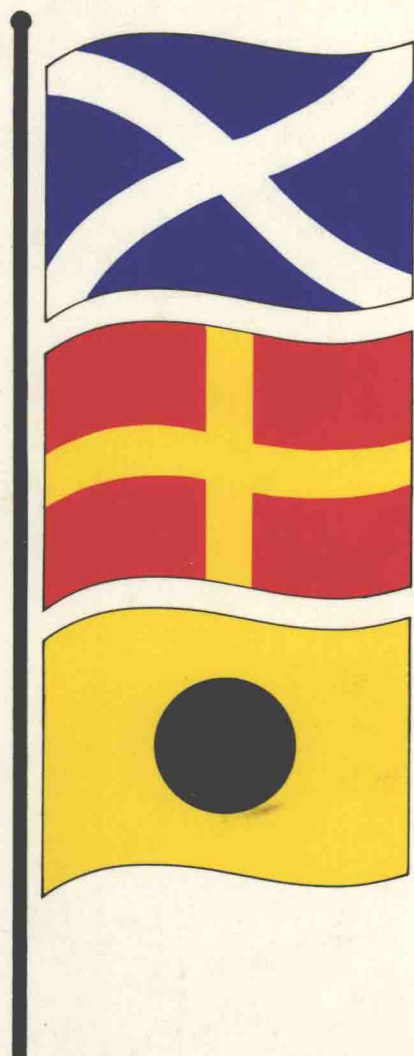


INTERNATIONAL MEDICAL GUIDE FOR SHIPS

2nd Edition



WORLD HEALTH ORGANIZATION
GENEVA



INTERNATIONAL MEDICAL GUIDE FOR SHIPS

Including the ship's medicine chest

Second edition



World Health Organization
Geneva
1988

The World Health Organization is a specialized agency of the United Nations with primary responsibility for international health matters and public health. Through this organization, which was created in 1948, the health professions of some 165 countries exchange their knowledge and experience with the aim of making possible the attainment by all citizens of the world by the year 2000 of a level of health that will permit them to lead a socially and economically productive life.

By means of direct technical cooperation with its Member States, and by stimulating such cooperation among them, WHO promotes the development of comprehensive health services, the prevention and control of diseases, the improvement of environmental conditions, the development of health manpower, the coordination and development of biomedical and health services research, and the planning and implementation of health programmes.

These broad fields of endeavour encompass a wide variety of activities, such as developing systems of primary health care that reach the whole population

of Member countries; promoting the health of mothers and children; combating malnutrition; controlling malaria and other communicable diseases including tuberculosis and leprosy; having achieved the eradication of smallpox, promoting mass immunization against a number of other preventable diseases; improving mental health; providing safe water supplies; and training health personnel of all categories.

Progress towards better health throughout the world also demands international cooperation in such matters as establishing international standards for biological substances, pesticides and pharmaceuticals; formulating environmental health criteria; recommending international nonproprietary names for drugs; administering the International Health Regulations; revising the International Classification of Diseases, Injuries, and Causes of Death; and collecting and disseminating health statistical information.

Further information on many aspects of WHO's work is presented in the Organization's publications.

Illustrations by Shaun Smyth.

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persons, external assistance to be obtained in case of serious health problems at sea, and diseases of fishermen. The diseases described in the last-mentioned chapter have been selected mainly on the basis of experience among fishermen in the North Atlantic and North Sea. Contributions by doctors from fishing vessels operating in tropical waters are invited, so that a wider range of fishermen's diseases may be covered in the next edition.

It was decided that the section on the International Code of Signals in the first edition of the guide served no useful purpose, and it has been dropped. Coded messages on such important matters as health emergencies on board ship may give rise to misunderstanding and should be avoided as far as possible. Plain language should be used in communicating with doctors on shore or on board other ships.

Advice on the prevention of diseases has been included in the sections dealing with them, and also in a brief separate chapter (Chapter 16).

¹ WHO Technical Report Series, No. 770, 1988 (*The use of essential drugs*: third report of the WHO Expert Committee).

A list of medicines recommended for use on board ships follows the chapter giving general advice on medicines. It is based on the WHO list of essential drugs,¹ and generic names are used.

Both the list of medicines and the list of recommended surgical equipment, instruments, and supplies given in the guide should be reviewed once every two years by the national health authorities of the maritime countries and the necessary changes, deletions, and additions made, in order to keep up with scientific progress and the requirements of maritime practice.

The number of illustrations in the guide has been more than doubled and new tables have been added. These will make the book more useful for the training of non-medical personnel in dealing with health problems on board ship.

At the September 1981 meeting of the Joint ILO/WHO Committee, references were made to the modern telemetric system of sending health information from ship to a hospital on shore and back. Since the equipment and the necessary shore units are not yet available in most maritime countries, this subject has not been dealt with in the present edition.

Preface

Over 20 years have passed since the first edition of the *International Medical Guide for Ships* (IMGS) was published by the World Health Organization. During this time, it has served the international seafaring community well.

