreign material), insert an oropharyngeal airway carefully and continue inflation of the lungs.
- Use an airway with unconscious casualties who are breathing, e.g. head injuries, stroke, etc., where difficulty is experienced in maintaining an open airway with the normal procedures of coma position, backward head tilt and jaw support or jaw thrust.

Contraindications

- Use by an untrained person.
- In the semi-comatose, an oropharyngeal airway can irritate the back of the throat and cause vomiting, spasm of the larynx or coughing.

Method of use

- This must be learnt under expert tuition and with practice on a training manikin. Retraining is required at least yearly.

OXYGEN THERAPY

This is the use of supplemental oxygen to increase the oxygen concentration in the inspired air for casualties who are still breathing.



Fig. 37 — Flexible face mask in use with a conscious casualty.

Indications for use

Oxygen therapy should be administered to casualties who:

- complain of severe chest pain;
- complain of difficulty with breathing from any cause;
- have lost blood and are showing symptoms and signs of circulatory collapse;
- have severe multiple injuries;
- are or have been cyanosed with an open airway;
- become unconscious;
- have inhaled toxic gas or smoke;
- have been rescued from near drowning.

Equipment required

- Flexible facemask that is clean and disposable (Fig 37) Note that the mask of a mechanical resuscitator is generally not satisfactory for oxygen therapy.
- A supply of oxygen — an oxygen cylinder and valve with a fixed orifice flow of 8 litres per minute (Fig 38).

Flexible facemasks:

These should:

- be made of clear transparent plastic;
- be easy to apply;

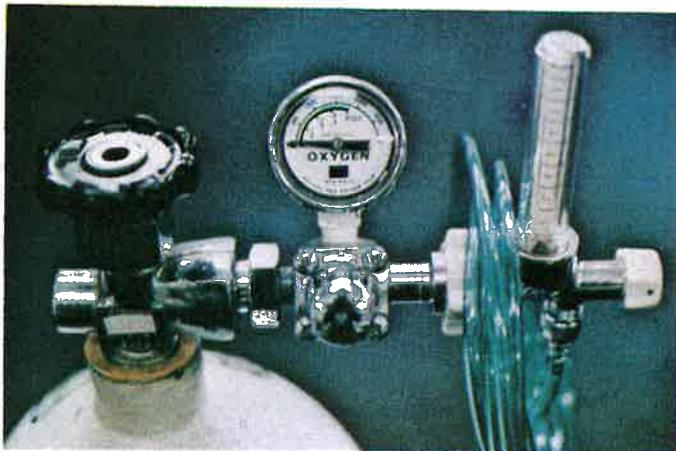


Fig. 38 — Oxygen cylinder with valve and flowmeter.

- be comfortable;
- provide an adequate oxygen concentration and not cause build-up of carbon dioxide.

RESUSCITATION SYSTEMS

These are used:

- for inflation of the lungs instead of and after initial Expired Air Resuscitation (E.A.R.) in casualties who are not breathing;
- instead of E.A.R. as a part of Cardio-Pulmonary Resuscitation (C.P.R.) when two people trained in resuscitation are present.

Some systems may also be used for oxygen therapy in breathing casualties.

Systems are available that:

- supply only air;
- supply oxygen-enriched air;
- supply 100% oxygen.

Those that provide oxygen-enriched air or 100% oxygen are particularly valuable. Although E.A.R. provides sufficient oxygen to sustain life and prevent brain damage, there are indications, for example, the near-drowned and those with severe haemorrhage from injury, where added oxygen greatly assists the casualty.



Fig. 39 — Self-inflating bag-valve-mask resuscitator. The clear plastic bag is for adding oxygen.

Self-inflating bag-valve-mask resuscitators

These resuscitators can be used with or without oxygen.

- Without oxygen: These provide 21% oxygen compared with 16.5% oxygen in E.A.R. Keeping a leak-proof seal between the mask and the face while maintaining an open airway can be difficult, especially when the operator is out of practice. Therefore, unless the operator is trained, and maintains his skills by regular practice on a training manikin, less ventilatory volume than E.A.R. will be provided.

If a self-inflating resuscitator is to be used, the type with the bag at the end of a flexible corrugated tube is recommended as easier to use than the type with the bag attached directly to the mask.

- With oxygen: Oxygen may be added through a special inlet nipple, thereby increasing the percentage of oxygen in the air supplied to the casualty.

Manually triggered valve-mask resuscitators

These consist of an oxygen supply connected to a valve which fits directly on top of the mask. The valve is provided with a button which, when depressed, delivers oxygen under pressure to inflate the lungs.

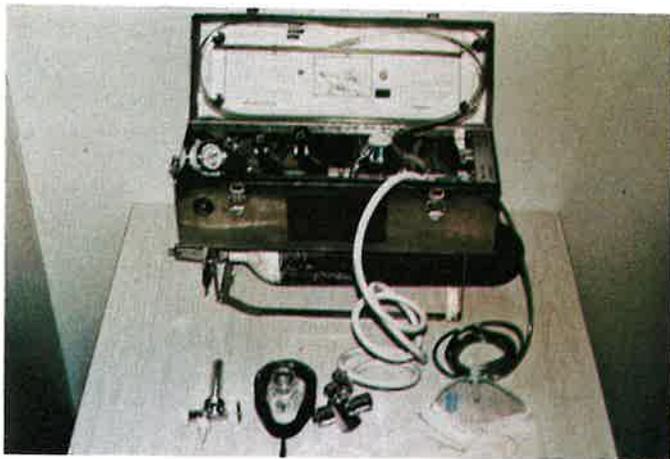


Fig. 40 — Manually triggered valve-mask resuscitator. This equipment has its own oxygen cylinder.

When the button is released, expired air passes out through a valve into the surrounding air. A pressure relief is also provided to prevent over-distension and rupture of the lungs.

Advantages of this type of respirator are:

- Some find them easier to use than the self-inflating bag-valve-mask resuscitators.
- They supply 100% oxygen compared with air or oxygen-enriched air.

Two disadvantages associated with this type of resuscitator are:

- Because of the high flow rate, should the airway be even partially obstructed, it is easy to distend the stomach with oxygen, causing regurgitation of stomach contents and splinting of the diaphragm, thereby reducing the amount the lungs can expand. Furthermore, should the regurgitated stomach contents enter the lungs, the casualty's life becomes endangered. The same problems may also occur with E.A.R. and self-inflating bag-valve-mask resuscitators if the airway is obstructed.
- The button on some valves must be fully depressed, otherwise oxygen is released into the atmosphere with no inflation of the lungs.

Demand valve resuscitator

This is a modification of the manually triggered valve-mask resuscitator; it is supplied with a demand valve which allows it to be used for oxygen therapy on a breathing casualty. When the casualty inspires, the demand valve automatically starts the flow of oxygen which continues until expiration commences. The oxygen is then shut off and expired air passes out through a valve. The demand valve has a manual override (a button or a lever), which enables the resuscitator to be used to inflate the lungs in a casualty who is not breathing.

Soft bag and mask resuscitators

Two types, both of which depend on oxygen, are available. The bag is made of soft rubber which remains collapsed and empty until filled with oxygen from the oxygen supply.