Scientific progress and developments in seafaring during the last decade have made it necessary to revise and update the guide. In September 1981, the Joint ILO/WHO Committee on the Health of Seafarers met in Geneva to review its technical content in detail and discuss the necessary changes. The Committee included representatives of the Inter-Governmental Maritime Consultative Organization (now the International Maritime Organization), of seafarers and of shipowners, experts on maritime medicine, and staff members of ILO and WHO. A list of the participants will be found in Annex 6.

Because it was important to have the revised version of the guide as soon as possible, it was decided to base it on recently published and updated national medical guides for ships.

The publishers of those guides have kindly made texts and illustrations available to WHO thus greatly reducing the time required to prepare the revised text. Thanks are due particularly to the United Kingdom Department of Trade and the United States Department of Health and Human Services, Public Health Service, for their contributions. Crown copyright material from the 1983 edition of *The ship captain's medical guide*¹ is used with the permission of the Controller of Her Britannic Majesty's Stationery

Office. Material from *The ship's medicine chest and medical aid at sea*² was made available to WHO by the Office of the Surgeon General, United States Department of Health and Human Services, Public Health Service.

The updating of the guide began shortly after the joint ILO/WHO Committee meeting. The draft sections of the updated text were later reviewed by the relevant units and divisions at WHO Headquarters.

The general layout of the guide has been changed from that of the first edition, to make it easier for non-medical persons responsible for the health of people on board ship to find advice on how to deal with emergencies without delay.

Conditions requiring immediate first aid are dealt with in Chapter 1, the pages of which are colour marked.

This chapter is followed by one on the toxic hazards of chemicals carried on board ship, in which there are cross-references to the *Medical first aid guide for use in accidents involving dangerous goods*³ published by the International Maritime Organization (IMO) on behalf of ILO, IMO, and WHO. This is the Chemicals Supplement to the present guide and must be available on board all ships that carry, or might carry, dangerous cargo.

The approach, used in the first edition, of grouping diseases in chapters based on systems: respiratory, digestive, nervous, etc. (as in a medical textbook) has been changed. For easy reference, about 60 diseases and medical problems have been selected (e.g., abdominal pain, chest pain, colds, cough, headache, and high temperature), arranged in alphabetical order, and described in a single chapter (Chapter 8).

Because of the increased employment of women on ships, a chapter on pregnancy and women's medical problems has been added. Other new chapters included in the revised guide deal with the medical care of castaways and rescued

¹ DEPARTMENT OF TRADE. *The ship captain's medical guide*. London, Her Majesty's Stationery Office, 1983.

² DEPARTMENT OF HEALTH AND HUMAN SERVICES, PUBLIC HEALTH SERVICE, OFFICE OF THE SURGEON GENERAL. *The ship's medicine chest and medical aid at sea*. Washington, DC, US Government Printing Office, 1984 (DHHS Publication No. (PHS) 84-2024).

³ *Medical first aid guide for use in accidents involving dangerous goods*. London, International Maritime Organization, 1985.

Introduction.

How to use the guide

The three functions of this guide are:

- to enable users to diagnose and treat injured and sick seafarers;
- to serve as a textbook on medical problems for those studying for a certificate in medical training;
- to help in giving crews some training on first aid, and on the prevention of diseases.

The guide should be kept in the ship's medical cabinet.

Those seeing this revised, second edition of the guide for the first time, should familiarize themselves with its contents. This will not only refresh and update their knowledge of medical problems, but will also help them to find *quickly*, in the relevant chapter and page, all the necessary information and advice, when there is a case of injury or illness on board.

First aid

First aid treatment for casualties is presented in Chapter 1 and, as regards toxic hazards, in Chapter 2. The pages of Chapter 1 have coloured corners to make it quickly and easily identifiable. Normally, there will also be on board a copy of the IMO publication *Medical first aid guide for use in accidents involving dangerous goods* (the Chemicals Supplement to the present guide),¹ in which more information on the subject of poisoning may be found.

Chapter 4 describes such further treatment for wounds and other injuries as may be necessary, following first aid and removal of a casualty to the ship's hospital or cabin.

In an emergency, there will probably be no time to find and consult the relevant sections of the guide concerning first aid and the application of

artificial respiration to a casualty, since one or two minutes may mean the difference between life and death. All seafarers should therefore receive training in the basic first aid skills, and their training and retraining in this area should be continued on every voyage. The most important life-saving skills are: artificial respiration, heart compression, and the control of severe bleeding.

It is necessary that on board all ships not carrying a doctor there should be at least one crew member, but preferably more, not only with a good practical knowledge of first aid skills, but also with training in nursing patients, administering oxygen and drugs from the ship's medicine chest, giving injections, etc. These skills cannot be learned simply by reading sections of this guide. They must be demonstrated and practised under supervision before the need arises to employ them at sea.

Illness

When a person falls sick, the first step is diagnosis. Some diseases and medical problems are relatively easy to diagnose; the diagnosis of others may be much more difficult.

Chapter 3 (Examination of the patient) describes how to take a patient's history, how to conduct a physical examination, how to note and record symptoms and signs of disease systematically, and also how to draw conclusions leading to a probable diagnosis.

The tables and figures in the text will be helpful, particularly in cases of abdominal or chest pain.

Diagnosis of the common diseases need not always be difficult if the person responsible is methodical and makes plenty of legible notes.

Once the initial diagnosis is made, find the relevant section in the guide, read the description

¹ *Medical first aid guide for use in accidents involving dangerous goods*. London, International Maritime Organization, 1985.

of the disease, and give the recommended treatment.

Monitor and record the patient's progress carefully. If other symptoms arise, check again to see whether the initial diagnosis was correct. If you are unsure of the diagnosis and the patient does not appear to be very ill, treat the symptoms only: for instance, relieve pain by giving acetylsalicylic acid or paracetamol tablets and allow the patient to rest in bed. See how the illness progresses. If the symptoms disappear you are on safe ground. If they do not, you will normally find that by the second or third day of the illness, the symptoms and signs are sufficient to permit a diagnosis. If the patient's condition worsens and you are still unable to make a diagnosis, seek RADIO MEDICAL ADVICE.

General advice on nursing the patient while he has to remain in bed, on treatment procedures, and on administering medicaments, is given in Chapter 5 (General nursing care).

Communicable diseases are described in Chapter 6, sexually transmitted diseases in Chapter 7, and other diseases and medical problems, including such general signs and symptoms as high temperature, cough, oedema, and abdominal and chest pain, in Chapter 8.

Women patients

Many ships carry women as passengers or crew members; some of their specific medical problems, and also pregnancy and childbirth, are described in Chapters 10 and 11.

Fishermen, castaways, radio medical advice

Also covered are diseases of fishermen (Chapter 9), and medical care of castaways and rescued persons (Chapter 12); advice is also given on what to do in the event of death at sea (Chapter 13).

Chapter 14 describes how to prepare and present information on a case of disease to the doctor on

shore (or on board another ship), when requesting radio medical advice, and also how to arrange for the transport of a patient by helicopter.

Prevention

Prevention is always better than cure. Many diseases occurring among seafarers can easily be prevented. The chapters on environmental control aboard ship (Chapter 15) and disease prevention (Chapter 16) should be read by the person responsible for the health of the crew, seafarers should be advised accordingly, and appropriate measures aimed at controlling diseases should be taken, such as: conducting regular sanitary inspections of the ship and maintaining cleanliness in the crew's living quarters and the galley, controlling disease vectors on board, chemoprophylaxis of malaria, immunization, etc.

Medicines

Chapters 17 and 18 of the guide contain information on the procurement and storage of medicines for the ship's medicine chest and on their use. All the medicines are listed in alphabetical order, and also according to the site and nature of their action. Advice is given for each of them as regards use, dosage in adults, and specific precautions to be taken when administering them.

The Annexes

Annex 1 contains notes on anatomy and physiology, while the different regions of the body are named in Annex 2. These two annexes will help in the examination of patients, in diagnosis, and in the preparation of notes for a doctor on shore before requesting his advice by radio. Annex 5 describes a procedure for the disinfection of potable water with chlorine.

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Chapter 1

First aid

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First aid is the emergency treatment given to the ill or injured before professional medical services can be obtained. It is given to prevent death or further injury, to counteract shock, and to relieve pain. Certain conditions, such as severe bleeding or asphyxiation, require *immediate* treatment if the patient is to survive. In such cases, even a few seconds' delay might mean the difference between life and death. However, the treatment of most injuries or other medical emergencies may be safely postponed for the few minutes required to locate a crew-member skilled in first aid, or to locate suitable medical supplies and equipment.

All crew-members should be prepared to administer first aid. They should have sufficient knowledge of first aid to be able to apply true emergency measures and decide when treatment can be safely delayed until more skilled personnel arrive. Those not properly trained must recognize their limitations. Procedures and techniques beyond the rescuer's ability should *not* be attempted. More harm than good might result.

Priorities

On finding a casualty:

- look to your own safety: do not become the next casualty;
- if necessary, remove the casualty from danger or remove danger from the casualty (but see observation below on a casualty in an enclosed space). If there is only one unconscious or bleeding casualty (irrespective of the total number of casualties), give immediate treatment to that casualty only, and then send for help.

If there is more than one unconscious or bleeding casualty:

- send for help;
- then start giving appropriate treatment to the worst casualty in the following order of priority: severe bleeding; stopped breathing/heart; unconsciousness.

If the casualty is in an enclosed space, do not enter the enclosed space unless you are a trained

member of a rescue team acting under instructions. Send for help and inform the master.