- Soft bag and mask — semi-closed circuit: some of the expired air is rebreathed but a high flow rate of oxygen prevents build up of carbon dioxide.
- Soft bag and mask — closed circuit: here the resuscitator includes means for chemically removing carbon dioxide from the expired air. As no gases are vented to the surroundings, considerably less oxygen is consumed than in other systems.

Although both types of resuscitators are effective and can be used both for oxygen therapy in breathing casualties and for resuscitation of non-breathing casualties, they are more difficult to use than the other resuscitators described. If such resuscitators are supplied at the workplace, it is important that tuition and training in their use be obtained.

SUCTION APPARATUS

A sucker is used to aspirate fluid, e.g. mucus, saliva, vomitus, etc., from the mouth to prevent inhalation of this fluid and to obtain and maintain an unobstructed airway.

A sucker should be available in any first aid room containing equipment for mechanical ventilation of the lungs.

Types of suckers available:

- Electric • mains only;
 - mains and/or battery;
 - battery only.
- Mechanical • foot operated;
 - hand operated.
- Oxygen powered.

Electric — mains and/or battery operated

The battery is rechargeable and is plugged into the mains when not in use.

Advantages:

- Easily portable.
- Allows both hands to be free.
- Excellent suction.
- Can be used easily by one person no matter where the casualty is.

Disadvantages:

- Dependent on mains supply for recharge of batteries.
- If battery fails or is left uncharged, no suction is available.

Foot operated mechanical sucker

Advantages:

- Independent of electricity supply.
- Easily portable.
- Allows both hands to be free to hold the casualty's head and to manipulate the suction catheter.

Disadvantages:

- Not easily used by one person, particularly if the casualty is lying on the floor.
- Suction is only fair.

Oxygen suckers

These are not recommended as they use excessive oxygen, depleting supply and limiting the amount available for ventilatory support.

Method of use — all suckers

- Roll the casualty onto his side and aspirate any fluid from the hollow of the lower cheek. Under no circumstances suck fluid from the back of the throat, as contact with the suction catheter may lead to gagging, vomiting or spasm of the larynx.

Chapter 11

ILLNESSES

Although most attendances at the first aid post will be for injuries, workers get sick at their place of employment and often seek assistance. In dealing with illness, the occupational first aid officer is not in the position to make a diagnosis and should therefore resist the temptation to do so. However, basic first aid, combined with sound common sense, will enable the occupational first aider to deal with the majority of illnesses.

He should take a careful history and note symptoms and signs.

For example:

- Is his colour different from usual, e.g. pale or flushed?
- Does he stand or sit as though he is in pain?
- Is there any difficulty with breathing?
- Has there been any nausea, vomiting or diarrhoea?
- Is he feverish?

Decide:

- Is the condition a minor one which will get better rapidly without medical assistance?
- Should the casualty be advised to go home?
- Should medical attention be sought quickly?
- Should the casualty be sent to hospital?

In dealing with illness, the occupational first aider will have many advantages over the first aider in the street. Medical records, means of taking the temperature, minor medications, and perhaps oxygen, will be available.

PRE-EXISTING MEDICAL CONDITIONS

Many workers in full-time employment have some chronic medical condition which is kept under control by medication prescribed by a doctor. Medical conditions commonly encountered are high blood

pressure, angina, ulcer of the stomach or duodenum, asthma, diabetes and epilepsy.

With the employee's permission, note on the First Aid Record Card

- Any chronic illnesses.
- Any medication being taken.
- Any emergency treatment which may be required.

In certain circumstances, the occupational first aid officer will become aware of health problems which the employee wishes to remain confidential. In such circumstances, the first aid officer may, with the employee's permission, keep his own personal confidential record. Should he consider it is important for the efficient operation of a company's plant or to preserve the safety of the worker and others, or when the existence of such a condition should be known to management, he should discuss this matter with the employee and request his permission to enter a suitable notation on the First Aid Record Card.

A worker with a chronic medical condition should obtain from his doctor recommendations for the first aid emergency treatment of his condition. These recommendations should be transcribed on to the First Aid Record Card.

INFECTIOUS DISEASES

Common infectious diseases are:

- U.R.T.I. (upper respiratory tract infection)
- influenza
- measles
- German measles
- mumps
- chicken-pox

Most adults will either have had or have been immunised against these diseases in childhood and will therefore be immune from further infection. The exceptions are U.R.T.I. and influenza, as immunity from an attack or following immunisation is relatively short. These infections may spread rapidly and can result in a serious depletion of the workforce.

Influenza vaccines are effective. Older age groups and those with a history of chronic or recurrent chest infection should be encouraged to see their own doctor for advice on immunisation.

Mild cases of U.R.T.I. should be given two paracetamol tablets and allowed to continue at work.

Symptoms and signs of influenza include:

- general feeling of being unwell;
- muscle aches and pains;
- sore throat;
- running nose;
- blocked feeling in the head;
- headache;
- cough, often with sputum;
- raised temperature;
- increased pulse rate.

These casualties should be sent home and advised to seek medical attention. A worker presenting with a rash and a feeling of being vaguely unwell should be dealt with in the same way, particularly if there is history of contact with a person suffering an infectious disease.

German measles is a particular problem with female employees, because infection during early pregnancy can cause serious deformities in the unborn child. Workers with vague symptoms and signs as follows should be referred for medical attention:

- general feeling of being unwell;
- a slight fever;
- tender glands in the back of the neck;
- a sore throat;
- mild aches in the joints;
- a light pink rash (in 50% of cases) on the face, body and limbs in succession, which appears about a week after the illness starts and lasts about 3 days;

The disease can be transmitted to another person during this first week of illness before the rash appears. Persons who have a doctor's diagnosis of German measles should be encouraged to notify the management at the place of employment so that any female worker who has been in contact with the infected person and who is or may be pregnant can be advised to seek medical attention.

DIARRHOEA AND VOMITING

Gastroenteritis with vomiting and/or diarrhoea is transmitted by faecal contamination of food. Poor hygiene, particularly with regard to toilet habits, is usually the cause.

If an outbreak of gastroenteritis occurs, report the details so management can check that food handlers in the works canteen are

not suffering from this condition and that adequate hand washing facilities are available near toilets, and are being used.

Management

- If the casualty is obviously ill and, especially if other symptoms, e.g. abdominal pain are present, send home with advice to seek medical attention.
- If there has been only one or two loose bowel motions and he is otherwise well, work should continue. Nothing should be eaten that day and care must be taken to wash the hands immediately after using the toilet. No medication is required.
- Anyone whose work involves the handling or processing of food should cease work immediately, and seek medical attention. Work should not be resumed until the person has been certified fit by a doctor.

HEADACHE

A simple headache with no other symptoms can be treated by giving two paracetamol tablets. However, if the headache is severe, and especially if it is accompanied by other symptoms, medical advice should be sought.

CHEST PAIN

Many employees suffering serious illnesses, e.g. heart attack, pneumonia, pneumothorax, present with chest pain. Any complaint of chest pain must therefore be regarded seriously, particularly if the pain is prolonged, i.e. lasts more than 20 minutes. Other symptoms and signs, e.g. shortness of breath, cyanosis, pallor, cold clammy skin and altered pulse (very fast, very slow or irregular), are likely to be present with more severe chest pain.

Management

Mild chest pain:

- Advise medical consultation.

Severe chest pain with or without other symptoms and signs:

- Send immediately for an ambulance.
- Lay the casualty down (a semi-sitting position may be more comfortable).
- Give oxygen if available.
- Support breathing and circulation if they fail.

SHORTNESS OF BREATH

Persistent shortness of breath is usually due to heart failure or respiratory disease (e.g. pneumonia, pneumothorax, asthma, bronchitis). Assess the severity of the condition by observing the degree of the casualty's distress and other symptoms and signs, e.g. cyanosis, chest pain.

Management

- The casualty may have had previous attacks and may be carrying personal medication.
- Check the First Aid Record Card and carry out any treatment listed.
- If shortness of breath is severe, give oxygen if available.
- Support breathing and circulation if they fail.
- Send urgently for an ambulance.

UNCONSCIOUSNESS

Loss of consciousness without injury has many causes. The initial first aid management is the same, irrespective of the cause.

SIMPLE FAINTING

This is a very common cause of unconsciousness and the least serious. Recovery is usually rapid but the casualty must be kept lying down until fully recovered. This may take up to 30 minutes.

DIABETES

Consciousness is lost gradually and is preceded by a period during which the casualty is confused, clumsy and may appear inebriated. The condition should be recognised before consciousness is lost, and appropriate treatment commenced. Check with the First Aid Record Card to confirm that the worker is a diabetic.

EPILEPSY

Loss of consciousness is preceded by a fit. Check the First Aid Record Card.

STROKE AND HEART ATTACK

These are two potentially fatal conditions which occasionally cause sudden loss of consciousness. With heart attack, the casualty will usually complain of severe crushing chest pain before consciousness is lost.

HEAT STROKE

This is uncommon but must be suspected when a person collapses in a hot humid environment. Apart from the routine management of an unconscious person, specific treatment must be started as soon as practicable (see Page 96).

In all cases when a diagnosis can be made, carry out further treatment as set out in the *St. John First Aid Manual*.

In addition, if there are indications for its use, give oxygen if available.

COMPLICATIONS OF STOMACH ULCER

Many workers with an ulcer of the stomach or duodenum may be on medication prescribed by their doctors and, ordinarily speaking, will not attend the first aid room with this problem unless complications arise.

Two complications which are dramatic and require urgent first aid are:

- bleeding; and
- perforation.

BLEEDING FROM THE ULCER

Bleeding is at first concealed, but usually makes itself visible by the vomiting of dark blood or blackish material (like coffee grounds) and/or passage of a black tarry bowel motion.

When bleeding occurs, the person usually feels faint and may collapse and show the symptoms and signs of circulatory collapse.

Management

- Treat as for haemorrhage from any cause.
- Give nothing by mouth.
- If symptoms and signs of circulatory collapse are present give oxygen if available.
- Send urgently to hospital.

PERFORATED ULCER

The ulcer may perforate, allowing the acid contents of the stomach to enter the peritoneal cavity.

Symptoms and signs

- Sudden onset of severe upper or generalised abdominal pain.
- The casualty may be cold, pale and sweating but as no blood has been lost the pulse will be normal.
- The casualty will usually lie still, often with the legs drawn up and be afraid to move as movement aggravates the pain.
- Breathing is often shallow and rapid.

Management

- Keep lying down and comfortably warm.
- Give nothing by mouth.
- Send urgently to hospital.

FEMALE MEDICAL CONDITIONS

Occasionally female employees may seek advice or treatment for problems associated with specifically female medical conditions. From the first aid point of view, these conditions can be broadly divided into two groups; those causing pain and those causing blood loss (with or without pain).

CONDITIONS CAUSING PAIN

Painful periods (dysmenorrhoea)

This pain is felt as an ache or a cramping pain in the lower abdomen, often extending to the lower back or down the legs. It occurs just before (24-48 hours) and/or during the period.

Treatment

Give two paracetamol tablets. Rest may also help. If pain persists the employee should be advised to seek medical advice.

Painful breasts

Pain in the breast may be of hormonal origin or due to bacterial infection.

With hormonal pain:

- one or both breasts may be involved;
- the patient is usually over the age of 30; and
- the temperature is normal.

With bacterial infection:

- one breast only is involved;
- the patient is nearly always a nursing mother; and
- the temperature is usually raised.

Treatment

Refer for medical attention:

- any nursing mother with a painful breast;
- any female employee with a painful breast and a raised temperature.

In other cases, two paracetamol tablets may provide relief. A good support brassiere will often help.

CONDITIONS CAUSING BLOOD LOSS

Excessive bleeding with periods (menorrhagia)

This may lead to anaemia with tiredness, shortness of breath on exertion and lethargy.

Treatment

- Refer the employee for medical advice.

Miscarriage (abortion)

This condition presents in its initial stages (threatened miscarriage), with cramping abdominal pain and moderate vaginal bleeding. Any female employee who attends with these symptoms and signs and who is, or thinks she may be, pregnant, must be referred for medical advice. If the employee is actually miscarrying, the pain is more intense and the vaginal bleeding becomes heavier (the passage of clots is common). This severe bleeding may lead to circulatory collapse.

Treatment

- Evacuate the casualty to hospital immediately.
- Treat circulatory collapse by the usual methods while awaiting the ambulance.

Ectopic pregnancy

Ectopic pregnancy is when the foetus develops inside the abdomen but outside the womb, usually in the Fallopian tube (the tube leading from the ovary to the womb). After about two months it will have grown to a size large enough to rupture the tube. Stretching of the tube before it ruptures may, in itself, cause pain. The woman may or may not know she is pregnant. Women with ectopic pregnancies therefore, present in two ways:

Non-acute cases (before the tube ruptures)

- There is sudden onset of severe lower abdominal pain with slight vaginal bleeding. The pain is often severe enough to cause fainting.
- After 10-15 minutes the woman recovers, though some mild lower abdominal pain and tenderness will persist.
- A day or two later a similar attack occurs.

Treatment

- Refer for medical advice immediately.

Acute cases (the tube has ruptured leading to severe internal bleeding)

- The woman is obviously seriously ill with severe low abdominal pain and circulatory collapse.

Treatment

- Evacuate urgently to hospital. Treat circulatory collapse while awaiting the ambulance.

SUMMARY

With any medical condition:

- Err on the side of safety — it is better to refer a casualty who does not require medical attention than not to refer one who does.
- Use basic first aid techniques — the diagnosis is often not relevant to the treatment required.
- When referring a casualty with a medical condition, send:
 - any known medical history from the First Aid Record Card;
 - the symptoms and signs;
 - a note of any treatment carried out.

Chapter 12

THE EYE**EYE INJURY**

All wounds heal with the formation of some scar tissue. In the eye, scarring can result in partial or even complete loss of vision.

First aid in eye injuries is aimed at reducing or preventing eventual scarring.

INCIDENCE

Eye injuries are, unfortunately, very common and rank third after back and hand injuries as a cause of occupational incapacity.

The list of occupations where eyes are at risk is considerable, but the danger is greatest where various particles are flying through the air in close proximity to workers. Most particles are iron and steel; others commonly involved are non-ferrous metals, glass and wood.