It must be assumed that the atmosphere in the space is hostile. The rescue team **MUST NOT** enter unless wearing breathing apparatus which must also be fitted to the casualty as soon as possible. The casualty must be removed quickly to the nearest safe adjacent area outside the enclosed space unless his injuries and the likely time of evacuation make some treatment essential before he can be moved.

General principles of first aid aboard ship

First aid must be administered *immediately* to:

- restore breathing and heart-beat;
- control bleeding;
- remove poisons;
- prevent further injury to the patient (for instance, his removal from a room containing carbon monoxide or smoke).

A rapid, emergency evaluation of the patient should be made immediately at the scene of the injury to determine the type and extent of the trauma. Because every second may count, only the essential pieces of the patient's clothing should be removed.

In the case of an injured limb, get the sound limb out of the clothing first, and then peel the clothes off the injured limb. If necessary, cut clothes to expose the injured part.

Keep workers from crowding round.

The patient's pulse should be taken. If it cannot be felt at the wrist, it should be felt at the carotid artery at the side of the neck (see Fig. 2). If there is no pulse, heart compression and artificial respiration must be started (see Basic life support, page 6). The patient should be treated for shock if the pulse is weak and rapid, or the skin pale, cold, and possibly moist, with an increased rate of shallow, irregular breathing. Remember that shock can be a great danger to life, and its prevention is one of the main objectives of first aid (see Shock, page 17).

The patient should be kept in the position that best provides relief from his injuries. Usually this is a lying-down position, which increases circulation of the blood to the head.

The patient should be observed for type of breathing and possible bleeding. If he is not breathing, mouth-to-mouth or mouth-to-nose artificial respiration must be given (see pages 8–9).

Severe bleeding must be controlled.

During this time, the patient, if conscious, should be reassured and told that all possible help is being given. The rescuer should ask about the location of any painful areas.

The patient should be kept in a lying-down position and moved only when absolutely necessary. The general appearance of the patient should be observed, including any signs and symptoms that may indicate a specific injury or illness.

The patient should *not* be moved if injuries of the neck or spine are suspected. Fractures should be splinted before moving a patient (see pages 19–22). No attempt should be made to set a fracture.

Wounds and most burns should be covered to prevent infection. The treatment of specific injuries will be discussed more fully in the rest of this chapter, and in the next chapter.

Once life-saving measures have been started or deemed not necessary, the patient should be examined more thoroughly for other injuries.

The patient should be covered to prevent loss of body heat.

If necessary, protect him also from heat, remembering that in the tropics, the open steel deck on which he may be lying will usually be very hot.

The patient should not be given alcohol in any form.

Never underestimate and do not treat as minor injuries:

- unconsciousness (page 3);
- suspected internal bleeding (page 40);

- stab or puncture wounds (page 68);
- wounds near joints (see Fractures, page 19);
- possible fractures (page 19);
- eye injuries (page 76).

Note. Never consider anyone to be dead, until you and others agree that:

- no pulse can be felt, and no sounds are heard when the examiner's ear is put to the chest;
- breathing has stopped;
- the eyes are glazed and sunken;
- there is progressive cooling of the body (this may not apply if the surrounding air temperature is close to normal body temperature).

Unconscious casualties

(See also: Basic life support: artificial respiration and heart compression, page 6; General nursing care, Unconscious patients, page 104.)

The causes of unconsciousness are many and are often difficult to determine (see Table 1). Treatment varies with the cause, but in first aid it is usually not possible to make a diagnosis of the cause, let alone undertake treatment.

The immediate threat to life may be:

- breathing obstructed by the tongue falling back and blocking the throat;
- stopped heart.

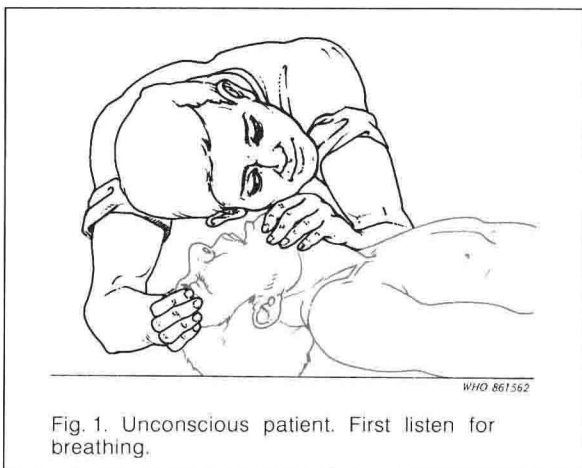


Fig. 1. Unconscious patient. First listen for breathing.