Hazardous situations

These include:

- machine tooling
- grinding
- steel hitting on steel, e.g. using a cold chisel
- steel hitting on rock, e.g. in mining
- welding — both from “welder’s flash” and from chipping flux from the completed weld
- chipping slag in refineries
- sand blasting
- using a rotary mower or agricultural equipment
- saw milling

PREVENTION

Prevention is of paramount importance in the reduction of the incidence of eye injury. Shielding of the eye is essential and is achieved by:

- fitting shields or screens to machines;
- placing screens between workers and dangerous chemicals, molten metal etc;
- providing exhaust ventilation systems for the removal of noxious fumes, dusts and smoke;
- wearing of protective spectacles, goggles or masks.

The provision of protective appliances and the enforcement of their use is the responsibility of management. Occupational first aid officers should, however, do all they can to alert workers to the risks and educate and encourage them to use eye protection.



Fig. 41 — Worker wearing protective goggles.

Worn tools, such as mushroomed chisels and hammers, are the cause of many eye disasters, as pieces of metal fly off at great speed. The use of good quality hand tools, and the discarding of hand tools if and when they become worn, greatly reduces the risk. When a faulty tool or faulty equipment is found to be the cause of an eye injury, the safety officer or management should be notified.

TYPES OF EYE INJURY

Foreign bodies

Small foreign bodies may land on or become embedded in the surface of the eye.



Fig. 42 — Metallic foreign body embedded in cornea.

Symptoms and signs — superficial foreign body

- a feeling of something in the eye;
- pain, especially on opening and closing the lids;
- watering and redness of the affected eye;
- spasm of the eyelids if pain is severe;
- photophobia (dislike or light).

A hot metal fragment can burn into the surface of the eye or a fragment may hit with sufficient speed to bury itself beneath the eye surface.

When the foreign body is deeply located in, and does not project above the surface of the cornea, irritation may not commence for several hours. The casualty may present next morning with a red, inflamed eye.

Larger foreign bodies moving at high speed may penetrate the eyeball, causing serious damage to structures inside the eye. In this case, symptoms and signs may be deceptively slight. A penetrating injury must be suspected whenever there is a history of a foreign body, moving at high speed, striking the eye.

Symptoms and signs — penetrating injury

- Pain is usually much less than with a superficial foreign body and may be felt *in* the eye.
- A small area of bleeding may be seen under the conjunctiva.
- An obvious laceration with prolapse of the black lining of the eye may be present.
- The shape of the pupil may be distorted.
- Blood may be visible inside the eye (seen through the cornea).



Fig. 43 — Penetrating injury of the eye. Note the distorted pupil and blood behind the cornea. Point of penetration to the right of the cornea is difficult to see.

- Vision may be impaired (e.g. blurring, haloes round lights) but is often normal.
- There may be little or no sign of eye injury.

Glass foreign bodies present a special problem. Pieces of glass are very sharp and easily cut or penetrate the eyeball. Symptoms and signs may be those of either a superficial small foreign body or of a penetrating injury.

Chemical burns

These may be due to any chemical which causes chemical burns to the skin (see page 88)

Other substances causing eye irritation and damage include:

- ammonia;
- solvents;
- thinners;
- degreasers;
- lime and cement.

Symptoms and signs depend upon the nature and the amount of the substance which gets into the eye. Strong acids and alkalis are much more dangerous than solvents, thinners and degreasers.

Symptoms and signs

- moderate to extreme pain;
- moderate to intense spasm of the eyelids;
- watering, redness of the eye and photophobia;
- signs of burning of the eye over the splashed area.

Molten metal splashes

Because of the extreme heat, these are very dangerous. Symptoms and signs are the same as those of a strong acid or alkali.

Blunt force injury

As the eyelids often close by reflex action before an object strikes the eye, a blow to the eye can cause internal damage without injury to the surface of the eye.

Symptoms and signs

- pain *in* the eye;
- impaired vision;
- bruising to the eyelids or blood under the conjunctiva;
- blood inside the eye.



Fig. 44 — Blunt force injury to the eye. Note blood inside the eye and bruising of eyelids.

Abrasions

An object brushing across the eyeball can rub off the superficial layer to cause an abrasion. Symptoms and signs are identical with those caused by a superficial foreign body except that no foreign body will be seen. An abrasion of the cornea will rarely be seen unless the eye is stained by a special dye.

Welding flash

Exposure to the ultraviolet rays of an electric welding arc without welder's eye protection can cause a flash burn to the eyes. This can be likened to sunburn of the eyes. Both eyes are always affected. If the casualty complains of a flash burn only in one eye, suspect a foreign body.

Symptoms and signs

These develop 4-24 hours after exposure. The eyes are:

- red and watering;
- painful and irritable on the surface, they feel gritty;
- hypersensitive to light (photophobia).

MANAGEMENT

Encourage all workers to seek first aid as soon as possible after any eye injury. Discourage self-help, as an attempt by the casualty or a workmate to remove a foreign body may result in further damage. Use posters, notice boards and direct advice to emphasise these points.

Take a careful history of the accident to assist in determining the type of injury.

Chemicals and molten metal

If there is a history of a chemical or molten metal splash, urgent treatment is required.

- Irrigate the eye with plain tap water from a tap or hose (see Page 137 "Dilution and Removal of Irritants").
- If a tap or hose is not readily available use any water source.
- Continue irrigation for at least 20 minutes by the clock; the casualty must *not* be moved until this irrigation is completed.
- While irrigation is proceeding arrange for medical attention or evacuation to hospital.
- After irrigation, cover the eye lightly with a pad and fix with adhesive tape.
- Await the arrival of medical aid or send immediately to hospital.

All other eye injuries are less urgent.

Glass

Glass is very difficult to see in the eye and even small pieces may penetrate the eyeball. If the history suggests glass is involved:

- Do not examine the eye or attempt removal.
- Protect the eye with an eye pad.
- Send immediately for medical attention.

Other eye injuries

A history of metal hitting metal or stone suggests a penetrating injury of the eyeball. If a grindstone was being used a small superficial foreign body is more likely.

The eye must be carefully examined before deciding on treatment.

EXAMINATION OF THE EYE

- Wash the hands with soap or a detergent-antiseptic solution, and dry on a paper towel.

- Have the casualty lie on a couch, and stand immediately above his head; or sit the casualty down, stand behind the chair, and tip the casualty's head back so that it is supported against your body.
- A good light, preferably an adjustable electric light, shining onto the eye is essential. A torch is unsatisfactory because the two hands are required for examination and treatment.



Fig. 45 — Examination of the eye with a binocular loupe. Casualty lying on a couch.

- Have sterile gauze squares, eye pads, cotton-tipped applicators, adhesive tape and sterile eye wash bottle close at hand.
- Inspect the outside of the lids and clean them, if necessary using sterile eye wash solution and sterile gauze. Do not use detergent-antiseptic solution as this will irritate the eye and make the eyelids slippery.
- Ask the casualty to open the uninjured eye widely; this will help in opening the injured eye.
- Separate the eyelids using two fingers of one hand placed on the bony margins above and below the eye, not on the eyeball itself: use both hands if the spasm is marked.
- With a magnifying lens, a binocular loupe or magnifying glasses, examine the eye.



Fig. 46 — Examination of the eyes- casualty sitting.

- Ask the casualty to look up and down and to the right and left, while carefully watching for a foreign body or any distortion of the reflected light indicative of a foreign body or abrasion.
- Look also for any laceration to the eyeball, subconjunctival bleeding or blood behind the cornea.
- If nothing is found, look under the lower and upper lids.

Following examination

If a foreign body is seen on the white of the eye or under a lid, either:

- flush out with irrigating solution; or
- gently remove with a cotton-tipped applicator moistened with tears from the corner of the eye, or irrigating solution. Make one attempt only. If this fails to remove the foreign body, refer for medical attention.

- Instil antiseptic eye drops, if available.

If a foreign body is seen on the cornea:

- do not attempt removal, refer for medical attention;
- to increase comfort during transport, place a pad lightly over the closed eye and fix with adhesive tape.

If there is evidence or strong suspicion of a penetrating wound or internal damage due to a blow:

- do not apply any pressure to the eye for any reason, including bleeding;
- do not irrigate the eye;
- do not apply ointments;
- lightly cover the eye with a pad and fix with adhesive tape;
- send urgently to hospital.

If no foreign body is seen, both eyes are involved, and there is a history of welding flash:

- instil neosynephrine eye drops 1/4%, two drops into each eye every 5 minutes, until symptoms are relieved;
- if pain is not relieved within 30 minutes, refer for medical attention. If no foreign body is seen and the history, symptoms and signs suggest an abrasion, treat as if there were a foreign body on the cornea.

CONJUNCTIVITIS

This is inflammation of the conjunctiva. The simple irritative conjunctivitis caused by smoke, noxious fumes or a foreign body will usually settle rapidly once the offending agent is removed.

Conjunctivitis is also caused by bacterial infection with or without an injury to or foreign body in the eye. Both eyes may be affected.

The symptoms and signs of an infective conjunctivitis are the same as simple irritative conjunctivitis except:

- the eyelids are often swollen and red with purulent discharge along the margins and on the eyeball;
- the eyelids are often stuck together with dried discharge on awakening.

Do not attempt to remove a foreign body from an eye showing signs of bacterial infection. The casualty is referred for medical attention.



Fig. 47 Bacterial conjunctivitis. Note intense redness of sclera, strands of pus and swollen lids.

Where the eye remains red and irritable following treatment, the casualty should be referred for medical attention.

EYE IRRIGATION

Eye irrigation is used for:

- dilution and removal of any irritating substance;
- washing out floating foreign bodies.

Dilution and removal of irritants

Large volumes of water from a tap or hose are required:

- Use a gentle stream.
- Lay or sit the casualty with the head tilted right back to prevent water running into the nose or mouth.
- Instruct the casualty to incline the head to the affected side with the neck extended.
- Ask the casualty to try to open both eyes to reduce the spasm of the eyelids of the affected eye.
- Hold the eyelids of the affected eye open with the first two fingers of the left hand placed on the bony margins above and below the eye.
- Have the casualty look to the right, to the left, and up and down,

while directing the stream of water on to the sclera rather than on to the cornea.

- Direct the stream also under the upper and lower lids to remove all trace of the irritant.



Fig. 48 — Eye irrigation with eye irrigating solution.

Washing out floating foreign bodies

Only a small volume is required. A commercial eye irrigating fluid in a hand held plastic bottle is easier to use and less irritating to the eye.

- Position the casualty and hold the eye open as before.
- Have the casualty or an assistant hold a kidney dish against the side of the face to catch excess fluid.
- Flush the foreign body out with a gentle stream of fluid.

Following irrigation, carefully examine the eye to make sure all foreign bodies have been removed.

Chemical neutralisers

Some occupational first aid rooms may be equipped with an irrigating set, consisting of a large reservoir containing a chemical neutraliser such as buffered phosphate solution. Irrigation with buffered phosphate solution neutralises both acids and alkali splashes in the eye; but in the end it is no more effective than large volumes of water.

INSTILLATION OF EYE DROPS

Method:

- position the casualty as for examining the eye;
- hold the lids open with the first and second fingers of the left hand;
- aim the drops into the inner corner of the eye rather than on to the eyeball itself, this causes less discomfort;
- do not touch the surface of the eye with the dropper.



Fig. 49 — Instilling eyedrops from plastic dropper bottle.

UNCONSCIOUS PATIENTS

Contact lenses if left in the eyes of unconscious casualties may lead to eye damage.

When referring an unconscious casualty who is known to wear contact lenses make sure this fact is conveyed to the medical officer taking over treatment.

Chapter 13

THE SKIN

Wounds and burns to the skin, caused by physical and chemical agents, are considered in other chapters of this manual. Two other groups of skin lesions are now considered:

- dermatitis; and
- skin infection without injury.

DERMATITIS

The skin acts, in most instances, as a very efficient barrier between the worker and his environment. Many substances however, when in sufficient concentration and acting for a sufficient period of time, can cause skin damage which presents as dermatitis.

The problem is much greater than generally recognised. It has been estimated that over 50% of occupational disease involves the skin and in over 50% of these cases, the skin of the hands is affected.

Two main varieties of occupational dermatitis are:

- irritant dermatitis; and
- allergic dermatitis;

Both varieties are commonly called contact dermatitis.

IRRITANT DERMATITIS

All people are susceptible to the direct action of an irritant on the skin. However, there is a marked variation in this susceptibility between individuals. Similar exposure to the same irritant will cause dermatitis in some people while in others it will not. Factors involved include skin dryness or oiliness, and complexion.

Irritant dermatitis may be *acute* or *chronic*.

- Acute irritant dermatitis is due to:

- higher concentrations of the irritant; or
 - a highly irritant substance;
- and appears in minutes or hours after contact.
- Chronic irritant dermatitis is due to:
 - lower concentrations of the irritant; or
 - a less irritant substance;
- and may take days, weeks, months or even years to appear.

ALLERGIC DERMATITIS

This is an allergic reaction in the skin to a substance (sensitiser). Irritants can also act as sensitisers. It takes at least 5-7 days, and may take years, for allergic dermatitis to develop after the first contact with a sensitiser. Again, the onset may be either acute or chronic.

Examples of irritants and sensitisers

Irritants

Physical

Friction
Heat
Moisture
Ultra violet light
(U.V.L.)

Chemicals

Acids
Alkalis
Mercury compounds
Formaldehyde

Fat Solvent

Paraffin "thinners"
White spirit etc.

Sensitisers

Aniline derivatives
e.g. T.N.T. Tetryl
Acridine derivatives
e.g. acriflavine
Oils and coal tars
Procaine
Explosives
Rubber
Photo developers
Soaps and cosmetics

Dyes
e.g. paraphenylene-diamine
Resins and plastics
e.g. epoxy resin
Metals
e.g. nickel chromates
Plants
e.g. tulips, primula
Woods
e.g. W. African mahogany etc.

Symptoms and signs

The symptoms and signs of irritant and allergic dermatitis are very similar. The actual diagnosis is a medical problem. There must be a history of contact with an irritant or sensitiser. Also, the condition tends to improve with absence of contact, for example, over weekends and during holidays.

Note that:

- cases vary greatly in severity; and
- not all of the following symptoms and signs will be present in each casualty.

Acute dermatitis

- itching or burning sensation;
- erythema (redness of the skin);
- papules (raised areas of skin, like hives);
- vesicles (small blisters);
- swelling of the affected areas;
- crusting (due to drying of the serum).

Chronic dermatitis

- mild irritation;
- thickening and scaliness;



Fig. 50 — Acute dermatitis of the hand.