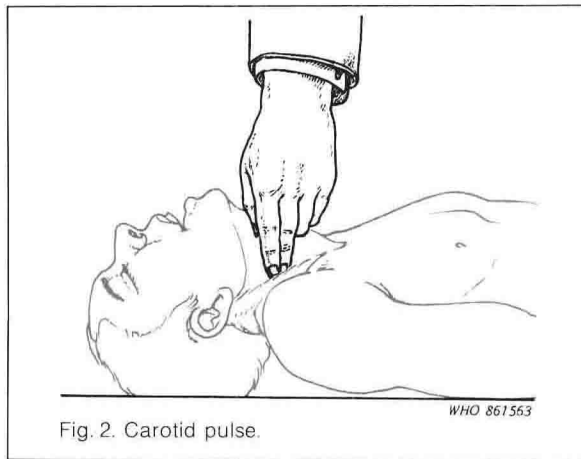


Fig. 2. Carotid pulse.

Breathing

With an unconscious patient, first listen for breathing. To relieve obstructed breathing, tilt the head firmly backwards as far as it will go (see Fig. 1).

Listen and feel for any movement of air, because the chest and abdomen may move in the presence of an obstructed airway, without moving air. The rescuer's face should be placed within 2–3 cm of the patient's nose and mouth so that any exhaled air may be felt against his cheek. Also, the rise and fall of the chest can be observed and the exhaled breath heard (see Fig. 1).

Remove patient's dentures, if any.

Heart

Next, listen for heart sounds. Feel pulse at wrist (see page 94) and neck (carotid pulse, see Fig. 2).

Quickly check the carotid (neck) pulse by placing the tips of the two fingers of one hand into the groove between the windpipe and the large muscle at the side of the neck.

The carotid pulse is normally a strong one; if it cannot be felt or is feeble, there is insufficient circulation.

Check the pupils of the eyes to see if they are dilated or constricted. When the heart stops

Table 1. Diagnostic signs in unconsciousness

	1 Fainting (p. 199)	2 Concussion (p. 74)	3 Brain compression (p. 74)	4 Epilepsy (p. 195)	5 Stroke (p. 231)	6 Alcohol (p. 164)	7 Opium and morphine (p. 191)
Onset	usually sudden	sudden	usually gradual	sudden	sudden as a rule	gradual	gradual
Mental condition	complete unconsciousness	unconsciousness but sometimes confusion only	unconsciousness deepening	complete unconsciousness	complete or partial unconsciousness	stupor, later unconsciousness	unconsciousness deepening
Pulse	feeble and fast	feeble and irregular	gradually slower	fast	slow and full	full and fast, later fast and feeble	feeble and slow
Respiration	quick and shallow	shallow and irregular	slow and noisy	noisy, later deep and slow	slow and noisy	deep, slow, and noisy	slow, may be deep
Skin	pale, cold, and clammy	pale and cold	hot and flushed	livid, later pale	hot and flushed	flushed, later cold and clammy	pale, cold, and clammy
Pupils	equal and dilated	equal	unequal	equal and dilated	unequal	dilated, later may contract; eyes bloodshot	equal, very contracted
Paralysis	none	none	present (of leg or arm)	none	present in leg, arm, or face, or all three, on one side	none	none
Convulsions	none	none	present in some cases	present	present in some cases	none	none
Breath	—	—	—	—	—	smells of alcohol	with opium, musty smell
Special points	often giddiness and swaying before collapse	often signs of head injury; vomiting on recovery	often signs of head injury; remember delayed onset of symptoms	tongue often bitten; urine or faeces may be voided; sometimes injury in falling	over middle age; eyes may look to one side; sometimes loss of speech	absence of the smell of alcohol excludes it as cause, but its presence does not prove that alcohol is the cause	look for source of supply

8 Barbiturate (sedative tablets) (p. 57)	9 Uraemic coma (p. 236)	10 Sunstroke and heat- stroke (p. 205)	11 Electric shock (p. 19)	12 Cyanide (prussic acid) (p. 57)	13 Diabetic coma (p. 187)	14 Shock (p. 17)	
gradual	gradual	gradual or sudden	sudden	very rapid	gradual	gradual	Onset
stupor, later deepening unconsciousness	very drowsy, later unconsciousness	delirium or unconsciousness	unconsciousness	confusion, later unconsciousness	drowsiness, later unconsciousness	listlessness, later unconsciousness	Mental condition
feeble and fast	full	fast and feeble	fast and feeble	fast and feeble, later stops	fast and feeble	fast and very feeble	Pulse
slow, noisy, and irregular	noisy and difficult	difficult	shallow and may cease	slow, gasping, and spasmodic	deep and sighing	rapid and shallow with occasional deep sigh	Respiration
cold and clammy	shallow, cold and dry	very hot and dry	pale, may be burnt	cold	livid, later pale	pale, cold and clammy	Skin
equal, somewhat contracted	equal and contracted	equal	eyes may squint	equal, staring eyes	equal	equal, dilated	Pupils
none	none	none	may be present	none	none	none	Paralysis
none	present in some cases	present in some cases	present in some cases	present	none	none	Convulsions
—	sometimes smells of urine	—	—	smells of bitter almonds	smells of acetone	—	Breath
look for source of supply	vomiting in some cases	vomiting in some cases	muscular spasm often causes tight gripping of the electrified object	rapid deterioration; breathing may stop	in early stages headache, restlessness, and nausea; test urine for sugar	may vomit; in early stages, shivering, thirst, defective vision, and ear noises	Special points