- cracks, fissures and ulcers.

The hands are most commonly affected, then the forearms, the face, the neck, areas irritated by clothing (collar, cuffs and belt line), and finally any other part of the body.

Dermatitis is not necessarily occupational. Other skin diseases have similar symptoms and signs. Also irritant and allergic dermatitis can be due to contact with:

- substances in common use in the house and garden;
- plants, grasses and other vegetable matter;
- animals, insects and parasites;
- drugs, ointments and lotions.

Management

No cases of dermatitis should receive continuing treatment in the first aid room.

Acute dermatitis

- Often it will be impossible for the first aider to identify the agent responsible; however, if there is an obvious cause, remove the casualty and wash off any irritant under warm running water.
- If itching is intense, apply calamine lotion.
- Refer for medical treatment if the dermatitis persists.

Chronic dermatitis

- There is no first aid treatment for chronic dermatitis.
- Do not apply any cream, ointment or lotion.
- Refer all cases for medical attention.

When referring cases of acute or chronic dermatitis send a note with the casualty advising of any known irritants or sensitisers in use at the workplace.

Prevention

All chemicals used should be examined to ascertain if they are known skin irritants or sensitisers. Make a list and keep it in the first aid room.

Personal cleanliness:

- The workplace should be provided with adequate washing facilities with warm running water, cleansing agent and paper towels. Where potent irritants are used, full showering facilities and change rooms are required.

Protective clothing:

- The occupational first aider should inform management if, despite provision of protective clothing, cases of dermatitis are still occurring.

Barrier creams:

- These creams provide only marginal protection from skin irritants but make removal of the irritant by washing, easier. Barrier creams must be reapplied following washing, before resuming work.

SKIN INFECTION WITHOUT INJURY

Work in hot and humid conditions, particularly if combined with poor personal hygiene, predisposes to skin infection. Most workers with simple skin infections do not seek medical attention but may attend the first aid room for treatment.

Skin infections are usually caused by staphylococci ("golden staph") gaining entry through a hair follicle. Because of the plugging effect of oil and other petroleum products on hair follicles, workers whose skin is in frequent contact with such products are particularly at risk.

FOLLICULITIS

This is a superficial infection of the hair follicle. It is commonly known as a pimple. The condition starts as a small, red, slightly raised tender area and later forms a small amount of pus which is seen as a yellowish white spot. Multiple lesions are common. There is no general effect on the body, i.e. normal temperature, pulse rate and no malaise (feeling unwell).

Management

- Do not squeeze a pimple as this spreads infection. This is particularly important if the lesion is near the eye, nose or upper lip, as the infection may spread inside the skull with the risk of serious illness.
- Advise the casualty to wash with antiseptic soap.
- If the lesion is being irritated, e.g. by clothing, swab the area with dilute antiseptic solution and apply a small dressing smeared with antiseptic cream. Redress at the beginning and end of each shift.

FURUNCULOSIS (BOILS)

These are similar to folliculitis except that the infection is deeper and involves the whole of the hair follicle and surrounding tissue. There is swelling, pain and tenderness and often a surrounding area

of inflammation. Pus, when it forms, tends to be semi-solid, forming the core of the boil. Infection may spread by the lymphatics to form swollen, tender glands in the groin or arm pit. Unless infection spreads, there is no general effect on the body. A single boil usually runs its course in one to two weeks. Infection, however, may spread from one part of the body to another, resulting in multiple or recurrent boils.

Management

- Never squeeze a boil.
- Use the disposable standard dressing kit, if available.
- Swab the area with dilute antiseptic solution.
- Apply a non-adherent dressing and secure with a bandage.
- Avoid adhesive dressings.
- If the boil is discharging pus, dressings may need to be replaced several times a day. Dispose of soiled dressings immediately.



Fig. 51 — Furuncle on the cheek.

Refer the casualty for medical attention if:

- there are signs of infection spreading;
- lymph glands are swollen and tender;
- there are general symptoms and signs of infection;
- the boil is on the face near the eyes, nose, or upper lip (Fig 51);
- the casualty is a known diabetic;
- the boil is in the arm pit, with pain on using the arm;
- recurrent boils occur.

CARBUNCLE

A carbuncle consists of several boils which have joined together to form a large abscess discharging from multiple sites (two or more cores). Before pus starts to discharge the area is red, angry and swollen with considerable pain and tenderness. The temperature and pulse rate are often raised and the casualty feels unwell.

A carbuncle always requires medical attention.

TINEA

Tinea is a fungal infection of the skin. It is transmitted directly from person to person and, also, by indirect contact through towels, shower room floors, etc.

Fungal infections are common in skin made moist by perspiration in the hot humid conditions of some occupational environments.

Common forms of tinea are:

- Tinea pedis (athlete's foot) which usually occurs between the toes (especially between the 4th and 5th toes) and presents as white sodden skin which may progress to cracks and raw red areas. The main symptom is itch with perhaps burning and stinging as well.
- Tinea cruris (tinea of the groin, jock itch). Here itchy red areas with a raised, sharply demarcated red border are found, usually in both groins.
- Tinea corporis (tinea of the body, ringworm). Itchy, scaly, roughly circular areas with a slightly raised red border develop, usually on exposed skin surfaces.

A large proportion of cases diagnosed as tinea by untrained observers are not fungal in origin and the application of various antifungal ointments and lotions to these misdiagnosed cases is a

potent cause of dermatitis. For this reason, antifungal agents are not to be kept in the first aid box or first aid room.

Treatment

Advise the casualty to adopt the following hygiene measures:

- Careful washing and drying of the skin particularly between the toes.
- Drying the skin with methylated spirit and the application of a drying powder such as talcum powder (not an antifungal powder).
- Regular changing of socks and underwear.

Secondary bacterial infection resulting in spreading inflammation and perhaps swollen tender lymph glands may occur. All such cases require medical attention.

Prevention

- Careful personal hygiene.
- Hygiene of communal showers and washrooms. The floors should be cleaned daily with a hose and stiff bristle broom followed by a commercial chlorine-based antiseptic solution.
- Towels must not be shared.

TOXICOLOGY

Toxicology is the science dealing with the harmful affects of substances. These may be:

- naturally occurring, e.g. hydrogen sulphide in mines and sewers;
- used in industry e.g. lead in battery making;
- by-products, e.g. carbon monoxide;
- industrial products e.g. pesticides.

Most problems arise because persons in industry are relatively unaware of dangers of the ever-increasing number of complex agents in use. This is because:

- the subject is so vast that only scientists and doctors working in occupational health have a complete knowledge of the subject;
- chemical or trade names often give no warning of the hazardous nature of the substances;
- toxic effects may take many years to make themselves known;
- substances once considered as harmless, e.g. aniline dyes, are now known to be dangerous; other substances now considered safe may prove to be dangerous in the future;
- workers tend to become overfamiliar with constant use of known hazardous materials and careless in their use;
- workers fail to read, or disregard, warning notices.

The occupational first aider should have a specific knowledge of hazardous substances used at his workplace and a sound knowledge of the first aid treatment of poisoning. It is necessary:

- to have a Manual of Hazardous Materials (or data sheets) with information on first aid treatment; this Manual should be provided by management and held at the first aid post or room;
- to know the trade name, chemical name and common-usage name of all hazardous materials in use;
- to have a cross index of the above for quick and easy reference.