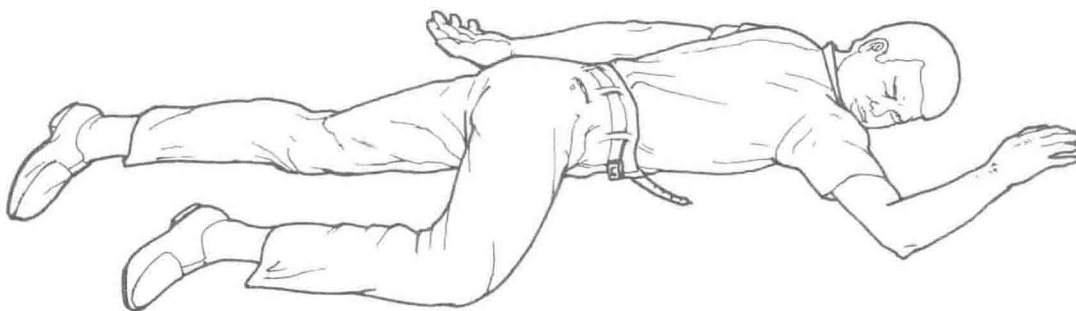


Fig. 3. The position for an unconscious patient; turn him face down, head to one side; no pillows should be used under the head. Pull up the leg and the arm on the side to which the head is facing, pull up the

chin. Stretch other arm out, as shown. His clothes should be loosened at the neck and waist, and any artificial teeth removed.

beating, the pupils will begin to dilate within 45–60 seconds. They will stay dilated and will not react to light (see Physical examination (eyes), p. 63).

The examination for breathing and heart action should be done as quickly as possible. The rescuer must immediately establish if the casualty

- is not breathing and the heart has stopped, or
- is not breathing but the heart has not stopped.

Not breathing, heart stopped

A trained first-aider must begin heart compression at once. Unless circulation is restored, the brain will be without oxygen and the person will die within 4–6 minutes.

- Lay casualty on a hard surface.
- Start heart compression at once (see page 9).
- Give artificial respiration (see page 8), since breathing stops when the heart stops.

The necessary aid can be given by one person alternately compressing the heart and then filling the lungs with air, or — better still — by two people working together (see page 11–12).

Not breathing, heart not stopped

- Open mouth and ensure the airway is clear (see Airway, page 7).
- Begin ARTIFICIAL RESPIRATION at once (see page 8).

If the heart is beating and breathing restored, and the casualty is still unconscious, place the casualty in the UNCONSCIOUS POSITION (see Fig. 3).

Turn casualty face down, head to one side or the other (Fig. 3). *No pillows should be used under the head.* Now pull up the leg and the arm on the side to which the head is facing. Then pull up the chin. Stretch the other arm out as shown. The subsequent treatment of an unconscious person is described in Chapter 5 (page 104).

Follow other general principles of first aid (see page 2).

Basic life support: artificial respiration and heart compression

Basic life support is an emergency life-saving procedure that consists of recognizing and correcting failure of the respiratory or cardiovascular systems.

Oxygen, which is present in the atmosphere in a concentration of about 21%, is essential for the life of all cells. The brain, the principal organ for conscious life, starts to die if deprived of oxygen for as little as four minutes. In the delivery of oxygen from the atmosphere to the brain cells, there are two necessary actions: breathing (taking in oxygen through the body's air pas-

sages) and the circulation of oxygen-enriched blood. Any profound disturbance of the airway, the breathing, or the circulation can promptly produce brain death.

Basic life support comprises the “**ABC**” steps, which concern the airway, breathing, and circulation respectively.

Its prompt application is indicated for:

- A. Airway obstruction
- B. Breathing (respiratory) arrest
- C. Circulatory or Cardiac (heart) arrest.

Basic life support requires no instruments or supplies, and the correct application of the steps for dealing with the above three problems can maintain life until the patient recovers sufficiently to be transported to a hospital, where he can be provided with *advanced* life support. The latter consists of the use of certain equipment, cardiac monitoring, defibrillation, the maintenance of an intravenous lifeline, and the infusion of appropriate drugs.

Basic life support must be undertaken with the maximum sense of urgency.

Ideally, only seconds should intervene between recognizing the need and starting the treatment. Any inadequacy or absence of breathing or circulation must be determined immediately.

If breathing alone is inadequate or absent, all that is necessary is either to open the **AIRWAY** or to apply **ARTIFICIAL RESPIRATION**.

If circulation is also absent, artificial circulation must be instituted through **HEART COMPRESSION**, in combination with artificial respiration.

If breathing stops before the heart stops, enough oxygen will be available in the lungs to maintain life for several minutes. However, if heart arrest occurs first, delivery of oxygen to the brain ceases immediately. Brain damage is possible if the brain is deprived of oxygen for 4–6 minutes. Beyond 6 minutes without oxygen, brain damage is very likely.