TOXICITY

This is the ability of a chemical to produce injury when it reaches a susceptible site in the body.

TOXICITY HAZARD

This is the probability that injury will be caused by the manner in which the substance is used.

CLASSES OF TOXIC SUBSTANCES

Toxic substances come in many forms. Apart from solids and liquids (which need no explanation) and living agents, such as bacteria, moulds, parasites, there are other forms which must be known and understood.

These include:

- Dusts:** Solid particles generated by handling, crushing, grinding, rapid impact, detonation or calcining of organic or inorganic materials such as rocks, ore, metal, coal, wood, grain, etc.
Dusts do not diffuse in air but settle slowly under the effects of gravity. Electrostatic forces may cause dust particles to stick together (flocculate) and settle rapidly.
- Fumes:** Solid particles formed by condensation from the gaseous state, generally after volatilisation of molten metals etc. This is often accompanied by a chemical reaction such as oxidation (e.g. in welding). Fumes flocculate and sometimes coalesce.
- Mists:** Suspended liquid droplets formed by condensation from the gaseous state, or by the breaking up of a liquid into a dispersed state, such as splashing, foaming and atomising (e.g. electroplating).
- Vapours:** The gaseous forms of substances which are normally in the solid or liquid state, which can be changed back to these states by increasing the pressure, or by decreasing the temperature (e.g. degreasing). Vapours diffuse in air.

- Gases:** Formless fluids which occupy the space of enclosure and which can be changed to the liquid or solid states only by the combined effect of increased pressure and decreased temperature (e.g. smelting). Gases diffuse in air.
- Smoke:** Carbon or soot particles less than 0.1μ in size ($1 \mu = 1/1\,000\,000 \text{ m}$) which result from the incomplete combustion of carbonaceous materials such as coal or oil.
- Aerosols:** Liquid droplets or solid particles that are small enough in particle size to remain dispersed in air for a period of time (e.g. agricultural spraying).

FACTORS INFLUENCING TOXICITY

Toxic substances are not always dangerous. Factors to be considered in assessing the danger of a substance include:

- degree of toxicity;
- level of concentration;
- duration of exposure;
- state of dispersion (particle size or physical state, e.g. dust, fumes, gas, etc.);
- affinity for human tissues;
- solubility in human tissue fluids;
- sensitivity of human tissue and organs.

Wide variations in these factors occur with toxic substances. Toxicologists have investigated the adverse effects of toxic substances and have recommended a hygienic standard for the atmospheric contamination of these substances.

HYGIENIC STANDARDS

The Hygienic Standards are published in the NH & MRC approved *Occupational Health Guide—Hygienic Standards for Atmospheric Contaminants*. The occupational first aider should familiarise himself with the contents of this document.

OTHER TERMS AND ABBREVIATIONS

A list of terms and abbreviations referring to various aspects of toxicology, with a definition of each, is given as follows:

| | |
|-------------|--|
| Acute: | Is used in the medical sense to mean "of short duration", i.e. seconds, minutes or hours when referring to inhalation or skin absorption, and a single quantity or dose when discussing ingestion or injection. |
| Chronic: | Is used in contrast to acute and indicates "of long duration", i.e. prolonged or repeated exposure over a period of days, months or years. It does not refer to the symptoms but to time of exposure, or number of doses which would be relatively harmless unless extended or repeated. |
| Sub-acute: | Lies between "acute" and "chronic" and will be included under "chronic". |
| Local: | Refers to the site of the effect of a toxic substance, and means that the effect takes place actually at the point of contact with the body. |
| Systemic: | Refers to the effects of a toxic substance in other parts of the body away from the point of contact. Systemic effects only occur when absorption of the substance into the body has taken place. |
| Absorption: | Occurs when a substance gains entry to the body through the skin, mucous membrane (e.g. mouth, nose), lung alveoli, stomach and bowel. It may then be carried to all parts of the body by the blood stream. |
| mg/L: | Milligrams of a substance per litre of solution. |
| μ g/L: | Micrograms of a substance per litre of solution. |
| M.L.D.: | Minimum lethal dose, the smallest dose of a toxic substance which kills one of a group of test animals. |
| L.D.50: | Lethal dose for 50%, the dose which kills $\frac{1}{2}$ of a group of test animals. |
| L.D.100: | Lethal dose for 100%, the dose which kills all of a group of test animals. |
| L.C.: | Lethal concentration — of airborne toxic substances. |

| | |
|-------------------|---|
| Flash point: | The minimum temperature at which a liquid gives off a vapour, in sufficient quantity to form an ignitable mixture with air, near the surface of the liquid. |
| Flammable limits: | Flammable liquids have a minimum concentration of vapour in air below which there is no propagation of flame on contact with a source of ignition. This is called L.E.L., the Lower Explosive Limit. There is also a maximum concentration above which propagation of flame does not occur. This is called U.E.L., the Upper Explosive Limit. |

POISONING

Poisoning may result from the entry of a toxic substance into the body:

- in large or small quantities;
- in a concentrated or dilute form;
- once or over a period of time.

The poison may enter the body by:

- inhalation;
- ingestion;
- absorption.

The poison and the route of entry will determine the nature of the poisoning and the type of emergency treatment necessary.

Inhalation

A large variety of harmful dusts, fumes, vapours and gases occur at the workplace and their inhalation is the commonest cause of occupational illness. Effects on the body are many and varied.

Simple asphyxiants:

- These, by replacing air, do not allow sufficient oxygen to be available for body needs. Examples are nitrogen (blackdamp in mines), methane (firedamp), and carbon dioxide (fermentation vats and agricultural silos). They are not strictly toxic substances.

Local effect:

- The nose, throat and occasionally, the lungs may be irritated by acids, alkalis, and other substances such as chlorine and ammonia.

Allergic and sensitisation reactions:

- These occur in the case of exposure to flours, grains, woods, fungi and enzymes.

Metal fume fever:

- Begins a few hours after exposure e.g. following the inhalation of zinc fumes, with shivering, pains in the limbs, headache, tightness in the chest and fever. Recovery occurs within 24 hours.

Systemic effects:

- Many factors are involved in this type of poisoning such as the type and size of dust particle, concentration, duration of exposure, individual sensitivity, past health, etc; substances involved include lead, cadmium, mercury.

Fibrosis:

- Certain dusts (e.g. silica and asbestos) may cause effects on the lungs when exposure occurs over many years, e.g. in mining. This direct effect leads to fibrosis of the lung tissue, known medically as pneumoconiosis.

Ingestion

The effect of an ingested poison may be:

Local:

- On the gastro-intestinal tract; as occurs with the swallowing of a strong acid or alkali.

Systemic:

- As with the ingestion of lead or arsenic.

Skin absorption

Toxic materials in contact with the skin may produce:

- Local effect: e.g. burns, dermatitis or ulcers, as may occur with acids, alkalis and chromium.
- Systemic effect: e.g. poisoning by the organo-phosphorous pesticides, causing paralysis. Aniline used in the dye industry can cause liver and kidney damage.

GENERAL PROCEDURES FOR EMERGENCY TREATMENT OF POISONING

Inhalation

- Remove the victim from the contaminated area; rescuers should be provided with respiratory protection and life lines.
- Keep the casualty warm (not hot) and quiet. Lying flat is usually the best position if the casualty is conscious.



Fig. 52 — Rescuer about to enter contaminated room. Note respiratory apparatus and life line.

- If breathing is distressed, or the casualty is cyanosed with an open airway, administer oxygen, if available.
- Support breathing or circulation, as required.
- If unconscious, treat as for unconsciousness from any cause.

Ingestion

- Attempt to empty the stomach by giving an emetic — syrup of ipecac, 50 ml, followed by a glass of water or milk.
- Do *not* induce vomiting when:
 - the poison is a strong acid, a strong alkali, a fuel or solvent;
 - the nature of the poison is unknown;
 - the casualty is unconscious;

- the casualty is having convulsions.

In the first two instances dilute the poison by giving fluids by mouth.

- Apply first aid if consciousness is lost or breathing or circulation fails.

Skin absorption

- Remove contaminated clothing. Use gloves if available.
- Dilute the contaminating substance with large amounts of water, e.g. shower, hose, bucket. Use luke warm water if available.
- Immediate dilution is the most important part of the whole treatment. Do not waste time looking for a chemical neutraliser.
- For treatment of chemical burns see Page 87.
- Use basic first aid treatment if consciousness is lost or breathing or circulation fails.

Following emergency treatment, all poison casualties must be sent for medical attention.

PREVENTION

Prevention of poisoning is largely the responsibility of management. However, the co-operation by workers, in the maintenance of exhaust ventilation, and in the use of protective devices and washing facilities, etc., is essential.

Environmental controls

- Substitution where possible of a more with a less toxic substance, e.g. toluene instead of benzene.
- Ventilation — local exhaust: Hoods, slots and booths; these prevent spread of toxic substances into the work area.
— general: Good ventilation prevents the rise of the concentration of toxic substances.
- Transportation by enclosed mechanical conveyors whenever possible.
- Isolation of toxic materials from workers by containing the materials in ducts, pipes, flues, retorts, vats, tanks and stills.
- Good washing facilities: for both work area and staff.
- Good housekeeping.

Protective measures

- Instruction to operators and supervisors in the use and care of personal protective equipment, and procedures to be adopted in cases of emergency.
- Instruction to operators in the hazards they may encounter, and the need to report if there is any evidence of exposure or illness.
- Supervision to ensure protective equipment is used.

SOME USEFUL REMINDERS

- Check that all rescue and resuscitation equipment is available and in good repair.
- Arrange a working liaison with the safety officer, and, in conjunction with him, use bulletins, posters and displays to inform and educate employees on health and safety matters.
- In the absence of an established safety service check that:
 - storage, handling and disposal are carried out as recommended;
 - immediate first aid needs, e.g. deluge showers, eye irrigators and oxygen, are available;
 - the correct personal protective equipment is available, used and understood and that it is available for use when entry into a contaminated area is required for first aid.
- Arrange that a working liaison with such personnel as:
 - Poisons Information Centre — the telephone number is listed with the emergency numbers in the telephone book;
 - local medical practitioner;
 - nearest hospital;
 - ambulance;
 - emergency services.
- Ensure there are adequate means of communication:
 - with the factory or work site;
 - with outside bodies.
- Ensure there are adequate means of transport:
 - within the factory or work site;
 - to outside bodies.
- Ensure facilities and procedures can cope with a group or mass emergencies.
- Arrange a method of conveying to the medical attendant or hospital the following information. Details may be given by phone, but written details should be sent with the casualty:

- details of the poison (it may be a common one in your factory but little known to the hospital or doctor);
 - known antidotes;
 - history and time of the accident;
 - clinical notes including observations of pulse, respiration, etc;
 - treatment given;
 - any other relevant information.
- Develop an understanding of industrial hygiene and learn how to recognise, evaluate and control environmental hazards.

ADDITIONAL READING

References giving details of specific poisons and toxic agents are given below.

1. Dreisback, R.H. *Handbook of Poisoning* — Lange Publications.
2. *Encyclopaedia of Occupational Health and Safety* International Labour Office, ILO — Geneva.
3. *Occupational Health Practice* — ed Schilling — Butterworths.
4. *Industrial Hygiene and Toxicology* — ed Patty — 2 Vols — Interscience, New York.
5. *Accident Prevention Manual for Industrial Operations* — National Safety Council — USA.
6. Approved *Occupational Health Guide* — National Health and Medical Research Council.
7. *Hygienic Guide Series* — American Industrial Hygiene Association.
8. *Documentation of the Threshold Limit Values* — American Conference of Governmental Industrial Hygienists.
9. *Chemical Safety Data Sheets* — Manufacturing Chemist Association, Washington.

APPENDIX I

OCCUPATIONAL HEALTH AUTHORITIES

New South Wales

Division of Occupational Health and Radiation Control
Health Commission of New South Wales
Joseph Street (P.O. Box 163)
LIDCOMBE N.S.W. 2141
(Telephone: 646 0222)

Victoria

Industrial Hygiene Division
Health Commission of Victoria
555 Collins Street
MELBOURNE. VIC. 3000
(Telephone: 616 7777)

Queensland

Division of Industrial Medicine
Department of Health
Health and Welfare Building
George Street
BRISBANE QLD. 4000
(Telephone: 224 5688)

South Australia

Division of Environmental and Occupational Health
South Australian Health Commission
52 Pirie Street (G.P.O. Box 1313)
ADELAIDE S.A. 5001
(Telephone: 228 0911)

Western Australia

Division of Occupational Health
 Department of Public Health
 57 Murray Street (G.P.O. Box 134)
 PERTH W.A. 6001
 (Telephone: 325 7911)

Tasmania

Division of Public Health
 Department of Health Services
 34 Davey Street (G.P.O. Box 191B)
 HOBART TAS. 7001
 (Telephone: 30 8022)

Australian Capital Territory

Capital Territory Health Commission
 CTHC Building
 Cnr Moore and Alinga Streets
 (P.O. Box 825),
 CANBERRA CITY A.C.T. 2601
 (Telephone: 45 4111)

Northern Territory

Northern Territory Department of Health
 MLC Building
 Smith Street (P.O. Box 1701)
 DARWIN N.T. 5794
 (Telephone: 802 9111)

APPENDIX II

| A.B.C. MANUFACTURING CO. | | FIRST AID RECORD CARD | |
|--|-------------|-----------------------|----------------|
| SURNAME (BLOCK LETTERS) | GIVEN NAMES | DATE OF BIRTH / / | DEPARTMENT |
| ADDRESS | | | PAY NUMBER |
| NEXT OF KIN | | | CLASSIFICATION |
| MEDICAL DETAILS | | | |
| BLOOD GROUP | ALLERGIES | | |
| OTHER CONDITIONS, MEDICATION, RESTRICTIONS | | | |
| | | | |
| DATE | TIME | NOTES | SIGNATURE |
| | | | |
| | | | |
| | | | |
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Example of a First Aid Record card — reverse is the same as the lower section of the card.

List instruction on the outside of the filing box or cabinet.

e.g. Record:

- All attendances.
- Full details of no-time-loss work-related injuries and illness.
- Full details of time-loss illness not related to work.
- Date, time, a short description and cross-reference to Notice of Injury form for time-loss, work-related injuries and illness.