It is thus clear why speed is essential in determining the need for basic life support and instituting the necessary measures.

Once you have started basic life support, do not interrupt it for more than 5 seconds for any reason, except when it is necessary to move the patient; even in that case, interruptions should not exceed 15 seconds each.

Airway (Step A)

ESTABLISHING AN OPEN AIRWAY IS THE MOST IMPORTANT STEP IN ARTIFICIAL RESPIRATION. Spontaneous breathing may occur as a result of this simple measure. Place the patient in a face-up position on a hard surface. Put one hand beneath the patient's neck and the other hand on his forehead. Lift the neck with the one hand, and apply pressure to the forehead with the other to tilt the head backward (see Fig. 4). This extends the neck and moves the base of the tongue away from the back of the throat. *The head should be maintained in this position during the entire artificial respiration and heart compression procedure.* If the airway is still obstructed, any foreign material in the mouth or throat should be removed immediately with the fingers.

Once the airway has been opened, the patient may or may not start to breathe again. To assess whether breathing has returned, the person providing the basic life support must place his ear about 2–3 cm above the nose and mouth of the patient. If the rescuer can feel and hear the movement of air, and can see the patient's chest and abdomen move, breathing has returned. Feeling and hearing are far more important than seeing.

With airway obstruction, it is possible that there will be no air movement even though the chest and abdomen rise and fall with the patient's attempts to breathe. Also, observing chest and abdominal movement is difficult when the patient is fully clothed.

Breathing (Step B)

If the patient does not resume adequate, spontaneous breathing promptly after his head has

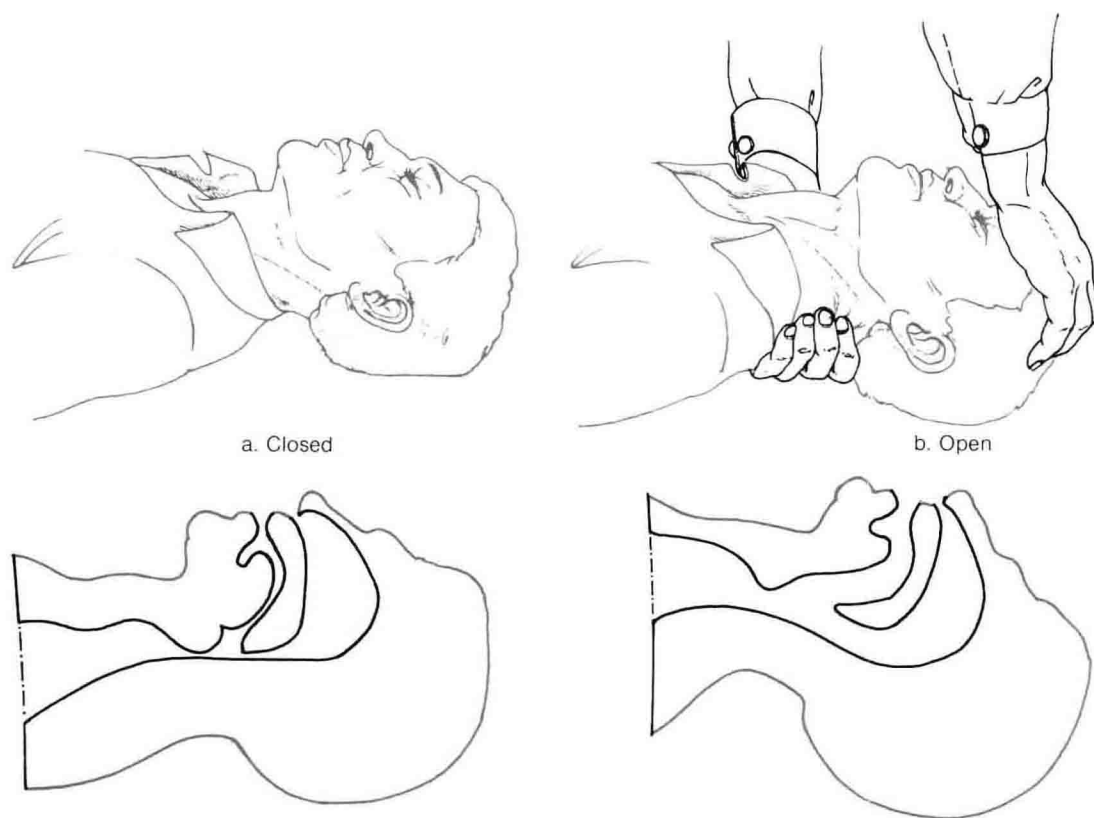


Fig. 4. Establishing an open airway.

been tilted backward, artificial respiration should be given by the mouth-to-mouth or mouth-to-nose method or other techniques. Regardless of the method used, preservation of an open airway is essential.

Mouth-to-mouth respiration

- Keep the patient's head at a maximum backward tilt with one hand under the neck (see Fig. 4b).
- Place the heel of the *other hand* on the forehead, with the thumb and index finger toward the nose. Pinch together the patient's nostrils with the thumb and index finger to prevent air from escaping.

Continue to exert pressure on the forehead with the palm of the hand to maintain the backward tilt of the head.

- Take a deep breath, then form a tight seal with your mouth over and around the patient's mouth (see Fig. 5).
- Blow four quick, full breaths in first without allowing the lungs to deflate fully.
- Watch the patient's chest while inflating the lungs. If adequate respiration is taking place, the chest should rise and fall.
- Remove your mouth and allow the patient to exhale passively. If you are in the right position, the patient's exhalation will be felt on your cheek (see Fig. 6).

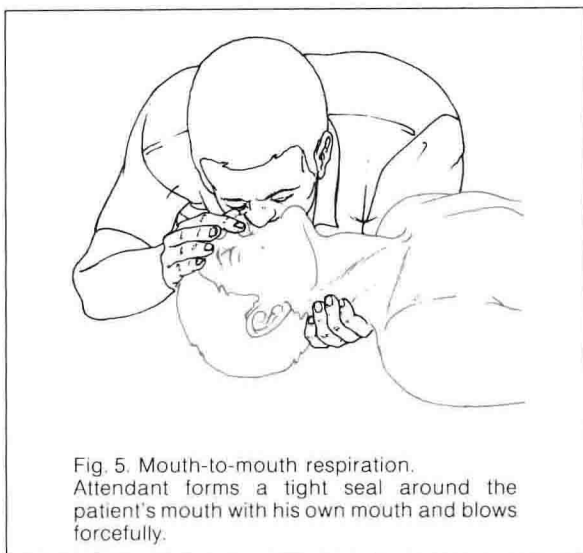


Fig. 5. Mouth-to-mouth respiration. Attendant forms a tight seal around the patient's mouth with his own mouth and blows forcefully.

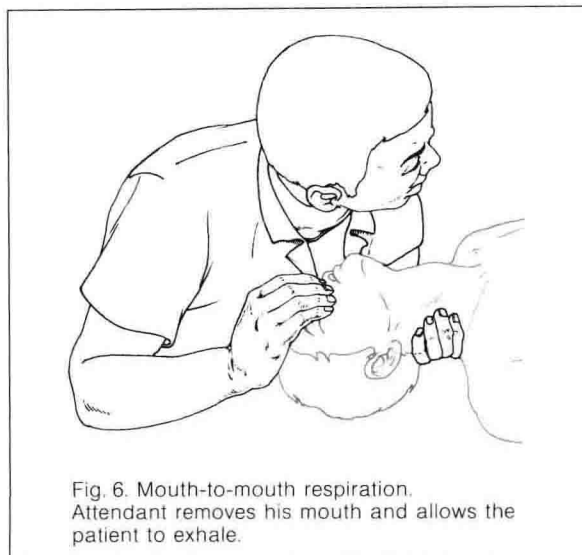


Fig. 6. Mouth-to-mouth respiration. Attendant removes his mouth and allows the patient to exhale.

- Take another deep breath, form a tight seal around the patient's mouth, and blow into the mouth again. Repeat this procedure 10–12 times a minute (once every five seconds) for adults and children over four years of age.
- If there is no air exchange and an airway obstruction exists, reach into the patient's mouth and throat to remove any foreign matter with your fingers, then resume artificial respiration. A foreign body should be suspected if you are unable to inflate the lungs despite proper positioning and a tight air-seal round the mouth or nose.

Mouth-to-nose respiration

The mouth-to-nose technique should be used when it is impossible to open the patient's mouth, when the mouth is severely injured, or when a tight seal round the lips cannot be obtained (see Fig. 7).

- Keep the patient's head tilted back with one hand. Use the other hand to lift up the patient's lower jaw to seal the lips.
- Take a deep breath, seal your lips round the patient's nose, and blow in forcefully and smoothly until the patient's chest rises. Repeat quickly four times.

- Remove your mouth and allow the patient to exhale passively.
- Repeat the cycle 10–12 times per minute.

Alternative method of artificial respiration (Silvester method)

In some instances, mouth-to-mouth respiration cannot be used. For instance, certain toxic and caustic materials constitute a hazard for the rescuer, or facial injuries may prohibit the use of the mouth-to-mouth or mouth-to-nose technique. An alternative method of artificial respiration (shown in Fig. 8) should then be applied. However, this method is much less effective than those previously described and it should be used only when the mouth-to-mouth technique cannot be used.

Artificial respiration should be continued as long as there are signs of life; it may be necessary to carry on for up to two hours, or longer.

Heart compression (Step C)

In attempting to bring back to life a non-breathing person whose heart has stopped beating, heart compression (external cardiac compression) should be applied along with artificial respiration.